MergeTree: A Fast Hardware HLBVH Constructor for Animated Ray Tracing
Ray tracing is a computationally intensive rendering technique traditionally used in offline high-quality rendering. Powerful hardware accelerators have been recently developed that put real-time ray tracing even in the reach of mobile devices. However, rendering animated scenes remains difficult, as updating the acceleration trees for each frame is a memory-intensive process. This article proposes MergeTree, the first hardware architecture for Hierarchical Linear Bounding Volume Hierarchy (HLBVH) construction, designed to minimize memory traffic. For evaluation, the hardware constructor is synthesized on a 28nm process technology. Compared to a state-of-the-art binned surface area heuristic sweep (SAH) builder, the present work speeds up construction by a factor of 5, reduces build energy by a factor of 3.2, and memory traffic by a factor of 3. A software HLBVH builder on a graphics processing unit (GPU) requires 3.3 times more memory traffic. To take tree quality into account, a rendering accelerator is modeled alongside the builder. Given the use of a toplevel build to improve tree quality, the proposed builder reduces system energy per frame by an average 41% with primary rays and 13% with diffuse rays. In large (> 500K triangles) scenes, the difference is more pronounced, 62% and 35%, respectively.

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Pervasive Computing, Research area: Computer engineering, Research Development Services
Authors: Viitanen, T., Koskela, M., Jääskeläinen, P., Kultala, H., Takala, J.
Number of pages: 14
Publication date: 12 Oct 2017
Peer-reviewed: Yes

Publication information
Journal: ACM TRANSACTIONS ON GRAPHICS
Volume: 36
Issue number: 5
Article number: 169
ISSN (Print): 0730-0301
Ratings:
Scopus rating (2016): CiteScore 5.69 SJR 2.45 SNIP 2.496
Scopus rating (2015): SJR 2.171 SNIP 3.744 CiteScore 6.24
Scopus rating (2014): SJR 2.098 SNIP 3.813 CiteScore 6
Scopus rating (2013): SJR 2.381 SNIP 3.624 CiteScore 6.18
Scopus rating (2012): SJR 1.683 SNIP 4.089 CiteScore 4.77
Scopus rating (2011): SJR 1.857 SNIP 3.88 CiteScore 5.81
Scopus rating (2010): SJR 1.767 SNIP 4.03
Scopus rating (2009): SJR 1.294 SNIP 3.477
Scopus rating (2008): SJR 1.44 SNIP 3.427
Scopus rating (2007): SJR 2.16 SNIP 4.247
Scopus rating (2006): SJR 1.526 SNIP 4.444
Scopus rating (2005): SJR 1.141 SNIP 4.096
Scopus rating (2004): SJR 0.588 SNIP 3.226
Scopus rating (2003): SJR 0.833 SNIP 2.504
Scopus rating (2002): SJR 1.835 SNIP 2.213
Scopus rating (2001): SJR 2.791 SNIP 1.946
Scopus rating (2000): SJR 1.838 SNIP 2.458
Scopus rating (1999): SJR 1.517 SNIP 3.939
Original language: English
Electronic versions:
Postprint
DOIs: 10.1145/3132702
Research output: Scientific - peer-review › Article

Ethics as a skill of software engineer?
One problem of the increasing intelligence of the systems is that the number of decisions having an ethical component is increasing, too. Traditionally, the designers of the system seldom made ethical decisions; the ethics was left for the user. However, when the system itself makes decisions, the ethical consequences have to be solved when the system is made.
Since these decisions are mostly implemented by software, it is often the programmers that have to make these decisions. Another problem is, if a programmer is asked to make illegal or unethical software. The well-known example of emission faking by car manufacturers is an example of such software, but this seems to be far more common than this. We have several ethic codes as the ethical guidelines for engineering. They give full ethical responsibility to engineers on the design and implementation of systems. The specific problem with software is that the programmers do not necessarily realise the ethical nature of the system; either they do not understand the application area enough to see it, or they do not know the full context of the piece of software they are implementing.

The conclusion discusses how to embed the awareness of ethical questions in software engineering education.

Towards Framework for Choosing 360-degree Video SDK
360-degree videos are gaining popularity among consumers. Still, software developers are early adopters of technology so it is important to map their needs for 360-degree video development. They use software development kits that help creating software on the 360-degree video software domain. We want to find out which factors developers need to take into account when choosing these software development kits. In this position paper we describe a preliminary 360-degree video SDK choosing criteria, based on literature and our own experiences, which we plan to evaluate with a survey.
in bottom-up compression. Together, these techniques reduce backtracking to a small fraction. Compared to a separate top-down compression pass, streaming bottom-up compression with the proposed optimizations saves on average 42% of memory accesses for LBVH construction and 56% for refitting of compressed BVHs, over 16 test scenes. In architectural simulation, the proposed streaming compression reduces LBVH runtime by 20% compared to a single-precision build, and 41% compared to a single-precision build followed by top-down compression. Since memory traffic dominates the energy cost of refitting and LBVH construction, energy consumption is expected to fall by a similar fraction.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Pervasive Computing, Research area: Computer engineering
Authors: Viitanen, T., Koskela, M., Jääskeläinen, P., Immonen, K., Takala, J.
Number of pages: 12
Pages: 167-178
Publication date: 5 Jul 2017
Peer-reviewed: Yes

Publication information
Journal: Computer Graphics Forum
Volume: 36
Issue number: 4
ISSN (Print): 0167-7055
Ratings:
Scopus rating (2016): SJR 0.89 SNIP 1.239 CiteScore 2.33
Scopus rating (2015): SJR 0.785 SNIP 1.549 CiteScore 2.34
Scopus rating (2014): SJR 0.991 SNIP 1.721 CiteScore 2.35
Scopus rating (2013): SJR 1.074 SNIP 1.869 CiteScore 2.68
Scopus rating (2012): SJR 0.771 SNIP 2.043 CiteScore 2.28
Scopus rating (2011): SJR 0.879 SNIP 1.691 CiteScore 2.2
Scopus rating (2010): SJR 0.814 SNIP 1.792
Scopus rating (2009): SJR 0.685 SNIP 1.81
Scopus rating (2008): SJR 0.688 SNIP 2.348
Scopus rating (2007): SJR 0.768 SNIP 1.753
Scopus rating (2006): SJR 0.664 SNIP 2.331
Scopus rating (2005): SJR 0.522 SNIP 2.256
Scopus rating (2004): SJR 0.376 SNIP 2.004
Scopus rating (2003): SJR 0.48 SNIP 1.633
Scopus rating (2002): SJR 1.187 SNIP 1.038
Scopus rating (2001): SJR 0.892 SNIP 1.173
Scopus rating (2000): SJR 0.626 SNIP 1.319
Scopus rating (1999): SJR 0.198 SNIP 0.914
Original language: English
ASJC Scopus subject areas: Computer Graphics and Computer-Aided Design
Electronic versions:
egsr_preprint
DOIs:
10.1111/cgf.13233
Links:
http://urn.fi/URN:NBN:fi:tty-2017082111689
Research output: Scientific - peer-review › Article

Nursing students’ experiential learning processes using an online 3D simulation game
The growing use of game-based simulation in healthcare education reflects the opportunities afforded to learners by serious games, which simulate real-world situations and enable students to emulate the roles of healthcare professionals in a safe and engaging learning environment. As part of a design-based research project to design, test, and evaluate an online 3D simulation game for use in game-based simulation in healthcare education, the present study applied Kolb’s experiential learning theory to investigate nursing students’ experiential learning processes during a 3D simulation game. The data, collected from eight nursing students, comprised audio and video recordings from gaming sessions and focus group interviews. The results indicate that in 3D simulation game, patient-related experiences were supported by audiovisual authenticity, the authenticity of scenarios, and interactivity. Feedback triggered students to reflect on their own learning processes. Students conceptualised knowledge by applying nursing theory, and they internalised procedures that
can be used in real life. They also had an opportunity to experiment by exploring and making decisions in the gaming environment. One of the main issues arising from these findings is that 3D simulation games used in game-based simulation should share familiar characteristics of leisure games to ensure an engaging learning experience.

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Pori Department, Regulation of learning and active learning methods (REALMEE), University of Helsinki, University of Turku

Authors: Koivisto, J., Niemi, H., Multisilta, J., Eriksson, E.

Number of pages: 16

Pages: 383-398

Publication date: 2017

Peer-reviewed: Yes

Early online date: 1 Dec 2015

**Publication information**

Journal: Education and Information Technologies

Volume: 22

Issue number: 1

ISSN (Print): 1360-2357

Ratings:

Scopus rating (2016): SJR 0.485 SNIP 0.94 CiteScore 1.06

Scopus rating (2015): SJR 0.457 SNIP 0.791 CiteScore 0.97

Scopus rating (2014): SJR 0.358 SNIP 0.66 CiteScore 0.85

Scopus rating (2013): SJR 0.403 SNIP 0.617 CiteScore 0.57

Scopus rating (2012): SJR 0.216 SNIP 0.612 CiteScore 0.5

Scopus rating (2011): SJR 0.438 SNIP 0.803 CiteScore 0.59

Scopus rating (2010): SJR 0.378 SNIP 0.558

Scopus rating (2009): SJR 0.356 SNIP 0.88

Scopus rating (2008): SJR 0.226 SNIP 0.58

Scopus rating (2007): SJR 0.319 SNIP 0.651

Scopus rating (2006): SJR 0.164 SNIP 0.412

Scopus rating (2005): SJR 0.345 SNIP 0.747

Scopus rating (2004): SJR 0.161 SNIP 0.796

Scopus rating (2003): SJR 0.136 SNIP 0.964

Scopus rating (2002): SJR 0.212 SNIP 0.651

Scopus rating (2001): SJR 0.176 SNIP 0.417

Scopus rating (2000): SJR 0.191 SNIP 0.353

Scopus rating (1999): SJR 0.252 SNIP 0.515

Original language: English

Keywords: Game-based simulation, 3D simulation game, Experiential learning process, Nursing students, Healthcare education

DOIs:

10.1007/s10639-015-9453-x

Research output: Scientific - peer-review › Article

**Project types and industrial collaboration in project-based learning**

Project-based learning is important in engineering education as it makes the students test their skills in a real-life setting. We have organised project-based learning for software engineering students since 1991. Already in the early times, the projects were based on collaboration with near-by companies and other customers. This collaboration with external organisations, called customers in this paper, creates strong links between education and surrounding society.

In this paper, we report the experiences from our project courses. Especially we describe 1) how the courses have helped collaboration between students, teachers and companies, 2) the different categories for topics and goals of the projects. Based on the analysis, we outline a new project type, a technology exploration project.

**General information**

State: Published

Ministry of Education publication type: A4 Article in a conference publication

Organisations: Department of Pervasive Computing, Research area: Software engineering
Low-energy algorithm for self-controlled wireless sensor nodes

In Internet of Things (IoT), the lifespan of Wireless Sensor Networks (WSN) has often become an issue. Sensor nodes are typically battery powered. However, high energy consumption by Radio Frequency (RF) module limits the lifespan of sensor nodes. In conventional WSN, the frequency of data transmission is normally fixed or adjusted according to requests from the gateway. In this paper, we present a WSN system for intelligent sensing. We propose a low-energy algorithm for sensor data transmission from sensor nodes for such system. In this algorithm, the sensor nodes are able to self-control their data transmission according to the trends of data. We adopt Adaptive Duty Cycle for adjustment of data transmission frequency and Compressive Sensing (CS) for sensor data compression. The simulation results show that Collective Transmission with CS-based data compression achieves 83.34% of RF energy reduction for the best-case transmission and 83.31% of RF energy reduction in the worst-case transmission, compared to the Continuous Transmission.
theses (constructive or research-oriented) has not changed much, the constructive ones being much more common.

The results partly proved the hypotheses, but interestingly enough, we got some surprises especially on the language of the theses and the gender on students.

**General information**

State: Published

Ministry of Education publication type: A4 Article in a conference publication

Organisations: Department of Pervasive Computing, Research area: Software engineering

Authors: Järvinen, H., Mikkonen, T.

Number of pages: 11

Publication date: 12 Sep 2016

**Host publication information**

Title of host publication: Proceedings of SEFI 2016 Annual Conference

Publisher: European Society for Engineering Education SEFI

Editors: Järvinen, H., Clark, R.

ISBN (Electronic): 9782873520144

ASJC Scopus subject areas: Computer Science(all)

Keywords: software engineering education, thesis, industrial impact

Electronic versions:

SEFI2016

Links:


http://urn.fi/URN:NBN:fi:tty-201709151888

Research output: Scientific - peer-review › Conference contribution

**Integrating mobile orienteering to team forming activity in a software engineering course**

One of the most important skills software engineers need when entering work life is working in teams, including communicating, collaborating, as well as coordinating work in a team. This paper presents a team building activity aiming to support the first phases of team formation with a mobile orienteering activity. Created tasks at orienteering checkpoints were related to communication, collaboration and work division. Students were enthusiastic about the activity and expressed in their group reports on the activity that it supported the team building activity well, helped break the ice and supported agreeing the ways of working. Students also liked getting out of the classroom. The approach seems promising and we will investigate in the future similar type of activities in the first phases of team formation as well as will explore further integrating physical activity to the exercise sessions.

**General information**

State: Published

Ministry of Education publication type: A4 Article in a conference publication

Organisations: Department of Pervasive Computing, Research area: User experience

Authors: Väätäjä, H., Ahtinen, A.

Publication date: Sep 2016

**Host publication information**

Title of host publication: SEFI 2016 Annual Conference Proceedings : Engineering Education on Top of the World: Industry University Cooperation

Publisher: European Society for Engineering Education SEFI

ISBN (Electronic): 9782873520144

Keywords: soft skills, engineering skills, collaboration, Team working, group forming, mobile orienteering, team forming

Links:


Research output: Scientific - peer-review › Conference contribution

**Longitudinal study on text entry by gazing and smiling**

This study presents the results of a longitudinal study on multimodal text entry where objects were selected by gazing and smiling. Gaze was used to point at the desired characters and smiling movements were performed to select them. Participants (N=12) took part in the experiments where they entered text for a total of 2.5 hours in ten 15-minute-long sessions during one-month time period. The results showed that the text entry rate improved with practice from 4.1 to 6.7 words per minute. However, the learning curve had not reached its plateau phase at the end of the experiment. Subjective ratings showed that the participants appreciated this multimodal technique.

**General information**
Design-inclusive UX research: design as a part of doing user experience research

Since the third wave in human–computer interaction (HCI), research on user experience (UX) has gained momentum within the HCI community. The focus has shifted from systematic usability requirements and measures towards guidance on designing for experiences. This is a big change, since design has traditionally not played a large role in HCI research. Yet, the literature addressing this shift in focus is very limited. We believe that the field of UX research can learn from a field where design and experiential aspects have always been important: design research. In this article, we discuss why design is needed in UX research and how research that includes design as a part of research aimed at supporting and advancing UX design practice. We do this by investigating types of design-inclusive UX research and by learning from real-life cases of UX-related design research. We report the results of an interview study with 41 researchers in three academic research units where design research meets UX research. Based on our interview findings, and building on existing literature, we describe the different roles design can play in research projects. We also report how design research results can inform designing for experience methodologically or by providing new knowledge on UX. The results are presented in a structured palette that can help UX researchers reflect and focus more on design in their research projects, thereby tackling experience design challenges in their own research.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Vermeeren, A. P., Roto, V., Väännänen, K.
Number of pages: 17
Pages: 21-37
Publication date: 2 Jan 2016
Peer-reviewed: Yes

Publication information
Journal: Behaviour and Information Technology
Volume: 35
Issue number: 1
ISSN (Print): 0144-929X
Ratings:
Scopus rating (2016): CiteScore 1.85 SJR 0.733 SNIP 1.083
Scopus rating (2015): SJR 0.644 SNIP 1.093 CiteScore 1.61
Scopus rating (2014): SJR 0.596 SNIP 1.167 CiteScore 1.39
The aim of this paper was to evaluate the use of three facial actions (i.e. frowning, raising the eyebrows, and smiling) in selecting objects on a computer screen when gaze was used for pointing. Dwell time is the most commonly used selection technique in gaze-based interaction, and thus, a dwell time of 400 ms was used as a reference selection technique. A wireless, head-mounted prototype device that carried out eye tracking and contactless, capacitive measurement of facial actions was used for the interaction task. Participants (N=16) performed point-and-select tasks with three pointing distances (i.e. 60, 120 and 240 mm) and three target sizes (i.e. 25, 30 and 40 mm). Task completion times, pointing errors and throughput values based on Fitts' law were used to compare the selection techniques. The participants also rated the techniques with subjective ratings scales. The results showed that the different techniques performed equally well in many respects. However, throughput values varied from 8.38 bits/s (raising the eyebrows) to 15.33 bits/s (smiling) and were comparable to or, in the case of smiling, better than in earlier research with similar interaction techniques. The dwell time was found to be the least accurate selection technique in terms of the magnitudes of point-and-select errors. Smiling technique was rated as more accurate to use than the frowning or the raising techniques. The results give further support for methods that combine facial behavior to eye tracking when interacting with technology.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering
Authors: Tuisku, O., Rantanen, V., Spakov, O., Surakka, V., Lekkala, J.
Pages: 1-12
Publication date: Jan 2016
Peer-reviewed: Yes

**Publication information**

Journal: Interacting with Computers
Volume: 28
Issue number: 1
ISSN (Print): 0953-5438
Ratings:

Scopus rating (2016): SJR 0.334 SNIP 0.837 CiteScore 1.55
Scopus rating (2015): SJR 0.449 SNIP 1.402 CiteScore 1.69
Scopus rating (2014): SJR 0.663 SNIP 2.175 CiteScore 2.42
Scopus rating (2013): SJR 0.748 SNIP 2.536 CiteScore 2.83
Scopus rating (2012): SJR 0.67 SNIP 2.177 CiteScore 2.75
Scopus rating (2011): SJR 0.736 SNIP 2.283 CiteScore 2.56
Scopus rating (2010): SJR 0.781 SNIP 1.582
Scopus rating (2009): SJR 0.698 SNIP 2.417
Scopus rating (2008): SJR 0.639 SNIP 1.789
A Case Study on Participatory Approach to Support Shift to Experience Design of Work Tools in B2B Context

To support the shift from technology-driven to experience-driven design in a company developing work tools (materials handling equipment), we developed and applied a participatory approach to increase awareness and buy-in of experience design and related methods at the company. We 1) present user experience (UX) design guidelines developed for both designers and managers based on the participatory process, 2) report evaluation of the guidelines with designers, developers, and selected internal and external stakeholders, and 3) present a participatory approach to create personas and experience journey maps covering the product life-cycle. SWOT analysis of the guidelines revealed that guidelines need to be understandable without expert UX knowledge, managerial support is needed that was aimed to be supported by the guidelines developed for managers, and representative user participation is needed. Participants experienced positively the applied participatory approach, and the mindset change is proceeding in the case company.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Aalto University, Department of Design, Rocla Oy
Authors: Väätäjä, H., Hilden, E., Roto, V., Uusitalo, K.
Number of pages: 18
Publication date: 2016

Host publication information
Title of host publication: Proceedings of the Thirty Seventh International Conference for Information Systems (ICIS 2016)
Publisher: Association for Information Systems
Article number: ICIS-1065-2016
ISBN (Electronic): 978-0-9966831-3-5
Keywords: experience design, user experience, Participatory design, learning organization, organizational change
Electronic versions:
vaataja et al ICIS 2016
Links:
http://urn.fi/URN:NBN:fi:tty-201708071658
Research output: Scientific - peer-review > Conference contribution

Digital storytelling promoting twenty-first century skills and student engagement

This article presents results on how students became engaged and motivated when using digital storytelling in knowledge creation in Finland, Greece and California. The theoretical framework is based on sociocultural theories. Learning is seen as a result of dialogical interactions between people, substances and artefacts. This approach has been used in the creation of the Global Sharing Pedagogy (GSP) model for the empirical study of student levels of engagement in learning twenty-first century skills. This model presents a set of conceptual mediators for student-driven knowledge creation, collaboration, networking and digital literacy. Data from 319 students were collected using follow-up questionnaires after the digital storytelling project. Descriptive statistical methods, correlations, analysis of variance and regression analysis were used. The mediators of the GSP model strongly predicted student motivation and enthusiasm as well as their learning outcomes. The digital storytelling project, using the technological platform Mobile Video Experience (MoViE), was very successful in teaching twenty-first century skills.
Embedded Linux Controlled Sensor Network

This study utilizes a simple model for constructing sensor nodes – master controller combinations in the Internet of Things. The model combines hardware and software for embedded systems which measure a predefined set of parameters. The master controller manages several sensor nodes, collects data from them and provides data for clients. The paper introduces a proof-of-concept implementation based on the model. The implementation uses an embedded Linux based small computer and microcontroller based sensor nodes in the context of condition measurement, and represents a way to use wireless data transfer between controller and nodes. The target of this study was to test the model, to determine how well a cost-efficient single-board computer could be used to gather sensory data from several sensor nodes, and how this data can be provided for clients over the public Internet.
Enabling Centralised Management of Local Sensor Data Refinement in Machine Fleets

In modern mobile machines, a lot of measurement data is available to generate information about machine performance. Exploiting it locally in machines would enable optimising their operation and, thus, yield competitive advantage and reduce environmental load due to reduced emissions. However, optimisation requires extensive knowledge about machine performance and characteristics in various conditions. As physical machines may be located geographically far from each other, the management of ever evolving knowledge is challenging. This study introduces a software concept to enable centralised management of data refinement performed locally in the machines of a geographically distributed fleet. It facilitates data utilisation in end user applications that provide useful information for operators in the field. Whatever the further data analysis requirements are, multiple preprocessing tasks are performed: it enables outlier limit configuration, the calculation of derived variables, data set categorisation and context recognition. A functional prototype has been implemented for the refinement of real operational data collected from forestry machines. The results show that the concept has considerable potential to bring added value for enterprises due to improved possibilities in managing data utilisation.
How to Evaluate the Social Effects and User Experience of Systems Enhancing Collocated Interactions?

Enhancing collocated interactions with interactive technology has quickly gained plenty of interest in the HCI community. Our approach within this research domain is to design and study mobile and wearable technology that encourages and motivates social interaction between collocated people. This paper sheds light on the considerations related to evaluating systems that address the complex and delicate issues related to social interaction. How do we evaluate the effectiveness of enhancing social interaction? How do we know if a system or a prototype is of high quality? What are the quality attributes? We highlight various evaluation challenges we have encountered in our studies and provide considerations for future research.

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Olsson, T., Jarusriboonchai, P., Paasovaara, S., Ojala, J., Olshannikova, E., Malapaschas, A., Väänänen, K.
Number of pages: 6
Publication date: 2016

Host publication information
Title of host publication: Workshop of Proxemic Mobile Collocated Interaction, in conjunction with CHI’16
Keywords: Collocated interaction, proxemic interaction, face-to- face, wearable technology, proactive systems, interaction design, user experience, evaluation
Electronic versions:
Links:
http://urn.fi/URN:NBN:fi.tty-201701051028
Research output: Professional › Conference contribution

Instrumentation-Driven Validation of Dataflow Applications
Dataflow modeling offers a myriad of tools for designing and optimizing signal processing systems. A designer is able to take advantage of dataflow properties to effectively tune the system in connection with functionality and different performance metrics. However, a disparity in the specification of dataflow properties and the final implementation can lead
to incorrect behavior that is difficult to detect. This motivates the problem of ensuring consistency between dataflow properties that are declared or otherwise assumed as part of dataflow-based application models, and the dataflow behavior that is exhibited by implementations that are derived from the models. In this paper, we address this problem by introducing a novel dataflow validation framework (DVF) that is able to identify disparities between an application's formal dataflow representation and its implementation. DVF works by instrumenting the implementation of an application and monitoring the instrumentation data as the application executes. This monitoring process is streamlined so that DVF achieves validation without major overhead. We demonstrate the utility of our DVF through design and implementation case studies involving an automatic speech recognition application, a JPEG encoder, and an acoustic tracking application.

Mobile Interactions Augmented by Wearable Computing: a Design Space and Vision
Wearable computing has a huge potential to shape the way we interact with mobile devices in the future. Interaction with mobile devices is still mainly limited to visual output and tactile finger-based input. Despite the visions of next-generation mobile interaction, the hand-held form factor hinders new interaction techniques becoming commonplace. In contrast, wearable devices and sensors are intended for more continuous and close-to-body use. This makes it possible to design novel wearable-augmented mobile interaction methods—both explicit and implicit. For example, the EEG signal from a wearable breast strap could be used to identify user status and change the device state accordingly implicit and the optical tracking with a head-mounted camera could be used to recognize gestural input explicit. In this paper, the authors outline the design space for how the existing and envisioned wearable devices and sensors could augment mobile interaction.
techniques. Based on designs and discussions in a recently organized workshop on the topic as well as other related work, the authors present an overview of this design space and highlight some use cases that underline the potential therein.

**Private cloud deployment model in open-source mobile robots ecosystem**

The focus of this paper is on secure cloud service platform for mobile robots ecosystem. Especially the emphasis is based on the scope of open-source software frameworks such as Apache Hadoop which offers numerous possibilities to employ open-source designing tools and deployment models for private cloud computing planning. This paper presents implementation of the OpenCRP (Open CloudRobotic Platform) locally-operated private cloud infrastructure and configuration methods by using Hadoop distributed file system (HDFS) for easing the ecosystem communications set-up in its entirety. For robot teleoperation, ROS (Robot Operating System) is used. The presented ecosystem utilizes security features for autonomous cloud robotic platform, software tools to manage user authentication and methods for large-scale robot-based data management and analysis. In addition to robot trial set-up of robot data storage and sharing, an ecosystem built with two low-cost mobile robots is presented.
Software Developers as Users: Developer Experience of a Cross-Platform Integrated Development Environment

Software development is professional activity that demands a plethora of skills and qualities from the developer. For instance, developers need technical skills to create the code that implements the running software and social skills to be able to collaborate with peer developers and with various stakeholders. Development is an endeavor towards building complex systems that realize user and business requirements in technologically sophisticated manner. Considering the challenges of software development, developer experience is a highly unstudied topic. Developers are users of multifaceted development tools such as integrated development environments. Yet, little is known of how to support developers in their demanding tasks. This paper presents early results towards increasing the understanding of developer experience in order to enable improvement of development tools to better support software developers in their activities. We present qualitative results of a survey study with 45 developers from 21 countries considering developers' perception of a particular integrated development environment.

Towards Agile Enterprise Data Warehousing

Traditional business intelligence and data warehouse projects are very much sequential in nature. The process starts with data preparation and continues with the reporting needed by business measurements. This is somewhat similar to the waterfall model of software development and also shares some of its problems: the work is done in serial manner and the reaction time for possible design changes is often long. Agile principles are not well supported by the traditional serial workflow. By making the data preparation and reporting tasks parallel, it is possible to gain several advantages, such as shorter lead time and shorter feedback cycle. The solution proposed in this paper is based on enriched conceptual model that enables the business intelligence implementation process of different teams to change from serial to parallel workflow. Keywords: data w
Context Awareness for Navigation Applications

This thesis examines the topic of context awareness for navigation applications and asks the question, “What are the benefits and constraints of introducing context awareness in navigation?” Context awareness can be defined as a computer’s ability to understand the situation or context in which it is operating. In particular, we are interested in how context awareness can be used to understand the navigation needs of people using mobile computers, such as smartphones, but context awareness can also benefit other types of navigation users, such as maritime navigators. There are countless other potential applications of context awareness, but this thesis focuses on applications related to navigation. For example, if a smartphone-based navigation system can understand when a user is walking, driving a car, or riding a train, then it can adapt its navigation algorithms to improve positioning performance.

We argue that the primary set of tools available for generating context awareness is machine learning. Machine learning is, in fact, a collection of many different algorithms and techniques for developing “computer systems that automatically improve their performance through experience” [1]. This thesis examines systematically the ability of existing algorithms from machine learning to endow computing systems with context awareness. Specifically, we apply machine learning techniques to tackle three different tasks related to context awareness and having applications in the field of navigation:

1. to recognize the activity of a smartphone user in an indoor office environment,
2. to recognize the mode of motion that a smartphone user is undergoing outdoors, and
3. to determine the optimal path of a ship traveling through ice-covered waters. The diversity of these tasks was chosen intentionally to demonstrate the breadth of problems encompassed by the topic of context awareness.

During the course of studying context awareness, we adopted two conceptual “frameworks,” which we find useful for the purpose of solidifying the abstract concepts of context and context awareness. The first such framework is based strongly on the writings of a rhetorician from Hellenistic Greece, Hermagoras of Temnos, who defined seven elements of “circumstance”. We adopt these seven elements to describe contextual information. The second framework, which we dub the “context pyramid” describes the processing of raw sensor data into contextual information in terms of six different levels. At the top of the pyramid is “rich context”, where the information is expressed in prose, and the goal for the computer is to mimic the way that a human would describe a situation.

We are still a long way off from computers being able to match a human’s ability to understand and describe context, but this thesis improves the state-of-the-art in context awareness for navigation applications. For some particular tasks, machine learning has succeeded in outperforming humans, and in the future there are likely to be tasks in navigation where computers outperform humans. One example might be the route optimization task described above. This is an example of a task where many different types of information must be fused in non-obvious ways, and it may be that computer algorithms can find better routes through ice-covered waters than even well-trained human navigators. This thesis provides only preliminary evidence of this possibility, and future work is needed to further develop the techniques outlined here. The same can be said of the other two navigation-related tasks examined in this thesis.
Dual-Mode Congestion Control Mechanism for Video Service

Video services represent over a half of Internet traffic. However, there is not any congestion control mechanism which would be suitable and widely used for all kinds of video services. This paper provides a study in which this kind of congestion control mechanism is further developed and improved based on the findings of our previous study. This mechanism offers a specific approach for congestion control because it can offer dual-mode congestion control services. There is a backward loading mode where the bandwidth is given away to other connections after the load level of a network exceeds a certain level. Instead, the other mode, a real-time mode, always wants its fair share of the bandwidth.

Priority Queue Classes with Priority Update

A limitation in the design of the interface of C++ containers (i.e., data structure implementations) is addressed. Priority queues and their use in Dijkstra's shortest path search algorithm are used as an example. Priority queues are often implemented using heaps. There is a problem, however: it may be necessary to change the priority of an element while it is in the queue, but finding the element from within a heap is costly. The problem may be solved by keeping track, in a variable that is outside the heap, of the position of the element in the heap. Unfortunately, this is impossible with the template class interface used by the C++ standard library priority queue. In this research, the problem is analysed in detail. Three interface designs and the corresponding implementations are suggested. They are compared experimentally to each other and the C++ design.
Rapid Customization of Image Processors Using Halide

Image processing applications typically involve data-oriented kernels with limited control divergence. In order to efficiently exploit the data level parallelism, image processors include SIMD instructions and other parallel computation resources. Generic processors that can be purchased off-the-shelf are adequate for most of the use scenarios of image processing. However, especially with embedded mobile devices, they might not be optimal for the algorithm, the environment, or the energy budget at hand. Such cases call for programmable customized architectures with just enough hardware resources to ensure the high priority applications reach their real time goals with minimal overheads. In order to maintain high engineer productivity, implementing image algorithms for customized processors should be as easy as with standard processors. This is emphasized at the processor codesign time; because the program is used to drive the processor design space exploration towards an optimized architecture, assembly programming is not feasible due to the required porting effort whenever the architecture is modified. In this paper we propose an image processor customization flow that exploits the domain-specific Halide language as an input to a processor co-design environment. In addition to efficiently exploiting standard resources in the customized processors, the flow provides an easy way to invoke special instructions from Halide programs. We validate the performance benefits of custom operations using example filters described with the Halide language.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Computer engineering
Authors: Korhonen, V., Jääskeläinen, P., Koskela, M., Viltanen, T., Takala, J.
Number of pages: 5
Pages: 629-633
Publication date: 14 Dec 2015

Host publication information
Title of host publication: IEEE Global Conference on Signal and Information Processing (IEEE GlobalSIP 2015)
Publisher: IEEE
ISBN (Electronic): 978-1-4799-7590-7
DOIs:
10.1109/GlobalSIP.2015.7418272
Research output: Scientific - peer-review › Conference contribution

Editorial: Is Game-Based Math Learning Finally Coming of Age?

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Pori Department, Research group: TUT Game Lab
Improving Code Density with Variable Length Encoding Aware Instruction Scheduling

Variable length encoding can considerably decrease code size in VLIW processors by reducing the number of bits wasted on encoding No Operations (NOPs). A processor may have different instruction templates where different execution slots are implicitly NOPs, but all combinations of NOPs may not be supported by the instruction templates. The efficiency of the NOP encoding can be improved by the compiler trying to place NOPs in such way that the usage of implicit NOPs is maximized. Two different methods of optimizing the use of the implicit NOP slots are evaluated: (a) prioritizing function units that have fewer implicit NOPs associated with them and (b) a post-pass to the instruction scheduler which utilizes the slack of the schedule by rescheduling operations with slack into different instruction words so that the available instruction templates are better utilized. Three different methods for selecting basic blocks to apply FU prioritization on are also analyzed: always, always outside inner loops, and only outside inner loops only in basic blocks after testing where it helped to decrease code size. The post-pass optimizer alone saved an average of 2.4 % and a maximum of 10.5 % instruction memory, without performance loss. Prioritizing function units in only those basic blocks where it helped gave the best case instruction memory savings of 10.7 % and average savings of 3.0 % in exchange for an average 0.3 % slowdown. Applying both of the optimizations together gave the best case code size decrease of 12.2 % and an average of 5.4 %, while performance decreased on average by 0.1 %.
Integer Linear Programming-Based Scheduling for Transport Triggered Architectures

Static multi-issue machines, such as traditional Very Long Instructional Word (VLIW) architectures, move complexity from the hardware to the compiler. This is motivated by the ability to support high degrees of instruction-level parallelism without requiring complicated scheduling logic in the processor hardware. The simpler-control hardware results in reduced area and power consumption, but leads to a challenge of engineering a compiler with good code-generation quality.

Transport triggered architectures (TTA), and other so-called exposed datapath architectures, take the compiler-oriented philosophy even further by pushing more details of the datapath under software control. The main benefit of this is the reduced register file pressure, with a drawback of adding even more complexity to the compiler side.

In this article, we propose an Integer Linear Programming (ILP)-based instruction scheduling model for TTAs. The model describes the architecture characteristics, the particular processor resource constraints, and the operation dependencies of the scheduled program. The model is validated and measured by compiling application kernels to various TTAs with a different number of datapath components and connectivity. In the best case, the cycle count is reduced to 52% when compared to a heuristic scheduler. In addition to producing shorter schedules, the number of register accesses in the compiled programs is generally notably less than those with the heuristic scheduler; in the best case, the ILP scheduler reduced the number of register file reads to 33% of the heuristic results and register file writes to 18%. On the other hand, as expected, the ILP-based scheduler uses distinctly more time to produce a schedule than the heuristic scheduler, but the compilation time is within tolerable limits for production-code generation.

Large-Scale Water Simulation in Games

Water is an important element in the nature. It is also often encountered in digital games and other virtual environments, but unfortunately interaction with it is typically very limited. The main reason for this is probably the immense
computational cost of simulating water behavior. Simulating water and other fluids by numerically solving \textit{Navier-Stokes equations} is commonplace for offline engineering applications such as bridge building, weather prediction, or aeronautics. Since the 1990s, these methods have also been applied to computer graphics, but the focus has been in offline applications such as movie special effects. Recent advances in programmable graphics hardware have facilitated real-time fluid simulation in a large enough scale to be applicable in games. This far these methods have been mostly used in games only for visual purposes. This thesis is motivated by the wish to see more games where also the gameplay is affected by water simulation.

The first part of this thesis studies the roles of interactive water in different kinds of games. Requirements for water simulation methods are formulated by examining those roles. The thesis then introduces some background theory and various methods for water simulation. The focus is in heightfield-based methods, which simplify the problem by assuming that the water surface can be represented as a vertical displacement from a neutral level. This assumption allows very large amounts of water to be simulated with the very limited resources available for this purpose in a typical game. Most of these methods work on a heightfield terrain and can be enriched with fully 3D effects such as splashes and waterfalls by adding a particle simulation system.

An important problem is coupling the water simulation with existing rigid body simulations that are largely used for the dynamics of game objects. The coupling includes effects such as floating, objects moving with the flow, and building dams out of bodies. The thesis introduces a new heightfield-based coupling method, which allows the building of dams from rigid bodies in the heightfield context, unlike the previous approaches. The proposed methods, including the underlying water simulation method and visualization, were implemented in parallel using graphics processing units. The methods were found to be fast enough to be applicable in games.

Finally, the most promising current simulation methods are compared from a games point-of-view using the criteria set in the beginning: performance, simplicity, visual quality, richness of behavior, and rigid body coupling. Since quality of experience is a subjective matter, user tests are recommended for comparison. Included in the thesis is one of the first such studies, which found out that leaving out the velocity self-advection step of a shallow water equation solver had no statistically significant effect on any of the measured psychological impacts. Based on the analysis, recommendations for the choice of simulation methods are given for different kinds of games.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Kellomäki, T.
Number of pages: 91
Publication date: 4 Dec 2015

Publication information
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1354
ISSN (Print): 1459-2045
Electronic versions:
  kellomaki_1354
Links:

Bibliographical note
Awarding institution: Tampere University of Technology
Research output: Collection of articles ▸ Doctoral Thesis

Istuut liikkumaan!

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Ahtinen, A.
Survey and evaluation of neural computation models for bio-integrated systems

Integrating neurobiological cultures with computer systems presents an opportunity to enhance computational energy efficiency. These Bio-Integrated Systems (BISs) require knowledge about structure and behavior of neural components and their interfacing. In the early design phases, modeling neurons offers cost, failure-free and retrial benefits compared to laboratory grown neural networks. The usefulness of these models lays in characteristics of being realistic but also computationally efficient.

This survey reviews computational models of spiking neurons and their changes in connections, known as plasticity. The review studies models that are faithful to real neural cultures, and are computational efficient for real-time BISs. Also, criteria and methods for comparing models with 'in-vitro' experiments are reviewed to conclude on the level of realism of models in comparison with biological setups. Izhikevich’s model of spiking neurons is recommended due to its accuracy in reproducing real neural firing patterns, computational efficiency, and ease of parameter adjustment. The model of Spike-timing dependent plasticity is recommended as current basis for representing neuron changes in connections. For the analysis of network connectivity and connectivity changes in BIS, the Cox method is recommended because it evaluates connections based on activities from all recorded neurons as opposed to pair-wise approaches.
Integrating UX Work in Agile Enterprise Software Development

Agile development methodologies have become the norm in software development. Simultaneously, user experience (UX) has become an increasingly important factor in the success or failure of software systems. However, agile methodologies do not give guidance on how to conduct UX work. Companies encounter challenges in UX work despite the previous academic research activities in order to integrate UX work with agile development practices.

This doctoral thesis investigates how to integrate UX work as part of agile development of enterprise software, where other factors such as business benefits often overrule end user needs. The thesis studies tasks and goals of which agile UX work consists of, challenges companies encounter while integrating UX work with agile development, and actions that support the integration. This thesis consists of nine publications and an introductory part. The research has been conducted in seven Finland-based companies in large- and middle-sized companies over the years 2011 to 2014. The research approach of the thesis is inductive, aiming at explaining and structuring the studied phenomena based on empirical findings. The main data gathering methods include surveys and interviews. Most of the study participants were agile projects' team members, but also end users and other roles significant to research and development activities in companies.

The main contributions of this thesis address the research questions of challenging issues in the integration of agile development and UX, tasks and goals related to UX, and activities that support the integration. We present a framework called BoB (Best of Both Worlds) for integrating UX work in agile enterprise software development. While most of the previous models for agile UX concentrate on integrating the role of UX specialist responsible for the UX work, BoB approaches the integration via UX tasks and shared ownership of the cross-functional team including software developers and UX specialists.

The results convey the conclusion that agile UX work should be collaborative effort with several contributing roles. BoB structures UX work via UX tasks unlike the previous models for agile UX work and partially merges upfront design work with development iterations.
**MergeTree: a HLBVH Constructor for Mobile Systems**

Powerful hardware accelerators have been recently developed that put interactive ray-tracing even in the reach of mobile devices. However, supplying the rendering unit with up-to-date acceleration trees remains difficult, so the rendered scenes are mostly static. The restricted memory bandwidth of a mobile device is a challenge with applying GPU-based tree construction algorithms. This paper describes MergeTree, a BVH tree constructor architecture based on the HLBVH algorithm, whose main features of interest are a streaming hierarchy emitter, an external sorting algorithm with provably minimal memory usage, and a hardware priority queue used to accelerate the external sort. In simulations, the resulting unit is faster by a factor of three than the state-of-the-art hardware builder based on the binned SAH sweep algorithm.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Computer engineering, Signal Processing Research Community (SPRC)
Authors: Viitanen, T., Koskela, M., Jääskeläinen, P., Kultala, H., Takala, J.
Number of pages: 4
Publication date: 2 Nov 2015

**Host publication information**
Title of host publication: SIGGRAPH Asia 2015 Technical Briefs
Place of publication: New York, NY, USA
Publisher: ACM
Article number: 12
ISBN (Electronic): 978-1-4503-3930-8
Electronic versions:
Article preprint
DOIs: 10.1145/2820903.2820916
http://dl.acm.org/citation.cfm?id=2820916 (Link to article in ACM Digital Library.)
Research output: Scientific - peer-review » Conference contribution

**Refactoring - a Shot in the Dark?**
A study performed semistructured interviews of 12 seasoned software architects and developers at nine Finnish companies. Its main goals were to find out how the practitioners viewed the role and importance of refactoring, and how and when they refactored. Another goal was to see whether shortened cycle times and, especially, continuous-deployment practices affected how and when refactoring was done. The results paint a multifaceted picture with some common patterns. The respondents considered refactoring to be valuable but had difficulty explaining and justifying it to management and customers. Refactoring often occurred in conjunction with the development of new features because it seemed to require a clear business need. The respondents didn’t use measurements to quantify the need for or impact of refactoring. This article is part of a special issue on Refactoring.

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: Software engineering, Managing digital industrial transformation (mDIT), University of Helsinki
Authors: Leppänen, M., Mäkinen, S., Lahtinen, S., Sievi-Korte, O., Tuovinen, A., Männistö, T.
Number of pages: 9
Pages: 62-70
Publication date: Nov 2015
Peer-reviewed: Yes

**Publication information**
Journal: IEEE Software
Volume: 32
Issue number: 6
ISSN (Print): 0740-7459
Ratings:
Scopus rating (2016): CiteScore 1.87 SJR 0.584 SNIP 1.966
Scopus rating (2015): SJR 0.472 SNIP 1.659 CiteScore 1.86
Scopus rating (2014): SJR 0.556 SNIP 1.808 CiteScore 1.53
Exercise apps cure the sitting disease
A sedentary lifestyle is the bane of our modern society and affects both body and mind. But help may be closer than you think – in your pocket. Can a mobile application get us up from our office chairs and start exercising?

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Ahtinen, A.
Publication date: 21 Oct 2015
Peer-reviewed: Unknown

Publication information
Journal: Interface: Science Magazine
Issue number: 2
Original language: English
Research output: General public › Comment/debate

LOGDIG Log File Analyzer for Mining Expected Behavior from Log Files
Log files are often the only way to identify and locate errors in a deployed system. This paper presents a new log file analyzing framework, LOGDIG, for checking expected system behavior from log files. LOGDIG is a generic framework, but it is motivated by logs that include temporal data (timestamps) and system-specific data (e.g. spatial data with coordinates of moving objects), which are present e.g. in Real Time Passenger Information Systems (RTPIS). The behavior mining in LOGDIG is state-machine-based, where a search algorithm in states tries to find desired events (by certain accuracy) from log files. That is different from related work, in which transitions are directly connected to lines of log files. LOGDIG reads any log files and uses metadata to interpret input data. The output is static behavioral knowledge and human friendly composite log for reporting results in legacy tools. Field data from a commercial RTPIS called ELMI is used as a proof-of-concept case study. LOGDIG can also be configured to analyze other systems log files by its flexible metadata formats and a new behavior mining language.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Signal Processing Research Community (SPRC), Department of Pervasive Computing, Research area: Computer engineering
Authors: Heikkinen, E., Hämäläinen, T. D.
Number of pages: 15
Semantics analyzing expression editors in IP-XACT design tool Kactus2

This paper presents parameter and expression editors of the design tool Kactus2. It is aimed at digital System-on-Chip (SoC) designs based on IEEE 1685 IP-XACT XML metadata standard. SoC’s are constructed by assembling parametrized components using generators for hardware language code and design configuration. The key challenges are the management of dependencies between thousands of parameters, as well as immediate validation and evaluation while editing. The expression editor in this paper has been designed to overcome these challenges. The editors include real-time syntax, semantic analysis and the use of UUIDs behind user displayed parameter names. The implementations for these have been published in Kactus2 v2.8 open source code, written in C++/Qt5, and consisting of 3000 LoC in the release. An independent industrial user on the SoC domain has verified the correctness, completeness and usability of the new solutions. The designed editors significantly improve the SoC parameter editing and design configuration.
ICDO: Integrated Cloud-based Development Tool for DevOps

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Ahmadighohandizi, F., Systä, K.
Number of pages: 15
Pages: 76-90
Publication date: 9 Oct 2015

Host publication information
Title of host publication: 14th Symposium on Programming Languages and Software Tools

Publication series
Name: CEUR Workshop Proceedings
Volume: 1525
ISSN (Electronic): 1613-0073
Links:
Research output: Scientific - peer-review › Conference contribution

Decision-Making Framework for Refactoring
Refactoring has been defined as improving code quality without affecting its functionality. When refactoring is overlooked in daily development, the likelihood of larger refactorings increases with time. Disadvantages of larger refactorings include that they disrupt the daily work, require additional planning effort, and often they need to be justified to stakeholders. In this paper, we investigate with interviews how professionals make refactoring decisions. As a result, we present a framework for decision making for larger refactoring operations describing the key stages in a refactoring workflow. Furthermore, one actual industry case of refactoring decision making is presented in detail.

Mobile Applications to Support Physical Exercise - Motivational Factors and Design Strategies
The growing incidence of health problems attributed to contemporary lifestyles, and the limited resources of healthcare, has led several stakeholders to look for alternative preventive healthcare methods. Physical exercise has many good effects for health, but people often lack motivation towards it. Smartphone applications can act as motivational tools, as they are accessible, mobile, and have suitable technological abilities. During past 10 years, a large number of mobile exercise applications have been launched and, increasingly, wellness technologies have been researched in the field of human-computer interaction (HCI). However, the field lacks a comprehensive overview of the design strategies related to motivational exercise applications. Additionally, research in the field has mostly been conducted in western cultures, and perspectives from the developing world are missing.
This thesis explores the design space of mobile applications that aim to motivate the users to engage in physical exercise. The main foci of the research were to identify the motivational factors towards the use of mobile exercise applications and to formulate a comprehensive overview of design strategies for motivational, mobile exercise applications. The results were gained from a constructive design research process that included user studies, concepting and evaluation of motivational exercise applications, a cross study analysis of motivational factors, and formulating design strategies. The user studies were conducted in Finland and India with working-age participants.

Based on a rich set of empirical studies, this research produces insights for a wide set of motivational factors towards the use of mobile exercise applications. It points out differences in motivational factors between Finnish and Indian participants. For example, the use of surprising elements and certain playful elements as sources of motivation appealed to Indian participants more than Finns, who, in general, had a more pragmatic perspective towards the exercise applications. Finns were motivated by viewing their goals and progress by numbers and graphs, while Indians did not adopt the numerical approaches. The second outcome of the research is a comprehensive, structured and focused model of design strategies for motivational, mobile exercise applications. The model includes 34 design strategies divided into six dimensions. Nine of the strategies are India specific. The design strategies can be utilised in the design work of future exercise applications.
Global vs. Local - Experiences from a Distributed Software Project Course Using Agile Methodologies

Global software engineering (GSE) has become common in the software industry. Distributed development work comes with many challenges, especially related to communication and coordination. Thus, it is essential to also teach and prepare the new population of software engineers to be aware of – and familiar with – these hurdles. We addressed this need by arranging a joint (agile) software project course between universities in Finland and Norway. We had three teams – one with students from both countries and two with students from the Norwegian university only. The students were given a teacher mentor, a handbook on agile practices and state-of-the-art tools for project management and software development. Apart from monitoring the teams’ progress, we also collected data from emails, questionnaires, student reports and interviews during and after the project. The main lesson learned is that the global and local teams are mostly facing the same challenges - especially when it comes to team building, clear project roles, and communication and management issues. Ultimately, our results show that the challenges were harder to solve by the global team and that not solving challenges in a timely manner had more serious consequences.
Continuous User Experience Development

Continuous approaches for software engineering such as continuous planning, development, and operations are becoming increasingly popular in agile software companies. It means that also user-centered design practitioners and practices need to adapt to both possibilities and challenges the increasingly rapid and more tightly integrated software engineering environment induces. Such issues include planning continuously throughout the life cycle instead of upfront planning, delivering user value whenever something is ready instead of delivering working software at the end of time-boxed iterations, and experimenting with real users instead of conducting traditional user studies and tests. In this position paper we discuss how user experience work can be organized with continuous software development.

Task allocation between UX specialists and developers in agile software development projects

Synchronizing efforts between developers and user experience (UX) specialists is one of the major challenges in agile UX work. In this paper, we report results of a study conducted over a release cycle of six agile software development projects in five companies, considering the task allocation and cooperation in the team. Team members (N = 31), including product owners, UX specialists, and developers, reported weekly on the UX-related tasks they had contributed to and whether the UX specialist had participated. We identified three forms of cooperation: minimal, product owner–UX specialist, and developer–UX specialist. Our study suggests that for projects operating in the minimal cooperation mode, the collaboration concentrates on the user interface (UI) design, while other aspects of UX work are downplayed. At the same time, many UX-related tasks were successfully handled by developers alone. Therefore, to support UX work integration, we suggest a task-oriented integration approach for projects with minimal UX resources.
The Next Level of User Experience of Cloud Storage Services: Supporting Collaboration with Social Features

Nowadays, individuals’ personal data is at their disposal real-time from any device through cloud storage services (CSS). Such services enable new kinds of collaboration between individuals and have fundamental impact on how we organize and share our data. Nevertheless, only a few studies have been made on the user experience (UX) of such services. This paper reports the user experience of different CSSs (focusing on Drop box, Google Drive, One Drive, and iCloud) based on 19 interviews and 65 survey responses. The results include reasons for the most positive and negative experiences and descriptions of current habits and motivations of the CSS users. As the current use of CSSs is still mostly individual we investigate the potential of taking the UX of CSSs to the next level by integrating different social features to current CSSs. We conclude the paper by explaining the importance of different Cloud UX aspects in CSS context and suggesting design implications improving UX for CSSs.
Unified Model for Software Engineering Data

Software process data is available in several tools such as version control systems, issue trackers and test and build systems to name a few. Using the data gathered in these software engineering tools would be ideal for collecting different kinds of software processes and product metrics as the data is already automatically gathered by the tools. However, the tools present and store the data in various formats. The data collection methods and interfaces also vary between the tools. This closes the software engineering data into silos and makes it hard to build reusable analysis and visualizations for the data.

In this position paper we present a unified model for software engineering data and a framework for data collection, conversion and storing that utilizes our model. The aim of the model is to define a common format for software engineering data which is not dependent on specific software engineering tools or the software engineering process and thus can be used as a basis for building reusable visualization and analysis components. To demonstrate that we can build reusable visualization plugins on top of the framework, we created a timeline visualization plugin. The visualization plugin is used to visualize two data sets from industrial software projects that have different contexts and semantics.
Understanding the most influential user experiences in successful and unsuccessful technology adoptions

Abstract Understanding processes underlying technology adoption or non-adoption is an important research theme often addressed using the technology acceptance model (TAM) approach. The objective of this research was to investigate most influential user experiences in successful and unsuccessful technology adoptions using user experience related concepts and methods in conjunction with the TAM. Participants (N = 76) described their most influential user experiences related to one successful and one unsuccessful technology adoption process and evaluated both experiences using rating scales, including the central TAM related scales and user experience related scales probing emotions, psychological needs, user values, task load, and the impact of technology on the user's well-being. The results suggested that user experience and technology acceptance related viewpoints can complement each other in order to gain a more holistic understanding of the factors affecting the success or failure of technology adoptions, and the results showed how these variables typically behave in both contexts. The overall valence of user experience was significantly affected by perceived usefulness, the fulfillment of psychological needs, and the salience of negative emotions in the most influential user experiences of successful adoptions, and by perceived usefulness, output quality, and the salience of negative emotions in the unsuccessful adoptions.
Mashing Up Software Issue Management, Development, and Usage Data

Modern software development approaches rely extensively on tools. Motivated by practices such as continuous integration, deployment and delivery, these tools are used in a fashion where data are automatically accumulated in different databases as a side-effect of everyday development activities. In this paper we introduce an approach for software engineering data visualization as a mash up that combines data from issue management, software development and production use. The visualization can show to all stakeholders how well continuous delivery is realized in the project. The visualization clearly shows the time spent to specify and develop the features as well the length of the delivery cycle. Furthermore the visualization shows how much work is unfinished and waiting for delivery. This can help the development team to decrease the amount of unfinished work and by that help them to keep up in continuous delivery mindset. In addition to development data usage of the features is also visualized.

Gathering useful programming data; Analysis and insights from real-time collaborative editing

Traditionally, collaborative coding has been practiced in open source communities where cooperation has mostly taken place on a coordination level. Nowadays, web technology is sufficiently advanced to enable collaborative coding in real-time as group work, which eases communication in software development. In this paper this phenomenon has been studied from a knowledge transfer and learning perspective. With the aid of two different example cases (code camps), we have examined the possibilities and challenges in learning during real-time group work. Additionally, we have evaluated the effect of the structure of log data created during software development. The research frame for this study is the utilization of log data visualization in evaluating group work and further improvement of the visualization in order to support software development.
Collaborative cloud-based management of home networks

Future home networks are expected to become extremely sophisticated, yet only the most technically adept persons are equipped with skills to manage them. In this paper, we provide a novel solution as to how complex smart home networks can be collaboratively managed with the assistance of operators and third party experts. Our solution rests in separating the management and control functionalities of the home access points and routers, away from the actual connectivity, traffic forwarding and routing operations within the home network. By so doing, we present a novel REST-based architecture in which the management of the home network can be hosted in an entirely separate, external cloud-based infrastructure, which models the network within the home as a resource graph.

General information

State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Tampere University of Technology
Authors: Silverajan, B., Luoma, J., Vajaranta, M., Itäpuro, R.
Number of pages: 4
Pages: 786-789
Publication date: 29 Jun 2015

Host publication information

Publisher: IEEE
ISBN (Print): 9783901882760
Keywords: Cloud, Homenet, IoT, Network Management
ASJC Scopus subject areas: Software, Computer Science Applications, Computer Networks and Communications
DOIs:
10.1109/INM.2015.7140376
Source: Scopus
Source-ID: 84942601939
Research output: Scientific - peer-review › Conference contribution

E-learning of ethics, awareness, hacking and research by information security majors

Some earlier courses were reorganized in 2013 to construct a syllabus for the information security major at Tampere University of Technology, a 30 ECTS credit unit package in the 300-cu master's degree. As their other subjects the students may have for instance communications or software engineering, or information management. This paper describes how the compulsory courses introduce four important but not very technical engineering skills using mainly an e-learning approach. The reasons for such an approach is to save resources in the very beginning – because of the large number of students heading for other majors – and after that to offer flexibility in scheduling to serve the elective courses, as well as the studies of other disciplines – those that provide a need for security. The four topic areas are ethics of individuals and organizations, personal awareness of security issues, hacking, i.e. offensive way of thinking, and The described introductory stage of exposing the students' minds to these matters does not forget innovativeness, but that remains more in the background before the students start working with cases and hands-on experiments later. The description covers four separate courses, forming a prerequisite chain. The first and last one are lecture-based and it takes at least two years to pass them; 3–4 years is more normal. The academic units are not essential here. Instead, one of the main points is the repeated exposure to the various ways of thinking. In the following summary of the succession the numbers 1–4 refer to the courses, but they can be just thought of as time-separated occasions: Ethics: 1. Laws 2. Laws 3. Ethical questions in one's own environment – technology-related ethical questions for individuals – ethical questions for organizations. 4. Interview a security professional, ethical point of view included. Awareness: 1 & 2. Policies, guidelines and web-sites of security information. 3. Daily observations (own or from news) and actions regarding information security, 4. Campaigns etc. Hacking: 1. By-pass authentication by changing the source code of a web page. 2. -- 3. Carry out and report an exercise found at one of listed sites, 4. Laboratory exercises in hacking. Research: 1. Fill in a questionnaire resembling the one from 3rd stage. 2. -- 3. A questionnaire to five acquaintances, completed by interviewing them; deal with the results. 4. Read research papers, interview a security professional trying to generalize together with peers. The paper explains the rationale of these exposures and how they are delivered. It must be noted that not everything is compulsory for passing the courses. The paper reports observations concerning the student choices and feedback. The course #3 appears in its earlier form in [1]. The current version was updated to be two times larger and more professionally oriented. Reference: [1] Jukka A. Koskinen, Tomi O. Kelo: Pure e-learning course in information security. Proc. 2nd Int. Conf. on Security of Information and Networks, 2009. 8–13.
Embedded Multi-Core Systems Dedicated to Dynamic Dataflow Programs

Multimedia applications and embedded platforms are both becoming very complex in order to improve user experience. Thus, multimedia developers need high-level methods to automate time-consuming and error-prone tasks. Dynamic dataflow modeling is attractive to describe complex applications, such as video codecs, at a high level of abstraction. This paper presents a dataflow-based design approach to implement video codecs on embedded multi-core platforms. First, we introduce a custom architecture model to design low-power multi-core chips based on distributed memory and Transport-Triggered Architecture processor cores. Then, we describe software synthesis techniques to improve dynamic dataflow implementations. This methodology has been implemented into open-source tools and demonstrated on video decoders based on the MPEG-4 Visual standard and the new High Efficiency Video Coding standard. The simulations achieve real-time decoding (40FPS) of high-definition (720P) MPEG-4 Visual video sequences on a custom multi-core platform clocked at 1Ghz, which is an improvement of more than 100% over previously proposed implementations.
During the course of the past two decades, Open Source Software (OSS) development model has lead to a number of projects which have produced software that rivals and in some cases even exceeds the scale and quality of the traditional software projects. Among others, Eclipse, Apache, Linux, and BSD operating system are representative examples of such success stories.

However, OSS project like traditional in-house projects, often pose the potential for enormous problems, whose effects run the gamut from immense cumulative delay through complete breakdown and failure. This situation is evident, as OSS development is a socio-technical endeavor and is non-trivial. Such development occurs within an intensively collaborative process, in which technical prowess must go hand in hand with the efficient coordination and management of a large number of social, inter-personal interactions across the development organization. Furthermore, those social and technical dimensions are not orthogonal. It has been recognized that the structure of a software product and the layout of the development organization working on that product correlate.

Therefore this thesis argue that a comprehensive understanding on the sustainable evolution of OSS projects can be gained through the examination of the mutual influence of social and technical dimensions in OSS development. Thus, the goal of this thesis is the verification and reasoning of the following proposition,

"The evolution of the Open Source Software (OSS) project is constrained by the non-orthogonal evolution of Social and Technical dimensions (often termed as Socio-Technical dependency) of such projects".

In concrete terms, this thesis investigates and measures empirically the extent to which the two dimensions of OSS projects, social and technical, approximate and influence each other during the evolution of the projects. Perceived insight is then used to build proposals that would provide empirical basis to frame theory around the affirmed proposition. Moving towards this goal, this thesis proposes models, methods, frameworks and tool supports to measure, assess, and reason the socio-technical dependency within OSS project context. The starting point is to propose a data model to mimic the social and technical dimensions and their inter-relationships. This model is instantiated through the repository data of OSS projects that represent each of these dimensions. Then, methods and a mathematical model are proposed to derive dependency between the two dimensions, and to utilize them in measuring socio-technical dependency quantitatively. These proposals are then put into practice within distinct OSS project contexts to empirically measure and investigate socio-technical dependency. Along the process, frameworks, architectural design and corresponding tool implementations...
are provided to automate the analysis and visualization of such dependency.

Reported results suggest that high degree of socio-technical congruence can be considered as the implicit underlying principle for building team collaboration and coordination within the developer community of long lived OSS projects. Even being highly distributed community of developers, and mostly using passive communication channels, OSS communities are tied together by maintaining task dependent communication. Such communication is often ad-hoc, adaptive and situated as it cope with rapid and continuous changes in the underlying software.

Additionally, collaboration among projects are significantly influenced by the resembling properties among the projects. Resembling properties (e.g., project domain, size, and programming language) often form a favorable ground, thus creating a stimuli for developers to participate in those projects.

Efficient Use of Teaching Technologies with Programming Education

Learning and teaching programming are challenging tasks that can be facilitated by using different teaching technologies. Visualization systems are software systems that can be used to help students in forming proper mental models of executed program code. They provide different visual and textual cues that help student in abstracting the meaning of a program code or an algorithm. Students also need to constantly practice the skill of programming by implementing programming assignments. These can be automatically assessed by other computer programs but parts of the evaluation need to be assessed manually by teachers or teaching assistants.

There are a lot of existing tools that provide partial solutions to the practical problems of programming courses: visualizing program code, assessing student programming submissions automatically or rubrics that help keeping manual assessment consistent. Taking these tools into use is not straightforward. To succeed, the teacher needs to find the suitable tools and properly integrate them into the course infrastructure supporting the whole learning process. As many programming courses are mass courses, it is a constant struggle between providing sufficient personal guidance and feedback while retaining a reasonable workload for the teacher.

This work answers to the question "How can the teaching of programming be effectively assisted using teaching technologies?" As a solution, different learning taxonomies are presented from Computer Science perspective and applied to visualization examples so the examples could be used to better support deeper knowledge and the whole learning process within a programming course. Then, different parts of the assessment process of programming assignments are studied to find the best practices in supporting the process, especially when multiple graders are being used, to maintain objectivity, consistency and reasonable workload in the grading.

The results of the work show that teaching technologies can be a valuable aid for the teacher to support the learning process of the students and to help in the practical organization of the course without hindering the learning results or personalized feedback the students receive from their assignments. This thesis presents new visualization categories that allow deeper cognitive development and examples on how to integrate them efficiently into the course infrastructure. This
thesis also presents a survey of computer-assisted assessment tools and assessable features for teachers to use in their programming assignments. Finally, the concept of rubric-based assessment tools is introduced to facilitate the manual assessment part of programming assignments.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Pervasive Computing
Authors: Ahoniemi, T.
Number of pages: 133
Publication date: 28 May 2015

Publication information
Publisher: Tampere University of Technology
ISBN (Print): 978-952-15-3526-0
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1301
ISSN (Print): 1459-2045
Electronic versions: ahoniemi_1301

Bibliographical note
Awarding institution: Tampere University of Technology
Versio ok 16.12.2015
Research output: Collection of articles › Doctoral Thesis

Techniques and Practices for Software Architecture Work in Agile Software Development
Since the publishing of Agile Manifesto in 2001, the agile software development has taken the world by storm. Agile software development does not emphasize the importance of software architecture, even though software architecture is often seen as a key factor for achieving the quality goals set for the software system. It has been even said that agile software development and software architecture are a clash of two cultures.

In many software projects there is no need to consider software architecture anymore. For example, when designing a mobile application, the ecosystem forces the developer to use certain architecture style provided by the platform. In web development ready-made frameworks and project templates are available offering complete software architecture designs for the application developer.

There are still domains and systems where careful architecture design is needed. When developing complex systems or systems with a long lifecycle, diligent software architecture design is a key to avoid massive rework during the development. It cannot be a coincidence that companies developing these kinds of systems struggle with agile software development the most.

On the one hand, the goal of this thesis was to study software architecture practices used in agile software development in the industry. On the other hand, the goal was to develop new methods and techniques to support incremental software architecture working practices which can be aligned with agile methods such as Scrum. The study applied case study, interviews and design science as the main research methods.

The results show that there are four main ways to carry out software architecture work while using agile methods. Basing on this result, models for aligning software architecture knowledge management were developed. These models can be used as guidelines for selecting the appropriate software architecture practices in an organization.

As a part of the research work, an architecture knowledge repository was developed for sharing the knowledge in agile projects and for automatic software architecture document generation. Additionally, the results of this study show that by taking a decision-centric approach to software architecture evaluation, the evaluation method can be lightweight enough to make incremental evaluation a viable option. Similarly, existing software architecture evaluation methods can be boosted to fit agile software development by utilizing domain knowledge.

General information
From the Internet of Things to the Internet of People

There's growing interest in developing applications for the Internet of Things. Such applications' main objective is to integrate technology into people's everyday lives, to be of service to them en masse. The form in which this integration is implemented, however, still leaves much room for improvement. Usually, the user must set parameters within the application. When the person's context changes, they have to manually reconfigure the parameters. What was meant to be a commodity in an unforeseen situation then becomes extra noise. This article describes a reference architecture that improves how people are integrated with the IoT, with smartphones doing the connecting. The resulting integration opens the way to new IoT scenarios supporting evolution towards the Internet of People.
The highways and country roads to continuous deployment

As part of a Finnish research program, researchers interviewed 15 information and communications technology companies to determine the extent to which the companies adopted continuous deployment. They also aimed to find out why continuous deployment is considered beneficial and what the obstacles are to its full adoption. The benefits mentioned the most often were the ability to get faster feedback, the ability to deploy more often to keep customers satisfied, and improved quality and productivity. Despite understanding the benefits, none of the companies adopted a fully automatic deployment pipeline. The companies also had higher continuous-deployment capability than what they practiced. In many cases, they consciously chose to not aim for full continuous deployment. Obstacles to full adoption included domain-imposed restrictions, resistance to change, customer desires, and developers' skill and confidence.
A Comparison of Methods to Move Visual Objects Between Personal Mobile Devices in Different Contexts of Use

As people increasingly own multiple mobile and portable devices (such as smartphones, tablets, and laptops), situations where several devices are used together have become more common. A frequent problem in such situations is how to move virtual visual objects (such as content items or application windows) between device displays. We present a comparative evaluation of three methods for moving objects between personal mobile devices: Tray, Transfer Mode, and Device Touch. The participants' preferences of the methods in different real-life scenarios were found to strongly depend on the task and the context of use, making the design of a single optimal cross-display object movement method a challenging task. We identify several clusters of contextual factors that influenced the users' preferences. We also report more detailed differences in efficiency, novelty, learnability, physical device handling, and task completion strategies between the three methods included in the evaluation.
A conceptual model towards the scaffolding of learning experience

The challenge of delivering personalized learning experiences is amplified by the size of classrooms and of online learning communities. In turn, serious games are increasingly recognized for their potential to improve education, but a typical requirement from instructors is to gain insight into how the students are playing. When we bring games into the rapidly growing online learning communities, the challenges multiply and hinder the potential effectiveness of serious games. There is a need to deliver a comprehensive, flexible and intelligent learning framework that facilitates better understanding of learners' knowledge, effective assessment of their progress and continuous evaluation and optimization of the environments in which they learn. This paper aims to explore the potential in the use of games and learning analytics towards scaffolding and supporting teaching and learning experience. The conceptual model discussed aims to highlight key considerations that may advance the current state of learning analytics, adaptive learning and serious games, by leveraging serious games as an ideal medium for gathering data and performing adaptations. This opportunity has the potential to affect the design and deployment of education and training in the future.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: TUT Game Lab, Regulation of learning and active learning methods (REALMEE), Coventry University, Universidad Complutense de Madrid, Herriot-Watt University, University of Northampton, Bremer Institut für Produktion und Logistik, University of Graz, Curtin University, Gruppo SIGLA S.r.l, Högskolan i Skövde, “Carol I” National Defence University
Authors: Arnab, S., Ger, P. M., Lim, T., Lameras, P., Hendrix, M., Kiili, K., Hauge, J. B., Ninaus, M., de Freitas, S., Mazzetti, A., Dahlbom, A., Degano, C., Stanescu, I., Riveiro, M.
Number of pages: 14
Pages: 83-96
Publication date: 2015

A Cross-Cultural and Gender-Based Perspective for Online Security: Exploring Knowledge, Skills and Attitudes of Higher Education Students.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: Information security
Authors: Chaudhary, S., Zhao, Y., Berki, E., Valtanen, J., Li, L., Helenius, M., Mystakidis, S.
Pages: 57-71
Publication date: 2015
Peer-reviewed: Yes
A Design Framework Enhancing Developer Experience in Collaborative Coding Environment

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Research area: Software engineering, Managing digital industrial transformation (mDIT)
Authors: Palviainen, J., Kilamo, T., Koskinen, J., Lautamäki, J. T., Mikkonen, T., Nieminen, A.
Number of pages: 8
Pages: 149-156
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 30th Annual ACM Symposium on Applied Computing
ISBN (Print): 978-1-4503-3196-8
DOIs:
10.1145/2695664.2695746
Research output: Scientific - peer-review › Conference contribution

A Diary Study on Combining Multiple Information Devices in Everyday Activities and Tasks
As people possess increasing numbers of information devices, situations where several devices are combined and used together have become more common. We present a user study on people's current practices in combining multiple information devices in their everyday lives, ranging from pragmatic tasks to leisure activities. Based on diaries and interviews of 14 participants, we characterize the usage practices of the most common devices, including smartphones, computers, tablets, and home media centers. We analyze 123 real-life multi-device use cases and identify the main usage patterns, including Sequential Use, Resource Lending, Related Parallel Use, and Unrelated Parallel Use. We discuss the practical challenges of using several information devices together. Finally, we identify three levels of decisions that determine which devices are used in a particular situation, including acquiring, making available, and selecting the devices for use.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Jokela, T., Ojala, J., Olsson, T.
Number of pages: 10
Pages: 3903-3912
Publication date: 2015

Host publication information
Title of host publication: CHI '15 Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems
Publisher: ACM
ISBN (Print): 978-1-4503-3145-6
DOIs:
10.1145/2702123.2702211
Research output: Scientific - peer-review › Conference contribution

Animal Welfare as a Design Goal in Technology Mediated Human-Animal Interaction
Designing technology mediated human-animal interaction with the animal welfare as a design goal calls for understanding of animal welfare issues. This paper discusses the notion of animal welfare and specifically focuses on domestic dogs (canis familiaris) as an example case. Strategies for mediating relatedness are discussed and an initial framework to support designing tactile interactions for human-animal interaction is presented. Paper builds its reasoning upon scientific research on human-animal interaction and welfare, and identifies issues for future work in this area.

General information
State: Published
Applying finite state process algebra to formally specify a computational model of security requirements in the key2phone-mobile access solution

Key2phone is a mobile access solution which turns mobile phone into a key for electronic locks, doors and gates. In this paper, we elicit and analyse the essential and necessary safety and security requirements that need to be considered for the Key2phone interaction system. The paper elaborates on suggestions/solutions for the realisation of safety and security concerns considering the Internet of Things (IoT) infrastructure. The authors structure these requirements and illustrate particular computational solutions by deploying the Labelled Transition System Analyser (LTSA), a modelling tool that supports a process algebra notation called Finite State Process (FSP). While determining an integrated solution for this research study, the authors point to key quality factors for successful system functionality.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Augmented Human Activities (AHA), University of Tampere, Department of Computer Engineering and Information Technology of College of Information and Communication Technology at the University of Dar Es Salaam, University of Jyväskylä, Beijing Institute of Petrochemical Technology, Department of Computer Science and Information Systems, Finwe Ltd
Authors: Chaudhary, S., Li, L., Berki, E., Helenius, M., Kela, J., Turunen, M.
Number of pages: 18
Pages: 128-145
Publication date: 2015

Host publication information
Title of host publication: Lecture Notes in Computer Science
Publisher: Springer Verlag
ISBN (Print): 9783319194578

Publication series
Name: Lecture Notes in Computer Science
Volume: 9128
ISSN (Print): 0302-9743
Assessment of social media skills among vocational teachers in Finland

In this explorative case study we planned, tested and verified an assessment tool for evaluating Social Media (SOME) skills among vocational teachers. We also planned and trained vocational teachers in the use of social media tools. The case study was automotive and transport engineering upper secondary vocational teacher training. According Huhtala [1], based on a large national inquiry of the automotive sector, there has arisen the need to develop the skills of the student in many ways. They require paying attention to coming trends of the teaching methods and the technology [2]. With the help of this training we wanted to provide teachers a better understanding of ideology of SOME and realize its pedagogical possibilities and benefits. In the case study training we introduced theories and examples about SOME and its potential to solve future challenges in the automotive sector. But there are multiple barriers in utilizing social software [3]. We explored an answer to the research question: How to assess utilization of social media tools in teaching among vocational Teachers? We discovered that utilizing an assessment survey questionnaire before a training course was very beneficial. In this case study we found out that the ability to utilize SOME tools among automotive vocational teachers was poor. Our earlier studies among adult SOME users support these findings [4],[5],[6],[7]. Our notion was that the automotive and transport engineering genre was very traditional and surprisingly conservative towards new technology like SOME for example. Limitations in the research process were typical for the case study [8],[9].

References:

Keywords: Social media, vocational teaching, SOME, SOME assessment, automotive, case study.

Augmenting food with information

Eating is not only one of the most fundamental human needs but also among the most regular activities. Acquiring food, preparing meals, and socializing around food are deeply rooted in all human cultures. In this paper we show how food can not only serve to satisfy hunger but also become a new display technology. Through food augmentation, a dinner could communicate its ingredients, convey messages, or provide instructions such as the recipe of a meal. We show how to
augment a large range of food with laser. We conducted a series of focus groups to gather people's first impressions and derive a broad range of meaningful augmentation scenarios. We discuss the perceived benefits, opportunities, and concerns. Additionally, we evaluated a number of scenarios through an online survey. The most readily accepted augmentation scenarios include adding practical information, increasing awareness about the food, and augmenting food items with a natural skin.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA), University of Stuttgart, Yahoo Inc.
Authors: Henze, N., Olsson, T., Schneegass, S., Sahami, A., Väänänen-Vainio-Mattila, K.
Number of pages: 8
Publication date: 2015

**Host publication information**
Title of host publication: MUM '15 Proceedings of the 14th International Conference on Mobile and Ubiquitous Multimedia
Publisher: ACM
ISBN (Print): 978-1-4503-3605-5
DOI: 10.1145/2836041.2836068
Links: http://dl.acm.org/citation.cfm?id=2836068&CFID=735197347&CFTOKEN=37865601
Research output: Scientific - peer-review › Conference contribution

**Benefits for supplier and customer with the help of logged usage data**
Visual analytics of logged usage data based on end-user interactions can increase understanding of user experience and system use. This in turn can support continuous development, technology renewal and service development that enhances the end-user's experience, as well as create competitive advantage.

**General information**
State: Published
Ministry of Education publication type: D2 Article in professional manuals or guides or professional information systems or textbook material
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Väätäjä, H., Heimonen, T., Tiitinen, K., Hakulinen, J., Turunen, M.
Pages: 110-112
Publication date: 2015

**Host publication information**
Title of host publication: User Experience and Usability in Complex Systems - UXUS : FIMECC Publications Series No. 8, 2010-2015
ISBN (Print): 978-952-238-146-0
ISBN (Electronic): 978-952-238-147-7

**Publication series**
Name: FIMECC Publication series
Publisher: FIMECC Oy
Volume: 8
ISSN (Print): 2342-2688
ISSN (Electronic): 2342-2696
Keywords: user experience, Usability, complex systems, human-computer interaction, human-centered design, logging
ASJC Scopus subject areas: Management of Technology and Innovation, Human-Computer Interaction
Research output: Professional › Chapter

**Characterizing Context of Use in Mobile Work**

**General information**
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Väätäjä, H.
Characterizing the Context of Use in Mobile Work

The context of use has been widely acknowledged as important when designing and evaluating systems for work-related activities. This paper describes in case of mobile news making the synthesized findings on the context of use. Findings are categorized to five components and nineteen subcomponents and characterized with examples from our studies. The presented findings validate a previously presented model for context of use in mobile HCI, extend it, and elaborate the definitions for the components. The presented elaborated model can be applied by academics and practitioners in development, research and evaluation activities from identifying requirements to evaluating systems for mobile work. Findings support understanding what circumstances and how they can contribute to user experience and acceptance of designed systems.
Code Density and Energy Efficiency of Exposed Datapath Architectures

Exposing details of the processor datapath to the programmer is motivated by improvements in the energy efficiency and the simplification of the microarchitecture. However, an instruction format that can control the data path in a more explicit manner requires more expressiveness when compared to an instruction format that implements more of the control logic in the processor hardware and presents conventional general purpose register based instructions to the programmer. That is, programs for exposed datapath processors might require additional instruction memory bits to be fetched, which consumes additional energy. With the interest in energy and power efficiency rising in the past decade, exposed datapath architectures have received renewed attention. Several variations of the additional details to expose to the programmer have been proposed in the academy, and some exposed datapath features have also appeared in commercial architectures. The different variations of proposed exposed datapath architectures and their effects to the energy efficiency, however, have not so far been analyzed in a systematic manner in public. This article provides a review of exposed datapath approaches and highlights their differences. In addition, a set of interesting exposed datapath design choices is evaluated in a closer study. Due to the fact that memories constitute a major component of power consumption in contemporary processors, we analyze instruction encodings for different exposed datapath variations and consider the energy required to fetch the additional instruction bits in comparison to the register file access savings achieved with the exposed datapath.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Jääskeläinen, P., Kultala, H., Viitanen, T., Takala, J.
Number of pages: 16
Pages: 49-64
Publication date: 2015
Peer-reviewed: Yes
Early online date: 1 Jan 2014

Publication information

Journal: Journal of Signal Processing Systems
Volume: 80
Issue number: 1
ISSN (Print): 1939-8018
Ratings:
Scopus rating (2016): CiteScore 0.78 SJR 0.226 SNIP 0.625
Scopus rating (2015): SJR 0.228 SNIP 0.639 CiteScore 0.7
Scopus rating (2014): SJR 0.292 SNIP 1 CiteScore 0.99
Scopus rating (2013): SJR 0.27 SNIP 0.858 CiteScore 0.97
Scopus rating (2012): SJR 0.281 SNIP 0.869 CiteScore 1.04
Scopus rating (2011): SJR 0.252 SNIP 0.717 CiteScore 0.92
Scopus rating (2010): SJR 0.288 SNIP 0.829
Scopus rating (2009): SJR 0.293 SNIP 0.849
Scopus rating (2008): SJR 0.314 SNIP 0.661
Scopus rating (2007): SJR 0.34 SNIP 1.021
Scopus rating (2006): SJR 0.261 SNIP 0.688
Scopus rating (2005): SJR 0.379 SNIP 0.914
Scopus rating (2004): SJR 0.384 SNIP 1.05
Scopus rating (2003): SJR 0.561 SNIP 1.024
Scopus rating (2002): SJR 0.475 SNIP 1.004
Scopus rating (2001): SJR 0.316 SNIP 0.752
Scopus rating (2000): SJR 0.21 SNIP 0.592
Scopus rating (1999): SJR 0.189 SNIP 0.569
Collaboration, distribution and culture - challenges for communication

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems, Tallin University of Technology, Christian-Albrechts-Universität zu Kiel, University of Lapland
Authors: Jaakkola, H., Henno, J., Thalheim, B., Mäkelä, J.
Number of pages: 8
Pages: 657-664
Publication date: 2015

Host publication information
ISBN (Print): 978-953-233-085-4
DOIs: 10.1109/MIPRO.2015.7160354
Source: Bibtex
Source-ID: urn:1138141c78979029b03c25a8442ec44a
Research output: Scientific - peer-review » Conference contribution

Content Sharing Building Social User Experiences
People are increasingly interested in personally creating content, such as images, audio and videos, as well as sharing them in social networking services. Creating content has become increasingly common with state-of-art devices and technology. Sharing such content mediates rich social interactions between the users in social media services. This research aims to gain deeper understanding of personal content management from the user experience viewpoint. This research studies the design solutions supporting and motivating users in management and sharing of their personal content. Contribution of this work is to identify the motivations and needs that occur in media content sharing regardless of the content type and as a theoretical outcome Content Sharing Social User Experience framework is constructed.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Ojala, J.
Number of pages: 3
Pages: 903-905
Publication date: 2015

Host publication information
Title of host publication: MobileHCI '15 Proceedings of the 17th International Conference on Human-Computer Interaction with Mobile Devices and Services
Publisher: ACM
ISBN (Print): 978-1-4503-3653-6
DOIs: 10.1145/2786567.2786937
Research output: Scientific - peer-review » Conference contribution
Cross-Cultural Design of Mobile Mathematics Learning Service for South African Schools

In the era of mobile devices and services, researchers in the educational domain have been interested in how to support learning with mobile technology in both local and global contexts. Recent human-computer interaction (HCI) research in the educational domain has particularly focused on how to develop mobile learning services and how to evaluate the learning outcomes. However, learning occurs in a local cultural context and the impact of culturally sensitive issues of the design of mobile learning needs more attention. We studied mobile mathematics learning-service in a longitudinal research with over 30 South African schools during three years. Our aim was to understand culturally dependent issues which need to be taken into consideration in the design of mobile learning services. We found subjective and objective culturally dependent issues in the content, context, infrastructure and technology of mobile learning and therefore, subjects to cross-cultural research. In conclusion, we argue that localization enhances the user experience and therefore support learning.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: User experience, University of Tampere
Authors: Vainio, T., Walsh, T., Varsaluoma, J.
Number of pages: 12
Pages: 81-93
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: IADIS International Journal on WWW/Internet
Volume: 12
Issue number: 1
ISSN (Print): 1645-7641
Original language: English
Keywords: Cross-Cultural Design, Mobile Learning, Cultural Context, Subjective and Objective Culture
Links:
Research output: Scientific - peer-review › Article

Cross-cultural issues in working with users in the design of interactive systems

Globalization of markets means that interactive systems need to be usable and provide positive user experience (UX) to users in many different cultures. There is an increasing realization that systems may need to be localized to different cultures, but less realization that methods used to work with users also need to be localized. We present two case studies which investigate cultural differences in users’ interpretation of and reactions to methods used to elicit usability and UX information. The first case study investigated the use of photos and sketches with Nigerian and Anglo-Celtic participants, the second investigated the use of three different question types, Likert items, sentence completion questions and open-ended questions with Chinese and British participants. Conclusions are drawn for conducting crosscultural user research.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, University of York, Simple Usability
Authors: Petrie, H., Walsh, T., Odutola, O., Ang, L.
Number of pages: 11
Pages: 515-525
Publication date: 2015

Host publication information
Title of host publication: ICoRD’15 – Research into Design Across Boundaries Volume 1 : Theory, Research Methodology, Aesthetics, Human Factors and Education
Publisher: Springer
ISBN (Print): 978-81-322-2231-6

Publication series
Name: Smart Innovation, Systems and Technologies
Volume: 34
ISSN (Print): 2190-3018
ASJC Scopus subject areas: Computer Science(all), Decision Sciences(all)
Keywords: Cross-cultural differences, Design methods, Usability, User experience
CueSense: a Wearable Proximity-Aware Display Enhancing Encounters
Wearable technology has been envisioned, amongst other things, to enhance face-to-face social interaction. For example, the visibility of wearable devices to other people (e.g. a wearable display) could augment the wearer's appearance by displaying public and socially relevant information about them. Such information could increase nearby people's awareness of the wearer, thus serve as tickets-to-talk and, ideally, enhance their first encounters. We present the design of CueSense, a wearable displays that shows textual content from the wearer's social media profiles, determined by the level of proximity to another user and match-making between their contents. We report the findings from a preliminary user study with 18 participants, followed by discussion as well as ideas for future research and further refinement of the concept.
Culture-Aware Web Information System Development

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems, Christian-Albrechts-Universität zu Kiel
Authors: Jaakkola, H., Thalheim, B.
Number of pages: 18
Pages: 121-138
Publication date: 2015

Host publication information
Title of host publication: 25th International Conference on Information Modelling and Knowledge Bases EJC 2015 June 9-12, 2015, Maribor, Slovenia
Place of publication: Maribor
Publisher: University of Maribor, Faculty of Electrical Engineering and Computer Science
Editors: Welzer, T., Hölbl, M., Kiyoki, Y., Thalheim, B., Jaakkola, H.
Research output: Scientific - peer-review » Conference contribution

Data collector service - practical approach with embedded linux
Nowadays embedded systems are one of the most important application areas in information technology. Embedded systems are often used in life critical situations, where reliability and safety are more important criteria than performance. This paper presents a data collector service that has been developed based on embedded Linux, which operates as a key element in a larger intelligent alarm system. The target of this study was to test out how well a cost-efficient single-board computer could be used to gather sensory data, and how this data can be provided for the client over the public Internet. The paper describes the data collector service currently in use and its functionality and also gives a concrete example of how to utilize a microcontroller with an embedded Linux distribution. The paper presents one solution on how to utilize embedded systems for managing and controlling conditions in buildings and also environmental conditions in a smart and cost-effective way.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems
Authors: Saari, M., Sillberg, P., Rantanen, P., Soini, J., Fukai, H.
Number of pages: 5
Pages: 1037 - 1041
Publication date: 2015

Host publication information
Data Correction for Seven Activity Trackers based on Regression Models

Using an activity tracker for measuring activity-related parameters, e.g. steps and energy expenditure (EE), can be very helpful in assisting a person’s fitness improvement. Unlike the measuring of number of steps, an accurate EE estimation requires additional personal information as well as accurate velocity of movement which is hard to achieve due to inaccuracy of sensors. In this paper, we have evaluated regression-based models to improve the precision for both steps and EE estimation. For this purpose, data of seven activity trackers and two reference devices was collected from 20 young adult volunteers wearing all devices at once in three different tests, namely 60-minute office work, 6-hour overall activity and 60-minute walking. Reference data is used to create regression models for each device and relative percentage errors of adjusted values are then statistically compared to that of original values. The effectiveness of regression models are determined based on the result of a statistical test. During a walking period, EE measurement was improved in all devices. The step measurement was also improved in five of them. The results show that improvement of EE estimation is possible only with low-cost implementation of fitting model over the collected data e.g. in the app or in corresponding service back-end.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Department of Signal Processing, Research group: Personal Health Informatics-PHI, Research area: Software engineering, Department of Electronics and Communications Engineering, Research group: Physiological Measurement Systems and Methods Group, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Augmented Human Activities (AHA), Research Community on Data-to-Decision (D2D)
Authors: Andalibi, V., Honko, H., Christophe, F., Viik, J.
Number of pages: 4
Pages: 1592 - 1595
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society
ISBN (Print): 978-1-4244-9270-1
ASJC Scopus subject areas: Biomedical Engineering
Links:

Bibliographical note
ORG=tie,0.3
ORG=sgn,0.35
ORG=elt,0.35
Research output: Scientific - peer-review › Conference contribution

Data driven ecosystem - Perspectives and problems

Our society and business ecosystem is becoming data driven. The value of data is becoming comparable to the value of physical products and becoming an important source of business. Open data itself is seen as a meaningful source of new business, especially for small and medium-sized companies. Open data is purposely aimed at being public. In addition, there is a lot of data used as if it were public - more or less without permission. In addition, the ownership of data has become unclear - the data related to an individual is no longer under the control of the persons themselves. However, declaring data sets to be open and/or allowing access to qualified users does not yet make data useful in practice. On the contrary, this often creates opportunities for misuse and dangers regarding personal security.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems, Tallinn University of Technology
Authors: Jaakkola, H., Henno, J., Soini, J.
Defining Metrics for Continuous Delivery and Deployment Pipeline

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Managing digital industrial transformation (mDIT)
Authors: Lehtonen, T., Suonsyrjä, S., Kilamo, T., Mikkonen, T.
Number of pages: 15
Pages: 16-30
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 14th Symposium on Programming Languages and Software Tools
Publication series
Name: CEUR Workshop Proceedings
Volume: 1525
ISSN (Electronic): 1613-0073
Links:
Research output: Scientific - peer-review › Conference contribution

Delayed key exchange for constrained smart devices
In the Internet of Things some nodes, especially sensors, can be constrained and sleepy, i.e., they spend extended periods of time in an inaccessible sleep state. Therefore, the services they offer may have to be accessed through gateways. Typically this requires that the gateway is trusted to store and transmit the data. However, if the gateway cannot be trusted, the data needs to be protected end-to-end. One way of achieving end-to-end security is to perform a key exchange, and secure the subsequent messages using the derived shared secrets. However, when the constrained nodes are sleepy this key exchange may have to be done in a delayed fashion. We present a novel way of utilizing the gateway in key exchange, without the possibility of it influencing or compromising the exchanged keys. The paper investigates the applicability of existing protocols for this purpose. Furthermore, due to a possible need for protocol translations, application layer use of the exchanged keys is examined.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Ericsson Research
Authors: Kannisto, J., Heikkinen, S., Slavov, K., Harju, J.
Number of pages: 15
Pages: 12-26
Publication date: 2015
Designing an Unobtrusive Analytics Framework for Monitoring Java Applications

In software development, attention has recently been placed on understanding users and their interactions with systems. User studies, practices such as A/B testing, and frameworks such as Google Analytics that gather data on production use have become common approaches in particular in the context of the Web, where it is easy to perform frequent updates as new needs emerge. However, when considering installable desktop applications, the situation gets more complex. While analytics facilities are still needed, they should address business logic, not generic traffic as is the case with many web sites. Moreover, analytics should be unobtrusive, and not have a high impact on the evolution of the actual application; thus, analytics should be treated as an add-on, as the target system may already exist. Finally, the instrumentation of features that are observed should be easy and flexible, but the provided mechanisms should be expressive enough for many use cases. In this paper, we examine different alternatives for implementing such monitoring mechanisms, and report results from an experiment with Vaadin, a web framework based on Java and Google Web Toolkit, GWT.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Suonsyrjä, S., Mikkonen, T.
Number of pages: 16
Pages: 160-175
Publication date: 2015

Designing Mobile Devices Encouraging and Supporting Collocated Interactions

General information
State: Published
Design Patterns for Model-Driven Development

Design patterns document solutions to recurring design and development challenges. UML, which is the de-facto modeling language in software development, supports defining and using patterns with its Collaboration concepts. However, as is demonstrated in the paper, the support is not sufficient for all kinds of patterns and all meaningful ways to use patterns. In this paper, the use of design patterns is suggested for documentation purposes in Model-Driven Development. The pattern support of UML is complemented with an approach that does not constrain the nature of pattern solutions. The approach is tool-supported in a model-driven development tool environment for basic control and safety-related control applications, UML AP tool. The developed tool support includes instantiating and highlighting patterns in models as well as gathering documentation on use of patterns, which could especially benefit safety system development.

General Information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering, Research area: Information Systems in Automation
Authors: Vepsäläinen, T., Kuikka, S.
Number of pages: 18
Pages: 21-38
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Communications in Computer and Information Science
Volume: 555
ISSN (Print): 1865-0929
Ratings:
Scopus rating (2016): SJR 0.162 SNIP 0.317 CiteScore 0.31
Scopus rating (2015): SJR 0.158 SNIP 0.276 CiteScore 0.15
Scopus rating (2014): SJR 0.153 SNIP 0.248 CiteScore 0.13
Scopus rating (2013): SJR 0.14 SNIP 0.22 CiteScore 0.13
Scopus rating (2012): SJR 0.141 SNIP 0.246 CiteScore 0.14
Scopus rating (2011): SJR 0.137 SNIP 0.324 CiteScore 0.16
Scopus rating (2010): SJR 0.133 SNIP 0.214
Scopus rating (2009): SJR 0.125 SNIP 0.176
Scopus rating (2008): SJR 0.117 SNIP 0.043
Developing Novel Services for the Railway Station Area through Experience-Driven Design

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Ojala, J., Korhonen, H., Laaksonen, J., Väänänen, K., Järvi, A., Raisamo, R., Mäkelä, V.
Number of pages: 12
Pages: 73-84
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: ID&A interaction Design & Architecture(S)
Volume: 25
Issue number: 1
ISSN (Print): 1826-9745
Ratings:
Scopus rating (2016): SJR 0.185 SNIP 0.115 CiteScore 0.52
Original language: English
Links:
Research output: Scientific - peer-review › Article

Do we know how difficult the rainfall problem is?
The programming task known as the Rainfall Problem has developed a reputation for being surprisingly difficult for introductory-level (CS1) students. We contribute a survey of studies of the problem as well as a new study of students' solutions collected at three institutions. In all three CS1s, at least about half of the students were able to fully solve the problem and the large majority were at least close. Failure to handle invalid or missing input accounted for most bugs. Our survey and study together suggest that the Rainfall Problem is not necessarily overwhelmingly difficult: Success rates vary and some reasonably good results have been achieved under multiple programming paradigms. We provide a breakdown of confounding factors and suggest improvements and hypotheses for future studies of the Rainfall Problem.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Regulation of learning and active learning methods (REALMEE)
Authors: Seppälä, O., Ihantola, P., Isohanni, E., Sorva, J., Vihavainen, A.
Number of pages: 10
Pages: 87-96
Publication date: 2015

Host publication information
Title of host publication: 15th Koli Calling Conference on Computing Education Research
Publisher: ACM
DOIs:
10.1145/2828959.2828963
Research output: Scientific - peer-review › Conference contribution

Early Product Design in Startups: Towards a UX Strategy
Startups often begin with minimal product versions to test and validate their product ideas as early as possible. Therefore, the first versions of the product need to be able to communicate the product idea to users in order to receive meaningful feedback. However, if user experience (UX) of the product
is poor, users tend to concentrate on the disturbing user interface instead of the actual product idea. Thus, we suggest that startups should have a UX strategy from the beginning in order to understand their goals related to UX at different stages of product maturity. To this end, we conducted an interview study with eight Finland-based startups and 13 participants. Our results contribute towards understanding both needs for early UX design in startups as well as the restrictions for UX work that the scarce resources of startups induce. This work contributes to creating a UX strategy model for startups.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Hokkanen, L., Kuusinen, K., Väänänen, K.
Number of pages: 8
Pages: 217-224
Publication date: 2015

Host publication information
Title of host publication: Product-Focused Software Process Improvement: 16th International Conference, PROFES 2015, Bolzano, Italy, December 2-4, 2015, Proceedings
Publisher: Springer International Publishing
ISBN (Print): 978-3-319-26843-9
ISBN (Electronic): 978-3-319-26844-6

Publication series
Name: Lecture Notes in Computer Science
Volume: 9459
ISSN (Print): 0302-9743
DOIs:
10.1007/978-3-319-26844-6_16
Research output: Scientific - peer-review • Conference contribution

EDB: A Multi-Master Database for Liquid Multi-Device Software
Device shipment trends indicate that the number of web-enabled devices will grow very rapidly. The rapid growth of different types of devices in our daily lives will fundamentally change the expectations on device synchronization. In this paper, we introduce EDB - a database architecture that has been built specifically to support automatic multi-master synchronization between multiple mobile devices with potentially intermittent network connectivity. EDB supports the broader vision of multiple device ownership and liquid software in which applications and services are expected to seamlessly roam from one device or computer to another.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Nokia Technologies
Authors: Koskimies, O., Wikman, J., Mikola, T., Taivalsaari, A.
Number of pages: 4
Pages: 125-128
Publication date: 2015

Host publication information
Title of host publication: 2015 2nd ACM International Conference on Mobile Software Engineering and Systems (MOBILESoft), 16-17 May 2015, Florence
Publisher: IEEE
ISBN (Print): 978-0-7695-5566-9
DOIs:
10.1109/MobileSoft.2015.27
Research output: Scientific - peer-review • Conference contribution

Educational Data Mining and Learning Analytics in Programming: Literature Review and Case Studies
Educational data mining and learning analytics promise better understanding of student behavior and knowledge, as well as new information on the tacit factors that contribute to student actions. This knowledge can be used to inform decisions related to course and tool design and pedagogy, and to further engage students and guide those at risk of failure. This working group report provides an overview of the body of knowledge regarding the use of educational data mining and learning analytics focused on the teaching and learning of programming. In a literature survey on mining students’
programming processes for 2005-2015, we observe a significant increase in work related to the field. However, the majority of the studies focus on simplistic metric analysis and are conducted within a single institution and a single course. This indicates the existence of further avenues of research and a critical need for validation and replication to better understand the various contributing factors and the reasons why certain results occur. We introduce a novel taxonomy to analyse replicating studies and discuss the importance of replicating and reproducing previous work. We describe what is the state of the art in collecting and sharing programming data. To better understand the challenges involved in replicating or reproducing existing studies, we report our experiences from three case studies using programming data. Finally, we present a discussion of future directions for the education and research community.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Regulation of learning and active learning methods (REALMEE)
Number of pages: 23
Pages: 41-63
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 2015 ITiCSE on Working Group Reports
Place of publication: New York, NY, USA
Publisher: ACM
ISBN (Print): 978-1-4503-4146-2
Keywords: educational data mining, learning analytics, literature review, programming, replication
DOIs: 10.1145/2858796.2858798
Source: Bibtex
Source-ID: urn:be2a13ce90750480ee2924cac5c1e05f
Research output: Scientific - peer-review > Conference contribution

Effect of Carouseling on Angular Rate Sensor Error Processes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: Computer engineering, Signal Processing Research Community (SPRC)
Authors: Collin, J., Kirkko-Jaakkola, M., Takala, J.
Number of pages: 11
Pages: 230-240
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: IEEE Transactions on Instrumentation and Measurement
Volume: 64
Issue number: 1
ISSN (Print): 0018-9456
Ratings:
Scopus rating (2016): CiteScore 2.8 SJR 0.926 SNIP 1.614
Scopus rating (2015): SJR 0.949 SNIP 1.931 CiteScore 2.78
Scopus rating (2014): SJR 0.765 SNIP 2.102 CiteScore 2.5
Scopus rating (2013): SJR 0.736 SNIP 2.145 CiteScore 2.67
Scopus rating (2012): SJR 0.737 SNIP 1.835 CiteScore 2.21
Scopus rating (2011): SJR 0.669 SNIP 1.763 CiteScore 1.93
Scopus rating (2010): SJR 0.55 SNIP 1.235
Scopus rating (2009): SJR 0.486 SNIP 1.502
Scopus rating (2008): SJR 0.641 SNIP 1.198
Scopus rating (2007): SJR 0.716 SNIP 1.587
Scopus rating (2006): SJR 0.707 SNIP 1.269
Empowering Industrial Maintenance Personnel with Situationally Relevant Information using Semantics and Context Reasoning

Industrial maintenance is a complex discipline requiring experience and know-how. Information such as maintenance work orders are usually provided through mobile devices to field personnel. There are also other information sources with manuals, documented history, contact information etc. that is of value supporting the tasks at hand but typically this needs to be retrieved manually. The challenge is how to utilize information originating from heterogeneous information sources that, in addition, may change e.g. for outsourced maintenance service providers taking care of different sites. To facilitate the use of supporting materials an ontology knowledge management approach is developed that integrates data and documents, and provides relevant information for the task at hand using context and semantics based reasoning. Results from early prototyping show that the approach can improve utilization of information in existing systems through adapter layers and complement existing mobile as well as upcoming augmented reality applications by automatically providing situationally relevant information.

Experience-Driven Design of Ambiences for Future Pop Up Workspaces

Knowledge work is in transformation and new means for supporting workers’ wellbeing and productivity are needed. Pop Up workspaces are temporary and often social working environments where people can modify their environment to suit their current work mode. The aim of the present research was to explore the opportunities of future Pop Up workspaces, and specifically their technology-mediated ambiances that can provide meaningful experiences for the workers. We employed the Experience-Driven Design (EDD) approach to gain insights of the desired experiences in Pop Up workspaces. We first conducted three participatory group sessions to ideate experience types for Pop Up workspaces. We then run a multidisciplinary concepting workshop in which we designed concepts for technology-mediated ambiances. Five
experience categories for worker mindsets were identified, namely Liberty, Fellowship, Determination, Retreat and Recovery. We present ambience concepts that utilise the mindsets and related target experiences, and how they can be supported by ambient technologies.

**General information**

State: Published

Ministry of Education publication type: A4 Article in a conference publication

Organisations: Department of Pervasive Computing, Research group: Public Buildings, School of Architecture, Department of Information Management and Logistics, Research group: Novi, Research area: User experience, Augmented Human Activities (AHA), Institute of Society and Space (SOCIS)

Authors: Ahtinen, A., Poutanen, J., Vuolle, M., Väänänen, K., Peltoniemi, S.

Number of pages: 17

Pages: 296-312

Publication date: 2015

**Host publication information**

Title of host publication: Ambient Intelligence : 12th European Conference, AmI 2015, Athens, Greece, November 11-13, 2015, Proceedings

Publisher: Springer Verlag

ISBN (Print): 978-3-319-26004-4

ISBN (Electronic): 978-3-319-26005-1

**Publication series**

Name: Lecture Notes in Computer Science

Volume: 9425

ISSN (Print): 0302-9743

DOIs:

10.1007/978-3-319-26005-1_20

Links:

http://www.ami-conferences.org/2015/

**Bibliographical note**

ORG=tie,0.7

ORG=ark,0.2

ORG=tlo,0.1

Research output: Scientific - peer-review › Conference contribution

**Explorative study of teaching programming to vocational teachers in Finland**

In this study we explore the possibility of organizing and structuring an information technology training day for upper secondary vocational teacher training in automotive and transport engineering. The objective is to show the development process of the three training sessions in response to survey data completed by teachers. Information technology has widely penetrated into the car industry during the last few decades but some teachers have difficulty in adapting and teaching new technologies to their students. This paper presents one approach to break the ice between 'old school' teachers and information technology, through the use of an 8-hour training day consisting of programming, electronic technology and data bus technology.

The aim of this study is to discover how to structure training of new technology for experienced vocational teachers. In this paper we describe how we developed, organized and assessed information technology training for vocational teachers within the case study. The training day was organized in three locations in Finland: In Pori, Jyväskylä and Vantaa. After the first surveys were completed by the vocational teachers, the arrangement of the next training day was adjusted in response to the outcome of the initial surveys. After the first lecture session, the training feedback indicated that there should be more 'learning-by-doing' type of action. The next sessions included Arduino board [1], electronic components and a laptop software development environment.

In this study we found that the attitudes of the training attendees were different in three locations around Finland. This is an interesting finding. When comparing the results obtained from Jyväskylä and Vantaa the outcomes were slightly more negative in Jyväskylä than in Vantaa. However the training was identical in both cases. The results also showed a difference in attitude between teachers of different age groups.

One of the biggest problems in this type of training was the limitation of time. Most of the teachers were familiar with the automotive based digital testing equipment, but they were also aware that their students were far more advanced in information technology than they were. This may have generated tensions and resistance from the older generation of teacher when adopting any new technology.

The overall outcome was positive. Teachers were pleased with this training in an automotive context, because it was first time they had received generic technological training. The attendees felt it was important because the training sessions
were targeted directly to them. The collected survey results provided information about what vocational teachers are actually missing in practice. In the conceptual part of this paper we discuss motivation to learn [2], [3] and Adult Education. In the empirical part of this paper we introduce the training method utilized and finally discuss the presented outcomes and conclusions of the survey data.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Data-analytics and Optimization, Research group: Business Ecosystems, Networks and Innovations
Authors: Saari, M., Turunen, J., Linna, P., Aramo-Immonen, H., Huhtala, M., Joel-Edgar, S.
Number of pages: 10
Pages: 2860-2869
Publication date: 2015

Host publication information
Title of host publication: 7th International Conference on Education and New Learning Technologies
ISBN (Electronic): 978-84-606-8243-1
Research output: Scientific - peer-review › Conference contribution

Exploring Attitudes, Knowledge and Competencies for Security Technology: A Cross-Cultural Survey in Higher Education

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), University of Tampere, University of Patras
Authors: Chaudhary, S., Zhao, Y., Berki, E., Valtanen, J., Li, L., Helenius, M., Mystakidis, S., Nalam, T., Thapa, R. B.
Number of pages: 8
Pages: 11-18
Publication date: 2015

Host publication information
Title of host publication: 8th International Conference on ICT, Society and Human Beings 2015
ISBN (Print): 978-989-8533-41-8
Research output: Scientific - peer-review › Conference contribution

Faster 128-EEA3 and 128-EIA3 Software
The 3GPP Task Force recently supplemented mobile LTE network security with an additional set of confidentiality and integrity algorithms, namely 128-EEA3 and 128-EIA3 built on top of ZUC, a new keystream generator. We contribute two techniques to improve the software performance of these algorithms. We show how delayed modular reduction increases the efficiency of the LFSR feedback function, yielding performance gains for ZUC and thus both 128-EEA3 and 128-EIA3. We also show how to leverage carryless multiplication to evaluate the universal hash function making up the core of 128-EIA3. Our software implementation results on Qualcomm’s Hexagon DSP architecture indicate significant performance gains when employing these techniques: up to roughly a 2.4-fold and a 4-fold throughput improvement for 128-EEA3 and 128-EIA3, respectively.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Avanzi, R., Brumley, B. B.
Number of pages: 10
Pages: 199-208
Publication date: 2015

Host publication information
Title of host publication: Information Security, 16th International Conference, ISC 2013, Dallas, Texas, November 13-15, 2013, Proceedings
Volume: 7807
Publisher: Springer Verlag
Editor: Desmedt, Y.
ISBN (Print): 978-3-319-27658-8
ISBN (Electronic): 978-3-319-27659-5
Faster Software for Fast Endomorphisms

GLV curves (Gallant et al.) have performance advantages over standard elliptic curves, using half the number of point doublings for scalar multiplication. Despite their introduction in 2001, implementations of the GLV method have yet to permeate widespread software libraries. Furthermore, side-channel vulnerabilities, specifically cache-timing attacks, remain unpatched in the OpenSSL code base since the first attack in 2009 (Brumley and Hakala) even still after the most recent attack in 2014 (Benger et al.). This work reports on the integration of the GLV method in OpenSSL for curves from 160 to 256 bits, as well as deploying and evaluating two side-channel defenses. Performance gains are up to 51%, and with these improvements GLV curves are now the fastest elliptic curves in OpenSSL for these bit sizes.

From Apps to Liquid Multi-Device Software

Authors: Brumley, B. B.
Number of pages: 14
Pages: 127-140
Publication date: 2015

Host publication information
Title of host publication: Constructive Side-Channel Analysis and Secure Design - 6th International Workshop, COSADE 2015, Berlin, Germany, April 13-14, 2015. Revised Selected Papers
Volume: 9064
Publisher: Springer Verlag
Editors: Mangard, S., Poschmann, A. Y.
ISBN (Print): 978-3-319-21475-7
ISBN (Electronic): 978-3-319-21476-4

Publication series
Name: Lecture Notes in Computer Science
Publisher: Springer
DOI: 10.1007/978-3-319-21476-4_9
Source: Bibtex
Source-ID: urn:6320d66c3887533ed517049ca61ed4a9
Research output: Scientific - peer-review › Conference contribution

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Taivalsaari, A., Mikkonen, T.
Number of pages: 7
Pages: 34-40
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Procedia Computer Science
Volume: 56
ISSN (Print): 1877-0509
Scopus rating (2016): SJR 0.267 SNIP 0.705 CiteScore 0.88
From Mobile to Wearable: Using Wearable Devices to Enrich Mobile Interaction

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Schneegass, S., Mayer, S., Olsson, T., Van Laerhoven, K.
Number of pages: 4
Pages: 936-939
Publication date: 2015

**Host publication information**
Title of host publication: MobileHCI '15 Proceedings of the 17th International Conference on Human-Computer Interaction with Mobile Devices and Services Adjunct
Place of publication: New York, NY, USA
Publisher: ACM
ISBN (Print): 978-1-4503-3653-6
Keywords: Actuating, Interaction, Sensing, Smart Garments, Wearable Computing, Workshop
DOIs: 10.1145/2786567.2795396
Source: Bibtex
Source-ID: urn:74ea2520ad933c6ee89eadda4560d0d5

**Getting started with the experience design process**
A shared vision of the targeted user experience and further user experience goals are required when designing for experiences. To achieve this, the design process should start with an experience-goals elicitation process where all relevant stakeholders together prioritize and choose the target experience goals. In the subsequent evaluation, appropriate metrics are needed to ensure that the targeted experiences are realized.

**General information**
State: Published
Ministry of Education publication type: D2 Article in professional manuals or guides or professional information systems or textbook material
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Varsaluoma, J., Vääätäjä, H., Kaasinen, E., Karvonen, H., Lu, Y.
Pages: 125-127
Publication date: 2015

**Host publication information**
Title of host publication: User Experience and Usability in Complex Systems - UXUS : FIMECC Publications Series No. 8, 2010-2015
ISBN (Print): 978-952-238-146-0
ISBN (Electronic): 978-952-238-147-7

**Publication series**
Name: FIMECC Publication series
Publisher: FIMECC Oy
Volume: 8
ISSN (Print): 2342-2688
ISSN (Electronic): 2342-2696
ASJC Scopus subject areas: Human-Computer Interaction
High-Level Synthesis Design Flow for HEVC Intra Encoder on SoC-FPGA

This paper presents a High-Level Synthesis (HLS) flow for mapping a software HEVC encoder into Altera CycloneV SoC-FPGA. The starting point is a C implementation of an open-source Kvazaar HEVC intra encoder, which is minimally refined for SystemC design space exploration and automatic Catapult-C RTL generation. The final implementation involves Kvazaar encoder executed in Linux on dual-core ARM, and HW accelerated intra prediction on FPGA. Changing the SW/HW partitioning or modifying the implementation takes hours instead of weeks with Catapult-C HLS. In addition, the design is portable to other platforms without major manual re-writing. We obtained 9 fps full-HD intra prediction speed with a single accelerator on Altera Cyclone V SX on Terasic VEEK-MT-C5SoC board including video capture and HEVC video streaming via Ethernet. To the best of our knowledge, this is the first reported HLS assisted implementation of HEVC encoder on SoC-FPGA.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Computer engineering, Signal Processing Research Community (SPRC)
Authors: Sjövall, P., Virtanen, J., Vanne, J., Hämäläinen, T. D.
Number of pages: 8
Pages: 49 - 56
Publication date: 2015
Increasing user and customer understanding through rapid ethnography in emerging markets

Rapid ethnography enables us to gain an in-depth understanding of customers and end-users as well as the business of the customers and the local market. A new approach was developed and trialled for company R&D purposes at Konecranes during the FIMECC UXUS programme.
In Search of the Emotional Design Effect in Programming

A small number of recent studies have suggested that learning is enhanced when the illustrations in instructional materials are designed to appeal to the learners' emotions through the use of color and the personification of key elements. We sought to replicate this emotional design effect in the context of introductory object-oriented programming (OOP). In this preliminary study, a group of freshmen studied a text on objects which was illustrated using anthropomorphic graphics while a control group had access to abstract graphics. We found no significant difference in the groups' scores on a comprehension post-test, but the experimental group spent substantially less time on the task than the control group. Among those participants who had no prior programming experience, the materials inspired by emotional design were perceived as less intelligible and appealing and led to lower self-reported concentration levels. Although this result does not match the pattern of results from earlier studies, it shows that the choice of illustrations in learning materials matters and calls for more research that addresses the limitations of this preliminary study.
Interaction and humans in internet of things

Internet of Things is mainly about connected devices embedded in our everyday environment. Typically, ‘interaction’ in the context of IoT means interfaces which allow people to either monitor or configure IoT devices. Some examples include mobile applications and embedded touchscreens for control of various functions (e.g., heating, lights, and energy efficiency) in environments such as homes and offices. In some cases, humans are an explicit part of the scenario, such as in those cases where people are monitored (e.g., children and elderly) by IoT devices. Interaction in such applications is still quite straightforward, mainly consisting of traditional graphical interfaces, which often leads to clumsy co-existence of human and IoT devices. Thus, there is a need to investigate what kinds of interaction techniques could provide IoT to be more human oriented, what is the role of automation and interaction, and how human originated data can be used in IoT.
Internal Marketplace as a Mechanism for Promoting Software Reuse

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Managing digital industrial transformation (mDIT)
Authors: Ripatti, M., Kilamo, T., Salli, K., Mikkonen, T.
Number of pages: 15
Pages: 119-133
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 14th Symposium on Programming Languages and Software Tools

Publication series
Name: CEUR Workshop Proceedings
Volume: 1525
ISSN (Electronic): 1613-0073
Research output: Scientific - peer-review › Conference contribution

Jossakin vuoti öljy, muualla tihkuivat tiedot - etiikka katoavien rajojen ja suurten skandaalien aikakaudella

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Pori Department
Authors: Lilja, K.
Number of pages: 16
Pages: 85-101
Publication date: 2015

Host publication information
Title of host publication: Silmät auki It-etiikkaan
Publisher: EDUSKUNNAN TULEVAISUUSVALIOKUNTA
ISBN (Print): 978-951-53-3581-4

Publication series
Name: Eduskunnan tulevaisuusvaliokunnan julkaisu
No.: 12
ISSN (Print): 2342-6594
ISSN (Electronic): 2342-6608
Links:

Bibliographical note
AUX=pla,"Lilja, Karl"
Research output: Scientific - peer-review › Chapter

Kvazaar HEVC encoder for Efficient Intra Coding

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Computer engineering, Signal Processing Research Community (SPRC), Tampere University of Technology
Authors: Viitanen, M., Koivula, A., Lemmetti, A., Vanne, J., Hämäläinen, T. D.
Number of pages: 4
Pages: 1662-1665
Publication date: 2015

Host publication information
Lean Startup Meets Software Product Lines: Survival of the Fittest or Letting Products Bloom?
Startups often operate with limited resources and are desperate for validating their products as fast as possible. Such validation is the key concept in Lean Startup, where companies build, measure and learn by creating multiple Minimum Viable Products (MVP). Similarly, Software product lines (SPL) promise increased productivity and reduced time-to-market in situations where multiple similar products are created. In this paper, we propose that there are parallels between these methods. We investigated two software companies using the Lean Startup method through a case study. We found that the companies had a hard time closing developed MVPs which were already used by customers. They ended up with multiple MVPs in production, tying up all the resources. This situation shares many parallels with classic SPLs such as product versioning and lifecycle management. This would indicate that we could use the established knowledge of SPLs to help manage MVP production and its risks.

Learning Analytics Architecture to Scaffold Learning Experience through Technology-based Methods
The challenge of delivering personalized learning experiences is often increased by the size of classrooms and online learning communities. Serious Games (SGs) are increasingly recognized for their potential to improve education. However, the issues related to their development and their level of effectiveness can be seriously affected when brought too rapidly into growing online learning communities. Deeper insights into how the students are playing is needed to deliver a comprehensive and intelligent learning framework that facilitates better understanding of learners’ knowledge, effective assessment of their progress and continuous evaluation and optimization of the environments in which they learn. This paper discusses current SOTA and aims to explore the potential in the use of games and learning analytics towards scaffolding and supporting teaching and learning experience. The conceptual model (ecosystem and architecture) discussed in this paper aims to highlight the key considerations that may advance the current state of learning analytics, adaptive learning and SGs, by leveraging SGs as an suitable medium for gathering data and performing adaptations.
Lightweight Immaterial Particle Displays with Mid-Air Tactile Feedback

Immaterial mid-air displays formed of flowing light-scattering particles are becoming feasible for displaying information in thin air and interacting with it. With light-weight desktop fogscreens and low-cost hand tracking, the user can easily and unobtrusively interact with virtual information. Any real objects can be seen or reached through the screen, as it is permeable and almost intangible. However, no tactile feedback can be perceived when interacting with a mid-air display.

Our contribution in this paper is the construction of an interactive mid-air fogscreens employing ultrasonic phased arrays in order to create mid-air tactile feedback. The feedback is suitable for small desktop-sized fogscreens. This creates a mixed reality setup where real objects and e.g., augmented reality content can be brought closer together conceptually and physically. In an experimental evaluation of the mid-air tactile feedback for the fogscreens we found no statistically significant difference in performance, but the mid-air tactile feedback was slightly preferred over no tactile feedback by the users. They found the tactile feedback as more engaging.

Localization of Storyboards for Cross-cultural User Studies

Storyboards are useful for presenting ideas visually to users helping them understand possible uses of technology allowing them to identify with use situations, especially when no prototypes are available to demonstrate. Storyboards are good for cross-cultural user studies, because they reduce the amount of text users with different native languages have to read. Storyboards are easy to implement in online surveys, which are convenient in gathering data from geographically dispersed groups of users. However, creating localized storyboards requires considering a number of culture related factors. Little research exists in Human-Computer Interaction about how to create localized storyboards for online UX surveys although the need for gathering global user feedback of technology products and services noticeable. We used two focus groups with Chinese participants to inform the design of localization of storyboards for an online survey. Results showed that localization was successful and some design implications were found of localizing storyboards.
Managing software engineering competences with domain ontology for customer and team profiling and training

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems, Tallinn University of Technology, Tallinn, Estonia
Authors: Robal, T., Ojastu, D., Kalja, A., Jaakkola, H.
Number of pages: 7
Pages: 1369 - 1376
Publication date: 2015

Host publication information
Title of host publication: PICMET '15 : Proceedings, Management of the Technology Age, August 2 - 6, 2015
Place of publication: Portland, Oregon, USA
Publisher: PICMET
Editor: Kocaoglu, D.
DOIs:
10.1109/PICMET.2015.7273171
Research output: Scientific - peer-review › Conference contribution

On the Design of a Collaborative Online Development Environment

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Nieminen, A.
Number of pages: 73
Publication date: 2015

Publication information
Place of publication: Tampere
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1317
ISSN (Print): 1459-2045

Bibliographical note
Awarding institution: Tampere University of Technology
Research output: Collection of articles › Doctoral Thesis

On the Design of a Responsive User Interface for a Multi-Device Web Service
The introduction of numerous new, web-enabled devices is leading to a change in the mindset in the design of web systems. Increasingly often, they are designed to take into account the special characteristics of different devices. In terms of implementation, designing these responsive web services requires frameworks and guidelines for user interface design for both desktop and mobile devices. In this paper we present a case study which was done during the implementation of open data. Fi service. During the project responsive mobile user interfaces were implemented to existing open source software with preserving as much of the original layouts as possible. We provide some insights to tools and libraries used.
in building the responsive user interfaces and share some of the findings that work well in customizing existing software. We also provide examples of solutions that won't work so well and look how to solve them properly.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Gofore Ltd
Authors: Voutilainen, J., Salonen, J., Mikkonen, T.
Number of pages: 4
Pages: 60-63
Publication date: 2015

**Host publication information**
Title of host publication: MOBILESoft '15 Proceedings of the Second ACM International Conference on Mobile Software Engineering and Systems
Publisher: IEEE
ISBN (Print): 978-0-7695-5566-9
DOIs: 10.1109/MobileSoft.2015.16
Research output: Scientific - peer-review › Conference contribution

**On the Role of Gamification and Localization in an Open Online Learning Environment: Javala Experiences**
Massive Open Online Courses (MOOCs) have rapidly become an important tool for educational institutes in teaching programming. Nevertheless, high drop-out rates have always been a problem in online learning. As MOOCs have become an important part of modern education, reducing the drop-out rate has become a more and more relevant research problem. This work studies a nine-year-long period of maintaining an open, online learning environment of programming. The aim is to find out how the implementation of the learning environment could engage the students to learning and this way affect the drop-out rate. We provide an insight to experiences stemming from nine years of data collected with Javala, an online system created to help shifting from C++ to Java programming. The paper also discusses two key properties of Javala, gamification, and localization, together with data to assess their significance.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Regulation of learning and active learning methods (REALMEE), Solita Oy
Authors: Lehtonen, T., Aho, T., Isohanni, E., Mikkonen, T.
Number of pages: 10
Pages: 50-59
Publication date: 2015

**Host publication information**
Title of host publication: 15th Koli Calling Conference on Computing Education Research
Publisher: ACM
DoIs: 10.1145/2828959.2828973
Research output: Scientific - peer-review › Conference contribution

**Optimal operation of a three camera system on a four-wheel robot**
At present the automated moving of a robot is made possible by a complete measurement system including GPS, laser scanners, radars and static cameras. Such approach is reliable but rather expensive. In this paper the optimal operation of a three camera system on a four-wheel robot is studied. The benefit of the dynamic camera system over the complete static measurement system is the reasonable price and the possibility to focus at certain directions.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Authors: Raunio, J., Ritala, R., Välimäki, T.
Pages: 968-973
Publication date: 2015

**Host publication information**
Pattern recognition with Spiking Neural Networks: a simple training method
As computers are getting more pervasive, software becomes transferable to different types of hardware and, at the extreme, being bio-compatible. Recent efforts in Artificial Intelligence propose that software can be trained and taught instead of “hard-coded” sequences. This paper addresses the learnability of software in the context of platforms integrating biological components. A method for training Spiking Neural Networks (SNNs) for pattern recognition is proposed, based on spike timing dependent plasticity (STDP) of connections. STDP corresponds to the way connections between neurons change according to the spiking activity in the network, and we use STDP to stimulate outputs of the network shortly after feeding it with a pattern as input, thus creating specific pathways in the network. The computational model used to test this method through simulations is developed to fit the behaviour of biological neural networks, showing the potential for training neural cells into biological processors.

Patterns for Distributed Machine Control Systems
Control systems are getting more and more complex and include growing number of features. The control systems are nowadays software controlled to high degree. All features of the machine, however, are not useful for all customers and customers do not want to pay for the features they do not need. The product, the work machine, needs to be tailored to fit the customer's needs. However, tailoring the product for each customer is not an option as there would be too many control system software versions and configurations of the control system and for example updating the control system software would became impossible. In this paper, we will present three patterns for control systems to help in addressing the aforementioned problems. These patterns generate software architecture that supports varying the control system for different customer needs.
Perceived Impacts as User Experience Components in Mobile News Making with Smartphones

This chapter discusses users’ perceptions of system impacts as one of the user experience components. Findings from twelve case studies on mobile news making with smartphones are summarized, focusing on the perceived impacts of system use and system characteristics that can contribute to user's perception of system quality. The findings indicate that the perceived impacts of system, i.e., the benefits and costs, for the mobile user, activity, outcome (news and news content), and journalism are important for understanding user experience and therefore the overall evaluative judgments of the system.

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Väätäjä, H.
Number of pages: 21
Pages: 218-238
Publication date: 2015

Host publication information
Title of host publication: Emerging Perspectives on the Design, Use, and Evaluation of Mobile and Handheld Devices
Publisher: IGI Global
Editor: Lumsden, J.
ISBN (Print): 9781466685833
ISBN (Electronic): 9781466685840
ASJC Scopus subject areas: Human-Computer Interaction, Information Systems, Organizational Behavior and Human Resource Management
Keywords: user experience, Impact, component, impression, perceived impact, benefit, cost, mobile work, mobile system, news making, mobile, work, outcome, news, content, work tool, smartphone, journalism
DOIs: 10.4018/978-1-4666-8583-3
Research output: Scientific - peer-review › Chapter

Phishing knowledge based user modelling in software design
Due to the limitations of anti-phishing software and limitations in creating such software, we propose the usage of metamodelling frameworks and software tools for implementing software systems where phishing prevention is already designed as a part of the system itself. An expressive computational, verifiable and validatable metamodel is created that captures user behaviour.

Next it is shown through examples that the metamodel follows and describes reported phishing scams accurately. The model is then used to create specification in an executable formal specification tool. The formal specification, which can be executed to observe user behaviour, can be used as a building block in the specification of a larger software system, resulting in an inherently phishing-resilient software system design in the form of a formal specification.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Information security, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Mathematical modelling with wide societal impact (MathImpact)
Authors: Li, L., Nummenmaa, T., Berki, E., Helenius, M.
Number of pages: 15
Pages: 221-235
Publication date: 2015

Host publication information
Pluggable Systems as Architectural Pattern: An Ecosystemability Perspective

In this paper we review the use of plug-in architectures as a technological platform for software ecosystems. Our observation is that the software community has viewed and used plug-ins as powerful extension mechanisms offering a wide range of quality properties. Looking beyond such low-level technical interpretation, we argue that pluggable systems should be perceived and treated as a higher level architectural pattern. In order to back our perspective we present the pattern following widely adopted documentation scheme, we show example usage of the pattern in the Eclipse ecosystem, and we discuss different implementation options of the pattern when building new technical solutions for ecosystems.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Syeed, M. M. M., Lokhman, A., Mikkonen, T., Hammouda, I.
Publication date: 2015

Host publication information
Title of host publication: ECSAW '15 Proceedings of the 2015 European Conference on Software Architecture Workshops
Publisher: ACM
Article number: 42
ISBN (Print): 978-1-4503-3393-1
DOIs: 10.1145/2797433.2797477
Research output: Scientific - peer-review › Conference contribution

pocl: A Performance-Portable OpenCL Implementation

OpenCL is a standard for parallel programming of heterogeneous systems. The benefits of a common programming standard are clear; multiple vendors can provide support for application descriptions written according to the standard, thus reducing the program porting effort. While the standard brings the obvious benefits of platform portability, the performance portability aspects are largely left to the programmer. The situation is made worse due to multiple proprietary vendor implementations with different characteristics, and, thus, required optimization strategies.

In this paper, we propose an OpenCL implementation that is both portable and performance portable. At its core is a kernel compiler that can be used to exploit the data parallelism of OpenCL programs on multiple platforms with different parallel hardware styles. The kernel compiler is modularized to perform target-independent parallel region formation separately from the target-specific parallel mapping of the regions to enable support for various styles of fine-grained parallel resources such as subword SIMD extensions, SIMD datapaths and static multi-issue. Unlike previous similar techniques that work on the source level, the parallel region formation retains the information of the data parallelism using the LLVM IR and its metadata infrastructure. This data can be exploited by the later generic compiler passes for efficient parallelization.

The proposed open source implementation of OpenCL is also platform portable, enabling OpenCL on a wide range of architectures, both already commercialized and on those that are still under research. The paper describes how the portability of the implementation is achieved. We test the two aspects to portability by utilizing the kernel compiler and the OpenCL implementation to run OpenCL applications in various platforms with different style of parallel resources. The results show that most of the benchmarked applications when compiled using pocl were faster or close to as fast as the best proprietary OpenCL implementation for the platform at hand.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Jääskeläinen, P., De La Lama, C. S., Schnetter, E., Raikila, K., Takala, J., Berg, H.
Number of pages: 34
Pages: 752-785
Publication date: 2015
Peer-reviewed: Yes
Requirements, Architecture, and Quality in a Mission-Critical System: 12 Lessons Learned

Public tender processes typically start with a comprehensive specification phase, where representatives of the eventual owner of the system, usually together with a hired group of consultants, spend a considerable amount of time to determine the needs of the owner. For the company that implements the system, this setup introduces two major challenges: (1) the written down requirements can never truly describe to a person, at least to one external to the specification process, the true intent behind the requirement; (2) the vision of the future system, stemming from the original idea, will change during the specification process – over time simultaneously invalidating at least some of the requirements. This paper reflects the experiences encountered in a large-scale mission critical information system – ERICA, an information system for the emergency services in Finland – regarding design, implementation, and deployment. Based on the experiences we propose more dynamic ways of system specification, leading to simpler design, implementation, and deployment phases and finally to a better perceived quality.

Rolling Out a Mission Critical System in an Agilish Way: Reflections on Building a Large-Scale Dependable Information System for Public Sector

Despite the increasing pace of development and deployment of new software systems, the expectations regarding critical information systems have not changed. Consequently, to ensure high quality in spite of rapid updates, the fashion these facilities are taken to use need careful considerations. This paper presents and analyses real-life experiences gathered during the many years of planning, design, implementation, testing and finally deploying as a service a large, multi-million euro, extremely mission critical information system for emergency services. The project was to be carried out in an agile way, although the scope, the price and the duration were fixed by signed contracts. Fortunately, the customer was willing and able to learn how to do system development iteratively and incrementally, as well as to provide personnel to constantly collaborate with the developers. Along the way, we learned that to truly succeed in such an endeavor as this one, it is not enough to do the things almost right or by the book. Instead, everyone involved must keep raising the bar every day, in a continuous, disciplined, and controlled way.
Service Architecture and Interface Design for Mobile Machine Parameter Optimization System

Abstract Performance improvement is a constantly important topic in manufacturing, and mobile work machines are no exception. In some mobile machines, machine behaviour is affected by various device parameters. Their effect can be examined by statistical analysis, but exploiting analysis results during machine operation requires a sophisticated distributed information system. This paper introduces an architecture for such a system suitable for geographically dispersed machine fleets. It covers aspects on data collection, storage, analysis and utilization. Once statistical analysis has been performed, its results are made available for applications that assess machine performance locally during operation. If there is room for improvement in parameter values, the operator of the machine is given suggestions to change them. A prototype implementation is presented. The results show that such an information system has a considerable potential of bringing competitive advantage to machine operators. Besides, added value is also expected to the manufacturer of the machine as performance-related knowledge is augmented. Thus, further service business development is also contributed.

Smartphones as Personal Profile Providers: Enhancing Mobile App Architectures

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Aapo, K., Mikkonen, T.
Number of pages: 4
Pages: 41-44
Publication date: 2015

Host publication information
Title of host publication: 2015 IEEE/ACM 2nd International Workshop on Rapid Continuous Software Engineering (RCoSE)
Publisher: IEEE
ISBN (Print): 9781479919345
DOIs:
10.1109/RCoSE.2015.15
Research output: Scientific - peer-review › Conference contribution

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering, Research area: Information Systems in Automation, Smart Energy Systems (SES)
Authors: Kannisto, P., Hästbacka, D., Vilkko, M., Kuikka, S.
Number of pages: 7
Pages: 848-854
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: IFAC-PapersOnLine
Volume: 48
Issue number: 3
ISSN (Print): 2405-8963
Ratings:
Scopus rating (2016): CiteScore 0.45
Original language: English
Keywords: Service Oriented Computing, In-process Manufacturing Monitoring, Manufacturing Resources and Processes
DOIs:
10.1016/j.ifacol.2015.06.189
Links:
Source: RIS
Source-ID: urn:90F44451FD1CEFE8952D2A6D958A38CF
Research output: Scientific - peer-review › Article

Smartphones as Personal Profile Providers: Enhancing Mobile App Architectures

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Activities that have traditionally been performed with tangible artifacts, e.g. reading the newspaper and browsing printed photos, have increasingly moved to mobile devices. This has made it harder for the surrounding people to become aware of the activities a person is performing with the device. As a result, the possibilities for serendipitous social interactions between the user and the collocated people have diminished. We introduce social displays, additional displays on mobile devices providing social cues about the activities of device user’s activities for surrounding people. We conducted five focus groups with in total 23 participants, each discussing four scenarios and co-designing the presentation of cues on the display. The results suggest that the display has potential to break the private bubble of mobile device activities, as well as to provide tickets-to-talk to enhance social interaction, especially between acquaintances. We discuss social opportunities and challenges as well as possible design directions for social displays.
Spicing Up Open Source Development with a Touch of Crowdsourcing

Leveraging the work and innovation of third party developers has risen as a viable business model for software companies. Most obviously, open source software has become an opportune ecosystem for creating innovative products with minimum number of paid developers. Then, having a company core where most of the development is done in-house by developers employed by the company can lead to a situation where the community contributions are not smoothly integrated into the code base of the open source product. Similarly, during the last decade, the use of the specialized workforce available online -- so-called crowd sourcing -- has received a lot of attention. While tapping into the unknown group of experts differs from the open source community-driven approach, they share certain similarities as well. In this paper, we present results of an initial study on how adopting and utilizing elements from crowd sourcing can help to boost community contributions in company lead development of an open source software product. We further discuss how such activity can be supported by an in-house development model where all contributions whether done by the developers of the company or community participants enter a common, automated integration pipeline.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Managing digital industrial transformation (mDIT)
Authors: Kilamo, T., Rahikkala, J., Mikkonen, T.
Number of pages: 8
Pages: 390-397
Publication date: 2015

Host publication information
Title of host publication: 2015 41st Euromicro Conference on Software Engineering and Advanced Applications (SEAA)
Publisher: IEEE
ISBN (Print): 978-1-4673-7585-6
DOI: 10.1109/SEAA.2015.33
Research output: Scientific - peer-review › Conference contribution

Supplier's Expectations on Usage Data Analytics of Complex Industrial Systems

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, University of Tampere
Authors: Vääätäjä, H., Heimonen, T., Tiitinen, K., Hakulinen, J., Turunen, M.
PUBLICATION DATE: 2015

Host publication information
Title of host publication: ISPIM Innovation Summit 2015
Publisher: International Society for Professional Innovation Management ISPIM
Editors: Huizingh, E., Conn, S., Bitran, I.
ISBN (Electronic): 9781911136002
Keywords: data analytics, user, usage data analytics, user experience, logging, user interaction, human-technology interaction, human-computer interaction, metals and engineering industry, manufacturing, MMS
ASJC Scopus subject areas: Human-Computer Interaction, Information Systems, Management of Technology and Innovation
Research output: Scientific - peer-review › Conference contribution

Teaching Distributed Agile Development to Software Professionals: A Flexible Approach

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Technologies for databases change management

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems
Authors: Jannaschk, K., Jaakkola, H., Thalheim, B.
Number of pages: 15
Pages: 271-285
Publication date: 2015

Host publication information
Title of host publication: New Trends in Database and Information Systems II. Selected papers of the 18th East European Conference on Advances in Databases and Information Systems and Associated Satellite Events, ADBIS 2014, Ohrid, Macedonia, September 7-10, 2014, Proceedings II
Publisher: Springer International Publishing
Editors: Bassiliades, N., Ivanovic, M., Kon-Popovska, M., Manolopoulos, Y., Palpanas, T., Trajcevski, G., Vakali, A.
ISBN (Print): 978-3-319-10517-8
ISBN (Electronic): 978-3-319-10518-5

Publication series
Name: Advances in Intelligent Systems and Computing
Volume: 312
ISBN (Print): 2194-5357
DOIs: 10.1007/978-3-319-10518-5_21

Bibliographical note
Siirretään Portfolio15
Contribution: organisation=pla,FACT1=1<br/>
Portfolio EDEND: 2014-12-16
Publisher name: Springer International Publishing
Source: researchoutputwizard
Source-ID: 10
Research output: Scientific - peer-review › Conference contribution

Teollista Internetiä työkoneissa – palveluarkkitehtuuri suorituskyvyn optimointiin

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Research area: Information Systems in Automation
Authors: Kannisto, P., Hästbacka, D., Kuikka, S.
Publication date: 2015

Host publication information
Title of host publication: Automaatio XXI Seminaari, 17.-18.3.2015, Helsinki. SAS julkaisusarja
Place of publication: Helsinki
Publisher: Suomen Automaatioseura ry
ISBN (Print): 978-952-5183-46-7

Publication series
Name: SAS julkaisusarja
No.: 44
ISSN (Print): 1455-6502
Research output: Scientific - peer-review › Conference contribution

The Fuzzy Front End of Experience Design: Workshop Proceedings
To start an experience design process, the designers should determine what experience they intend to aim for. How should this decision be made? In the fuzzy front end of the experience design process, there are often several alternative sources for gaining insight and inspiration. There may be different, even conflicting viewpoints and opinions. In addition to user studies, insight and inspiration for experience, goals can be sought from brand promises, technology and societal trends, as well as from just a vision of renewal.
In these proceedings, we present the results of the “Fuzzy Front End of Experi-
ence Design” workshop held in NordiCHI 2014 in Helsinki. The workshop brought together practitioners and academics to share knowledge and lessons learned on and explore how to get from the fuzzy front end to a shared vision of the experience to aim for.

We accepted to the workshop eight excellent position papers that presented experience goal setting on different fields. Prior to the workshop, we collected with an online questionnaire participants’ views related to experience design. These results were analysed and presented in the workshop. During the workshop, we shared experiences and discussed where insight and inspiration to experience goals setting can be sought, what the characteristics of good experience goals are, and how experience goals should be communicated. Our goal is that this report will provide inspiration and guidance to defining experience goals, thus shedding light on the fuzzy front end of experience design.

These proceedings include the following: an introduction and description of the workshop as well as related phases and activities, an overview of the survey results, results of the workshop activities, and the position papers presented at the workshop. The description of the workshop has been published earlier in NordiCHI 2014 conference proceedings. The papers have been published on the workshop website.

General information
State: Published
Ministry of Education publication type: D6 Edited professional books
Organisations: Department of Pervasive Computing, Research area: User experience, VTT Technical Research Centre of Finland
Authors: Kaasinen, E., Karvonen, H., Lu, Y., Varsaluoma, J., Väätäjä, H.
Number of pages: 76
Publication date: 2015

Publication information
Publisher: Teknologian tutkimuskeskus VTT Oy
Original language: English
Links:
Research output: Professional › Anthology

The Fuzzy Front End of Experience Design: Eliciting and Communicating Experience Goals
When starting an experience design process, designers should first determine the experience to aim for. In the fuzzy front end of the experience design process, there are often several alternative sources for gaining insight and inspiration in defining this experience. In this paper, we describe the results of a survey where we studied experience design practitioners’ views of experience goal setting and approaches to communicate about these goals with stakeholders. The results from 9 different design cases suggest that “empathic understanding of the users’ world” is the most used source of insight and inspiration in defining experience goals. As an end result, we propose an initial model for an Experience Goal Elicitation Process to clarify the fuzzy front end of experience design. Also, instructions to support designers in defining and evaluating experience goals are presented.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA), VTT Technical Research Centre of Finland
Authors: Varsaluoma, J., Väätäjä, H., Kaasinen, E., Karvonen, H., Lu, Y.
Number of pages: 9
Pages: 324-332
Publication date: 2015

Host publication information
Title of host publication: OzCHI ’15 - Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction
Publisher: ACM
ISBN (Print): 978-1-4503-3673-4
Keywords: experience goal, UX goal, experience design, fuzzy front end, survey study, Experience Goal Elicitation Process, experience-driven design, user experience, requirements engineering, user-centered design
ASJC Scopus subject areas: Human-Computer Interaction, Information Systems
Electronic versions:
Fuzzy front-end of experience design
DOIs:
10.1145/2838739.2838761
Links:
The Social Developer – Now, Then, and Tomorrow

The practice of software engineering needs both individual commitment as well as social interaction. It has long been widely recognized that communication problems are a major factor in the delay and failure of software projects. However, the patterns of communication that can be associated with the different development paradigms have gained less attention. In this paper, we present some views to the evolution of social dimensions in the light of software engineering methodologies and associated tools. To study this, we have surveyed a number of software developers working in industry to reflect our views into the state-of-practice in software development companies and shed light to the impact of distributed and agile development has had on developer communication. Towards the end of the paper, we provide some ideas for future research and draw some final conclusions.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Managing digital industrial transformation (mDIT)
Authors: Kilamo, T., Leppänen, M., Mikkonen, T.
Number of pages: 8
Pages: 41-48
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 7th International Workshop on Social Software Engineering
ISBN (Print): 978-1-4503-3818-9
DOIs: 10.1145/2804381.2804388
Research output: Scientific - peer-review › Conference contribution

The spatial presence experience scale (SPES): A short self-report measure for diverse media settings

The study of spatial presence is currently receiving increased attention in both media psychology and communication research. The present paper introduces the Spatial Presence Experience Scale (SPES), a short eight-item self-report measure. The SPES is derived from a process model of spatial presence (Wirth et al., 2007, Media Psychology, 9, 493-525), and assesses spatial presence as a two-dimensional construct that comprises a user's self-location and perceived possible actions in a media environment. The SPES is shorter than many other available spatial presence scales, and can be conveniently applied to diverse media settings. Two studies are reported (N-1 = 290, N-2 = 395) that confirm sound psychometric qualities for the SPES.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Hartmann, T., Wirth, W., Schramm, H., Klimmt, C., Vorderer, P., Gyspers, A., Böcking, S., Ravaja, N., Laarni, J., Saari, T., Gouveia, F., Sacau, A.
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Journal of Media Psychology
Volume: 28
Issue number: 1
ISSN (Print): 1864-1105
Ratings:
Scopus rating (2016): SJR 0.56 SNIP 0.543 CiteScore 1.05
Scopus rating (2015): SJR 0.724 SNIP 0.956 CiteScore 1.19
Scopus rating (2014): SJR 1.747 SNIP 1.327 CiteScore 1.62
Scopus rating (2013): SJR 0.692 SNIP 0.956 CiteScore 1.32
Scopus rating (2012): SJR 1.005 SNIP 0.871 CiteScore 1.36
Scopus rating (2011): SJR 0.695 SNIP 1.116 CiteScore 1.39
Scopus rating (2010): SJR 0.752 SNIP 0.942
Scopus rating (2009): SJR 0.44 SNIP 0.576
Three Dimensional Volume Managers Replacing Window Managers in Augmented Reality Application Paradigm

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Huawei
Authors: Peuhkurinen, A., Mikkonen, T.
Publication date: 2015

Host publication information
Title of host publication: 2nd ACM International Conference on Mobile Software Engineering and Systems
ISBN (Print): 978-0-7695-5566-9
Links:
http://dl.acm.org/citation.cfm?id=2825041.2825075
Research output: Scientific - peer-review › Conference contribution

To UML or not to UML? – Empirical Study on the Approachability of Software Architecture Diagrams
Software architecture design is key to building systems that meet quality demands. Choosing the appropriate way to model the architecture ensures it is rightly understood by everyone involved. UML diagrams are commonly used in software engineering but free-form diagrams are almost as common. In this paper, we study the factors influencing the approachability of diagrams, and particularly whether there is a difference in the approachability between UML and non-UML diagrams and colored and black & white diagrams. Our results show that colors do not necessarily increase the approachability of diagrams and free-form diagrams can suffer from ambiguousness. We conclude that simplicity and correctness are key factors when modeling architectures.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Managing digital industrial transformation (mDIT), Regulation of learning and active learning methods (REALMEE), Vincit Oy
Authors: Eloranta, V., Isohanni, E., Lahtinen, S., Sievi-Korte, O.
Number of pages: 5
Pages: 101-105
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the ASWEC 2015 24th Australasian Software Engineering Conference (ASWEC '15 Vol. II)
Place of publication: New York, NY, USA
Publisher: ACM
ISBN (Electronic): 978-1-4503-3796-0
DOIs:
10.1145/2811681.2811701
Research output: Scientific - peer-review › Conference contribution

Towards an ideal software engineering project course
Software Engineering (SE) project course is usually a capstone of an SE curriculum. With industrial involvement, it may also be one point of mutual interaction. This paper considers a collection of best practices tried out on one university course over a couple of decades, as well as future improvement to attain an ideal SE project course.

General information
State: Published
Towards blended learning: A case study

Abstract - University education is in the middle of a technological and pedagogical revolution. Traditional models are under considerable pressure to change. In this paper, we introduce a case where IT education was radically challenged by new possibilities. The case is a small university department, which runs a Master's degree program for an annual intake of about 60 students. The students study while working either full or part-time. Thus, the key challenge is to enable an efficient balance between work and studies especially by supporting distance learning. This means that the location and schedule of studies have to be flexible. One way has been to increase the multiformity of the pedagogical methods. For example, teaching is moving increasingly toward the flipped classroom method. In addition to the teachers' own video production, external academic Internet sources have been used and experiments have also been made of using external Massive Open Online Course materials for example in executing web development and database courses. This paper is a summary and analysis of the observations from the viewpoint of the students, teachers, and administration. Some plans and future intentions are also presented.

Towards Deeper Understanding of User Experience with Ubiquitous Computing Systems: Systematic Literature Review and Design Framework

Over the past decades, a plethora of innovative ubiquitous computing (ubicomp) systems have been constructed. The acceptance of the systems, however, depends on how users experience them in real contexts. While many of the ubicomp research projects include some form of user study, there is no overview of how user experience (UX) is approached in ubicomp research. To this end, we conducted a systematic literature review of ubicomp UX studies. Our findings reveal that users' experiences with ubicomp systems have often been investigated in rather lightweight ways, for example by addressing basic usability issues, collecting ratings by simple, predetermined scales, or producing descriptions of general experiences such as fun and trust. Based on the findings we argue that a deeper and more fine-grained understanding of
user experience would help developing more successful ubicomp systems. We propose a ubicomp UX framework that can help design and evaluate ubicomp systems with a desirable set of target experiences.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA), University of Lapland
Authors: Väänänen-Vainio-Mattila, K., Olsson, T., Häkkilä, J.
Number of pages: 18
Pages: 384-401
Publication date: 2015

Host publication information
Title of host publication: Human-Computer Interaction – INTERACT 2015 : 15th IFIP TC 13 International Conference, Bamberg, Germany, September 14-18, 2015, Proceedings, Part III
Publisher: Springer Verlag
ISBN (Print): 978-3-319-22697-2
ISBN (Electronic): 978-3-319-22698-9

Publication series
Name: Lecture Notes in Computer Science
Volume: 9298
ISSN (Print): 0302-9743
DOIs: 10.1007/978-3-319-22698-9_26
Research output: Scientific - peer-review » Conference contribution

Towards liquid web applications
As the complexity of rich Web applications grows together with the power and number of Web browsers, the next Web engineering challenge to be addressed is to design and deploy Web applications to make coherent use of all devices. As users nowadays operate multiple personal computers, smart phones, tablets, and computing devices embedded into home appliances or cars, the architecture of current Web applications needs to be redesigned to enable what we call Liquid Software. Liquid Web applications not only can take full advantage of the computing, storage and communication resources available on all devices owned by the end user, but also can seamlessly and dynamically migrate from one device to another continuously following the user attention and usage context. In this paper we address the Liquid Software concept in the context of Web applications and survey to which extent and how current Web technologies can support its novel requirements.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), University of Lugano (USI)
Authors: Mikkonen, T., Systä, K., Pautasso, C.
Number of pages: 10
Pages: 134-143
Publication date: 2015

Host publication information
Title of host publication: Engineering the Web in the Big Data Era : 15th International Conference, ICWE 2015, Rotterdam, The Netherlands, June 23-26, 2015, Proceedings
Publisher: Springer Verlag
ISBN (Print): 978-3-319-19889-7
ISBN (Electronic): 978-3-319-19890-3

Publication series
Name: Lecture Notes in Computer Science
Volume: 9114
ISSN (Print): 0302-9743
ISSN (Electronic): 1611-3349
ASJC Scopus subject areas: Computer Science(all), Theoretical Computer Science
DOIs: 10.1007/978-3-319-19890-3_10
Source: Scopus
Source-ID: 84937402708
Towards Post-Agile Development Practices Through Productized Development Infrastructure

Modern software is developed to meet evolving customer needs in a timely fashion. The need for a rapid time-to-market together with changing requirements has led software intensive companies to utilize agile development, where each iteration aims at producing end-user value and change is embraced. In today’s post-agile software development world, there is a need for processes and tools that deliver new software to the end-user as fast as possible. The level of adoption of these continuous software engineering practices depends on the product, customers, and the business domain. In this paper, we investigate the benefits gained from implementing a completely continuous delivery workflow using a domain specific productized development infrastructure through a descriptive single case study. Embracing the continuous delivery mindset throughout the development pipeline allows the case customer company to gain fast insight on new business directions and lends the services to live experimentation which in turn adds to end-user value. Up-to-date feedback cycles between all stakeholders all the way from concept design to end-users are offered.

User experience goals as a guiding light in design and development – Early findings

User experience (UX) goals are one means to describe user experience requirements and guide the design and evaluation of interactive systems in different application domains. This position paper discusses the results of a pre-workshop questionnaire for participants of a workshop on UX goals and their utilization. The domains of the case studies that participants described vary from workplace to consumer applications and education. Workshop participants defined a good UX goal as something that (1) helps in focusing the design, (2) is measurable, (3) describes positive emotions, and (4) communicates the desired experience. Furthermore, UX goals were considered useful in keeping the focus on important issues during design and development, and providing inspiration for design.
User Experience of Digital News: Two Semi-long Term Field Studies

Reading of digital news on personal devices has dramatically increased. Parallel to new devices, novel service or even content types are created forming new habits and experiences for readers. However, previous research is limited in understanding temporal aspects of such users’ experiences (UX). The goal of this study is to understand user experience of mobile news reading in a real context of use over one week in two different case studies. UX of digital replicas, browser optimized versions of digital news, and novel media authentication method for news reading and ordering were explored with actual news readers (N=36) in field using their own tablets and personal computers. Data-collection included in daily diaries with the UX questionnaires and the retrospective interviews. The results showed that the studied forms of digital news and authentication methods provided positive user experience and they were appealing for future digital news. UX also showed a tendency of improving over a time. In addition, the user’s habits of reading digital news reflected the conventions of reading a print newspaper.

User Experience of Mobile Proximity-Based Applications for Playful Social Interaction

Mobile proximity-based connectivity technology like Wi-Fi Direct allows detecting nearby devices and establishing a direct data transfer between them. The opportunities provided by that are still underutilized. My doctoral research looks into proximity-based playful social interactions as a way to enhance interactivity between collocated people, both friends and
strangers. I do qualitative user research on new research prototypes as well as on existing commercial systems like Nintendo’s StreetPass.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Paasovaara, S.
Number of pages: 4
Pages: 411-414
Publication date: 2015

Host publication information
Title of host publication: CHI PLAY ’15 Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play
Publisher: ACM
ISBN (Print): 978-1-4503-3466-2
Keywords: Proximity-based interaction; playfulness; games
DOIs: 10.1145/2793107.2810279
Research output: Scientific - peer-review › Conference contribution

Using video games to combine learning and assessment in mathematics education

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Pori Department, Research group: TUT Game Lab, Stanford University
Authors: Kiili, K., Devlin, K., Perttula, A., Tuomi, S., Lindstedt, A.
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: International Journal of Serious Games
Volume: 2
Issue number: 4
ISSN (Print): 2384-8766
Original language: English
DOIs: 10.17083/ijsg.v2i4.98
Links: http://journal.seriousgamessociety.org/index.php?journal=IJSG&page=announcement&op=view&path%5B%5D=5
Research output: Scientific - peer-review › Article

UX sensors - Understanding the UX of complex systems through usage analysis

General information
State: Published
Ministry of Education publication type: D2 Article in professional manuals or guides or professional information systems or text book material
Organisations: Department of Pervasive Computing, Research area: User experience, University of Tampere, University of Jyväskylä, Fastems
Authors: Heimonen, T., Tiitinen, K., Turunen, M., Keskinen, T., Väätäjä, H., Varsaluoma, J., Jokinen, J., Nieminen, H.
Pages: 113-115
Publication date: 2015

Host publication information
Title of host publication: User Experience and Usability in Complex Systems - UXUS : FIMECC Publications Series No. 8, 2010-2015
ISBN (Print): 978-952-238-146-0
ISBN (Electronic): 978-952-238-147-7
Publication series
UX work in startups: Current practices and future needs

Startups are creating innovative new products and services while seeking fast growth with little resources. The capability to produce software products with good user experience (UX) can help the startup to gain positive attention and revenue. Practices and needs for UX design in startups are not well understood. Research can provide insight on how to design UX with little resources as well as to gaps about what kind of better practices should be developed. In this paper we describe the results of an interview study with eight startups operating in Finland. Current UX practices, challenges and needs for the future were investigated. The results show that personal networks have a significant role in helping startups gain professional UX advice as well as user feedback when designing for UX. When scaling up startups expect usage data and analytics to guide them towards better UX design.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Hokkanen, L., Väänänen-Vainio-Mattila, K.
Number of pages: 12
Pages: 81-92
Publication date: 2015

Host publication information
Volume: 212
Publisher: Springer Verlag
ISBN (Print): 9783319186115

Publication series
Name: Lecture Notes in Business Information Processing
Volume: 212
ISSN (Print): 1865-1348
Keywords: Lean, Startup, User experience
ASJC Scopus subject areas: Business and International Management, Management Information Systems, Modelling and Simulation, Information Systems, Information Systems and Management, Control and Systems Engineering
DOIs: 10.1007/978-3-319-18612-2_7
Source: Scopus
Source-ID: 84942786975
Research output: Scientific - peer-review › Conference contribution

Vibrotactile Stimulation as an Instructor for Mimicry-Based Physical Exercise
The present aim was to investigate functionality of vibrotactile stimulation in mimicry-based behavioral regulation during physical exercise. Vibrotactile stimuli communicated instructions from an instructor to an exerciser to perform lower extremity movements. A wireless prototype was tested first in controlled laboratory conditions (Study 1) and was followed by a user study (Study 2) that was conducted in a group exercise situation for elderly participants with a new version of the system with improved construction and extended functionality. The results of Study 1 showed that vibrotactile instructions were successful in both supplementing and substituting visual knee lift instructions. Vibrotactile stimuli were accurately recognized, and exercise with the device received affirmative ratings. Interestingly, tactile stimulation appeared to stabilize acceleration magnitude of the knee lifts in comparison to visual instructions. In Study 2 it was found that user experience of the system was mainly positive by both the exercisers and their instructors. For example, exercise with vibrotactile instructions was experienced as more motivating than conventional exercise session. Together the results indicate that tactile instructions could increase possibilities for people having difficulties in following visual and auditory instructions to take part in mimicry-based group training. Both studies also revealed development areas that were primarily related to a
slight delay in triggering the vibrotactile stimulation.

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA), University of Tampere, Audio Riders, Ltd.
Authors: Lylykangas, J., Heikkinen, J., Surakka, V., Raisamo, R., Myllymaa, K., Laitinen, A.
Publication date: 2015
Peer-reviewed: Yes

**Publication information**
Journal: Advances in Human Computer Interaction
Article number: 953794
ISSN (Print): 1687-5893
Ratings:
Scopus rating (2016): SJR 0.529 SNIP 2.021 CiteScore 2.74
Scopus rating (2015): SJR 0.421 SNIP 1.167 CiteScore 1.86
Scopus rating (2014): SJR 0.183 SNIP 0.718 CiteScore 0.99
Scopus rating (2013): SJR 0.228 SNIP 0.943 CiteScore 1
Scopus rating (2012): SJR 0.272 SNIP 1.582 CiteScore 1.09
Scopus rating (2011): SJR 0.556 SNIP 1.518 CiteScore 1.38
Original language: English
ASJC Scopus subject areas: Human-Computer Interaction
DOIs:
10.1155/2015/953794
Links:
http://www.scopus.com/inward/record.url?scp=84947260991&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84947260991
Research output: Scientific - peer-review › Article

**W2E - Wellness Warehouse Engine for Semantic Interoperability of Consumer Health Data**
Novel health monitoring devices and applications allow consumers easy and ubiquitous ways to monitor their health status. However, technologies from different providers lack both technical and semantic interoperability and hence the resulting health data is often deeply tied to a specific service, which is limiting its re-usability and utilization in different services. We have designed a Wellness Warehouse Engine (W2E) that bridges this gap and enables seamless exchange of data between different services. W2E provides interfaces to various data sources and makes data available via unified Representational State Transfer Application Programming Interface (REST API) to other services. Importantly, it includes Unifier – an engine that allows transforming input data into generic units re-usable by other services, and Analyzer – an engine that allows advanced analysis of input data, such as combining different data sources into new output parameters. In this paper, we describe the architecture of W2E and demonstrate its applicability by using it for unifying data from four consumer activity trackers, using a test base of 20 subjects each carrying out three different tracking sessions. Finally, we discuss challenges of building a scalable Unifier engine for the ever-enlarging number of new devices.
Ways to Cross the Rubicon: Pivoting in Software Startups

Startup, or a potential company looking for form and repeatable, scalable business model, has become an advocated mechanism for embracing high ambition, innovativeness, and growth. The success of a startup is often related to the time it takes the startup to develop their business model. When the entire business is based on extreme uncertainty the main business hypothesis of the business model must be continuously tested and improved. This main business hypothesis can be split into smaller business hypotheses and when one of these business hypotheses proves to be false, a change in the direction of the company – so-called pivot – must be considered. Readily made approaches exist to accomplish this, including in particular the Lean Startup framework, that aims at iteratively developing, experimenting, and validating business hypotheses. In this paper study how pivots can change business hypotheses shown as a segments in Lean Model Canvas, a strategic management tool for developing business models. As an empirical contribution, we describe this definition of pivots with three case companies – all small software startups from Tampere region, Finland – and map the pivot effects on the business hypotheses. We found out that the pivots can be identified by changes in the Lean Model Canvas, that pivots typically take place in groups, and that comprehensive pivots happen early in the startup's life, whereas once the business model is clarified, fine-tuning is more likely to take place.
Ways to measure spatial presence: Review and future directions

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Laarni, J., Ravaja, N., Saari, T., Böcking, S., Hartmann, T., Schramm, H.
Number of pages: 27
Pages: 139-185
Publication date: 2015

Host publication information
Title of host publication: Immersed in Media. Telepresence theory, Measurement & Technology
Publisher: Springer
Editors: Lombard, M., Biocca, F., Freeman, J., IJsselsteijn, W., Schaevitz, R.
ISBN (Print): 978-3-319-10189-7
ISBN (Electronic): 978-3-319-10190-3
DOIs:
10.1007/978-3-319-10190-3_8
Links:
http://www.springer.com/computer/hci/book/978-3-319-10189-7

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2015-01-09
Source: researchoutputwizard
Source-ID: 17
Research output: Scientific - peer-review › Chapter

WHIRLBOB, the Whirlpool Based Variant of STRIBOB

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Saarinen, M. O., Brumley, B. B.
Number of pages: 17
Pages: 106-122
Publication date: 2015

Host publication information
Title of host publication: Secure IT Systems - 20th Nordic Conference, NordSec 2015, Stockholm, Sweden, October 19-21, 2015, Proceedings
Publisher: Springer Verlag
Editors: Buchegger, S., Dam, M.
ISBN (Print): 978-3-319-26501-8
ISBN (Electronic): 978-3-319-26502-5

Publication series
Name: Lecture Notes in Computer Science
Publisher: Springer
Volume: 9417
Maximizing Product Value: Continuous Maintenance

General information
State: Published
Organisations: Department of Pervasive Computing, Research area: Software engineering, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Managing digital industrial transformation (mDIT)
Authors: Mikkonen, T., Systä, K.
Number of pages: 4
Pages: 298-301
Publication date: 10 Dec 2014

Host publication information
Title of host publication: Lecture Notes in Computer Science, Vol 8892, Springer : Product Focused Software Process Improvement
Publisher: Springer International Publishing
ISBN (Print): 978-3-319-13834-3
ISBN (Electronic): 978-3-319-13835-0

The fuzzy front end of experience design
The basic idea behind Experience Design approach is that before ideating the solution, you define what experience to design for. This is a critical point in a design process, because the experience goal needs to be appropriate for the target context of use, in line with the brand experience, and meaningful to truly engage users. In the early phases of the experience design process, in the fuzzy front end, there are several sources that can guide experience goal setting. One important way is empathic understanding of the users' world and stepping into the users' shoes, but there are also other sources of insight and inspiration for setting the experiential goals such as brand promise, technology and societal trends as well as mere vision of renewal. In this workshop, we aim to collect examples of the fuzzy front end of the experience design process and analyze how the different sources of insight and inspiration influence experience goal setting.

Copyright is held by the owner/author(s).

General information
State: Published
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA), Aalto University, VTT Technical Research Centre of Finland, School of Arts, Design and Architecture
Authors: Kaasinen, E., Väätäjä, H., Karvonen, H., Lu, Y.
Number of pages: 4
Pages: 797-800
Publication date: 26 Oct 2014

Host publication information
Title of host publication: Proceedings of the NordiCHI 2014: The 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational
Capacitive Facial Activity Measurement

The human facial activity consists of voluntary and spontaneous behavior that can be measured to provide valuable information for several application domains. The objective of this thesis is to introduce a new, capacitive measurement method for the task. The motivation to develop a new method was to avoid some of the drawbacks that existing methods have. The existing ones that have been used to measure activity from the entire face are electromyography (EMG) that measures the electric activity of the facial muscles and image-based methods that use machine vision. EMG has drawbacks due to its requirement to attach electrodes to the face, whereas vision-based methods rely on using cameras and heavy computational processing to collect information about the facial behaviour. The presented capacitive method does not require physical contact to the face, the computational requirements of the needed signal processing are low, and it can be used in mobile applications because the measurement can be integrated to head-mounted devices. The thesis includes several studies where prototypes were constructed, experiments carried out, signal and data processing methods applied, and results analysed. The method was first applied as a way to detect facial movements for human–computer interaction. It was integrated with a gaze tracker to point targets on a computer screen with the gaze and click with facial movements. Later, the method was extended from the detection of single facial movements to be feasible in the detection and classification of movements and expressions of the entire face. It was also applied to the measurement of the activation intensities of certain facial muscles. The results of the thesis show that the new measurement method detects facial movements with a good performance. Pointing and clicking also performs well when the detection method is combined with gaze tracking. The classification of facial movements performs very well with the ones included in the experiments of the thesis, and the classification can be expected to work also with more complex facial expressions. Further, the measurement method’s performance in determining the intensities of facial muscle activations was good for ones that have a wide movement range. Finally, the thesis also states the limitations of the new measurement method and includes suggestions to overcome them and to develop the method further.
Lightweight Evaluation of Software Architecture Decisions

Software architecture is an important foundation of every software project. Therefore, it is advisable to evaluate it in early stages of the software design. Architecture evaluation helps to uncover risks and suboptimal decisions before they cause tremendous cost and re-engineering efforts. Unfortunately, many software companies still do not integrate architecture evaluations into their software projects as a standard activity. This is partially because architecture evaluation is perceived as complicated and time-consuming by some people. Modern agile development methodologies are perceived as avoiding up-front architectural design, which amplifies this problem. In this chapter, we present an extended description of the decision-centric architecture review (DCAR) method. DCAR is lightweight and easy to integrate into different types of software projects (traditional and agile projects). We present the method in detail and show how it can be used in an incremental development process. Additionally, we explain different approaches for integrating DCAR with Scrum to support continuous and iterative architecture evaluation. Finally, we present industrial experiences from the evaluations we carried out using DCAR, both as external reviewers in industrial projects and when applying DCAR in our own industrial software projects.

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Pervasive Computing, University of Groningen, Capgemini, Utah Valley University
Authors: Eloranta, V., van Heesch, U., Avgeriou, P., Harrison, N., Koskimies, K.
Number of pages: 23
Pages: 157-179
Publication date: 25 Jul 2014

Host publication information
Title of host publication: Relating System Quality and Software Architecture
Publisher: Elsevier
ISBN (Print): 9780124171688, 9780124170094
ASJC Scopus subject areas: Computer Science(all)
Keywords: Software architecture, Software architecture decisions, Software architecture evaluation
DOIs:
10.1016/B978-0-12-417009-4.00006-5
Links:
http://www.scopus.com/inward/record.url?scp=84942256624&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84942256624
Research output: Scientific - peer-review › Chapter

Integrating mobile learning, digital storytelling and social media in vocational learning

In this chapter, the focus falls on integrating mobile learning, digital storytelling, and social media into vocational learning practices. The literature review introduces the development of mobile learning and digital storytelling and presents ways in which these concepts can piggyback the interactive features of social media. A case study during which participating students used mobile phones and videos with a mobile social video application (MoViE) to design and produce representative digital stories based on local tourism attractions is also presented. Twenty-five students participated in the internet inquiry about student attitudes towards the use of social media as part of their vocational expertise and their learning experiences with mobile devices and MoViE. This chapter illustrates the benefits as well as the shortcomings of the used learning concept in order to produce more concrete knowledge of the use of mobile devices and social video applications in learning.

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Pori Department, Research group: TUT Game Lab, University of Lapland
Authors: Eriksson, M., Tuomi, P., Vuojärvi, H.
Number of pages: 23
Pages: 365-387
Patterns for controlling chaos in a startup

A growing trend in industrial software engineering is that new software products and information services are developed under conditions of notable uncertainty. This is especially visible in startup enterprises which aim at new kinds of products and services in rapidly changing social web, where potential customers can quickly adopt new behavior. Special characteristics of the startups are lack of resources and funds, and startups may need to change direction fast. All these affect the software engineering practices used in the startups. Unfortunately almost 90 percent of all startups fail and goes bankrupt. There are probably indefinite numbers of reasons why startups fail. Failure might be caused by wrongly chosen software engineering practices or inconsiderate decision making. While there is no recipe for success, we argue that good practices that can help on the way to success can be identified from successful startups. In this paper, we present two patterns that startups can consider when entering the growth phase of the lifecycle.

Two patterns for minimizing human resources in a startup

In this paper, we describe two patterns that are part of a larger pattern language for software startup companies. These two particular patterns help startup companies to focus on the essential: the product itself and keeping their team intact and productive. In this way, the startup may operate with a sustainable team size.
Prediction models and techniques for Open Source Software projects: A systematic literature review

Open Source Software (OSS) is currently a widely adopted approach to developing and distributing software. For effective adoption of OSS, fundamental knowledge of project development is needed. This often calls for reliable prediction models to simulate project evolution and to envision project future. These models provide help in supporting preventive maintenance and building quality software. This paper reports on a systematic literature survey aimed at the identification and structuring of research that offer prediction models and techniques in analyzing OSS projects. In this review, we systematically selected and reviewed 52 peer reviewed articles that were published between January, 2000 and March, 2013. The study outcome provides insight in what constitutes the main contributions of the field, identifies gaps and opportunities, and distills several important future research directions.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Chalmers and University of Gothenburg
Authors: Syeed, M. M. M., Hammouda, I., Systä, T.
Number of pages: 39
Pages: 1-39
Publication date: 1 Apr 2014
Peer-reviewed: Yes

Publication information
Volume: 5
Issue number: 2
ISSN (Print): 1942-3926
Ratings:
Scopus rating (2016): SJR 0.102 SNIP 0 CiteScore 0.07
Scopus rating (2015): SJR 0.127 SNIP 0.185 CiteScore 0.24
Scopus rating (2014): SJR 0.277 SNIP 0.286 CiteScore 0.42
Scopus rating (2013): SJR 0.129 SNIP 0.406 CiteScore 0.21
Scopus rating (2012): SJR 0.179 SNIP 0.818 CiteScore 0.46
Scopus rating (2011): SJR 0.135 SNIP 0.731 CiteScore 0.24
Scopus rating (2010): SJR 0.183 SNIP 0.351
Original language: English
Keywords: Fault prediction, Open Source Software, OSS community, Prediction, Systematic literature review
ASJC Scopus subject areas: Software
DOIs:
10.4018/ijossp.2014040101
Links:
http://www.scopus.com/inward/record.url?scp=84924346193&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84924346193
Research output: Scientific - peer-review › Article

Action-based visualization

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Regulation of learning and active learning methods (REALMEE)
A High Throughput LDPC Decoder using a Mid-range GPU

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Xie, W., Jiao, X., Jääskeläinen, P., Kultala, H., Chen, C., Berg, H., Bie, Z.
Number of pages: 5
Pages: 7565-7569
Publication date: 2014

Host publication information
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-2893-4

Publication series
Name: IEEE International Conference on Acoustics, Speech and Signal Processing
Publisher: IEEE
ISSN (Print): 1520-6149
Links:
http://www.icassp2014.org/home.html


General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Laukkarinen, T., Määttä, L., Suhonen, J., Hännikäinen, M.
Number of pages: 22
Pages: 85-106
Publication date: 2014

Host publication information
Title of host publication: Advancing Embedded Systems and Real-Time Communications with Emerging Technologies
Publisher: IGI Global
Editor: Virtanen, S.
ISBN (Print): 978-1-4666-6034-2
ISBN (Electronic): 978-1-4666-6035-9
DOIs: 10.4018/978-1-4666-6034-2.ch004
Links:
http://www.igi-global.com/book/advancing-embedded-systems-real-time/97393

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 1810
Research output: Scientific - peer-review › Conference contribution
Are visualization tools used in programming education?: by whom, how, why, and why not?

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Regulation of learning and active learning methods (REALMEE)
Authors: Isohanni, E., Järvinen, H.
Number of pages: 6
Pages: 35-40
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 14th Koli Calling International Conference on Computing Education Research, Koli, Finland, November 20-23, 2014
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3065-7

Publication series
Name: Koli calling - international conference on computing education research
DOI: 10.1145/2674683.2674688
Links:
http://dl.acm.org/citation.cfm?doid=2674683.2674688

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 1682
Research output: Scientific - peer-review › Conference contribution

Assessing Dog's experience in ACI

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Väätäjä, H.
Number of pages: 4
Pages: 1-4
Publication date: 2014

Host publication information
Publisher: Animal-Computer Interaction Workshop

Publication series
Name: NordiCHI 2014, Nordic Conference on Human-Computer Interaction
Links:
https://www.copy.com/s/otT3PFz1SrHHA0Qg
http://www.open.ac.uk/blogs/ACI/?page_id=574

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-01-04<br/>Publisher name: Animal-Computer Interaction Workshop
Source: researchoutputwizard
Source-ID: 1682
Research output: Scientific - peer-review › Conference contribution
Beyond the "One Sprint Ahead" Approach: Organizing User Experience Work in Agile Software Development

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Kuusinen, K.
Publication date: 2014

Host publication information
Title of host publication: Workshop on the Interaction of UCD in Agile Development, in conjunction with NordiCHI 2014, The 8th Nordic Conference on Human-Computer Interaction, 26.-30.10.2014, Helsinki, Finland
Publisher: Workshop on the Integration of UCD in Agile Development

Publication series
Name: Nordic Conference on Human-Computer Interaction
Links:
http://ucdandagile.wordpress.com/papers/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2015-01-09<br/>Publisher name: Workshop on the Integration of UCD in Agile Development</br>publication_forum:64098
Source: researchoutputwizard
Source-ID: 15
Research output: Scientific - peer-review › Conference contribution

Binocular and Monocular Augmentations for Different Distances on See-Through Near-Eye Displays

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Järvenpää, T., Suhonen, K., Jumisko-Pyykkö, S., Salminen, M.
Number of pages: 4
Pages: 301-304
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the Society for Information Display international symposium, SID Symposium Digest of Technical Papers, San Diego, CA, June 1-6, 2014
Publisher: John Wiley & Sons

Publication series
Name: SID Symposium Digest of Technical Papers
Building and programming ubiquitous social devices

Abstract Architecture knowledge management (AKM) aims to codify and maintain the architectural knowledge of a software system in a form that can be easily accessed by different stakeholders. Integrating AKM with an agile project management paradigm is a challenge because the agile philosophy downplays both plan-driven development and documentation. Yet, by integrating lightweight AKM practices with the process, agile software development could avoid maintenance and communication problems arising from scarce documentation. In this chapter, we introduce existing technologies that could be used as elements of lightweight AKM for agile software development and present possible models to integrate AKM with Scrum, which is the most popular agile approach in use today. In particular, we advocate the exploitation of architectural evaluations to collect architecturally significant information semiautomatically and the use of automated document generation to expose the contents of an architectural information repository in an easily accessible form. The proposed models are based on observed architecting work practices in industry and on interviews carried out in industry to identify the architectural information flow in real-life agile projects.
Cloud Space Web-based Smart Space with Management UI

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Mattila, A., Systä, K., Voutilainen, J., Mikkonen, T.
Number of pages: 6
Pages: 137-142
Publication date: 2014

Host publication information
Publisher: SCITEPRESS - Science and Technology Publications
ISBN (Print): 978-989-758-024-6

Publication series
Name: International Conference on Web Information Systems and Technologies
Publisher: SCITEPRESS - Science and Technology Publications
Volume: 2
Links:
http://www.webist.org/?y=2014

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 1054
Research output: Scientific - peer-review › Conference contribution

Comparative Study of 8 and 10-bit HEVC Encoders

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Vanne, J., Vittanen, M., Koivula, A., Hämäläinen, T. D.
Number of pages: 4
Pages: 542-545
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the The IEEE Visual Communications and Image Processing Conference, IEEE VCIP, Valletta, Malta, December 7-10, 2014
Publisher: IEEE
ISBN (Print): 978-1-4799-6139-9
Comparing the Effectiveness of Electronic Diary and UX Curve Methods in Multi-Component Product Study

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Sahar, F., Varsaluoma, J., Kujala, S.
Number of pages: 8
Pages: 95-102
Publication date: 2014

Host publication information
Title of host publication: Academic MindTrek Conference 2014, Tampere, Finland, November 4-6, 2014
Place of publication: New York, NY
Publisher: The Association for Computing Machinery, ACM
Editors: Lugmayr, A., Franssila, H., Paavilainen, J.
ISBN (Print): 978-1-4503-3006-0

Compiler Optimizations for Code Density of Variable Length Instructions
Variable length encoding can considerably decrease code size in VLIW processors by decreasing the amount of bits wasted on encoding No Operation (NOPs). A processor may have different instruction templates where different execution slots are implicitly NOPs, but all combinations of NOPs may not be supported by the instruction templates. The efficiency of the NOP encoding can be improved by the compiler trying to place NOPs in such way that the usage of implicit NOPs is maximized. Two different methods of optimizing the use of the implicit NOP slots are evaluated: prioritizing function units that have fewer implicit NOPs associated to them, and a post-pass to the instruction scheduler which utilizes the slack of the schedule by rescheduling operations with slack into different instruction words so that the available instruction templates are better utilized. The post-pass optimizer saved an average of 2.5 % and at best of 9.1 % instruction memory, without performance loss. Prioritizing function units gave best case instruction memory savings of 12.7 % but the average savings were only 1.0 % and there was in average 5.7 % slowdown for the program.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Kultala, H., Viitanen, T., Jääskeläinen, P., Helkala, J., Takala, J.
Number of pages: 6
Pages: 1-6
Publication date: 2014

Host publication information
Publisher: IEEE
**Conceptual Modelling of Collaboration for Information Systems**

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Pori Department
Authors: Thalheim, B., Jaakkola, H., Nakanishi, T., Sasaki, S., Schewe, K.
Number of pages: 34
Pages: 272-305
Publication date: 2014

**Host publication information**
Title of host publication: Information Modelling and Knowledge Bases XXV
Place of publication: Amsterdam
Publisher: IOS Press
Editors: Tokuda, T., Kiyoki, Y., Jaakkola, H., Yoshida, N.
ISBN (Print): 978-1-61499-360-5

**Publication series**
Name: Frontiers in Artificial Intelligence and Applications
Publisher: IOS Press
Volume: 260
ISSN (Print): 0922-6389
ISSN (Electronic): 1879-8314
DOIs:
10.3233/978-1-61499-361-2-272

**Bibliographical note**
Contribution: organisation=pla,FACT1=1<br/>Portfolio EDEND: 2014-06-30<br/>Source: researchoutputwizard
Source-ID: 1619
Research output: Scientific - peer-review › Chapter

**Connectivity Emulation Testbed for IoT Devices and Networks**

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Javed, N., Silverajan, B.
Number of pages: 10
Pages: 146-155
Publication date: 2014

**Host publication information**
Content Generation in a Collaborative Browser-Based Game Environment

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Pervasive Computing
Authors: Vanhatupa, J., Lautamäki, J.
Number of pages: 19
Pages: 92-110
Publication date: 2014

Host publication information
Title of host publication: Handbook of Digital Games
Place of publication: Hoboken, NJ
Publisher: John Wiley & Sons
Editors: Angelides, M. C., Agius, H.
ISBN (Print): 978-1-118-32803-3
DOIs: 10.1002/9781118796443.ch3

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-05-23<br/>Publisher name: Springer International Publishing
Source: researchoutputwizard
Source-ID: 1699
Research output: Scientific - peer-review › Chapter

Cross-Cultural Design of Mobile Mathematics Learning Service for South African Schools

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Walsh, T., Vainio, T., Varsaluoma, J.
Number of pages: 10
Pages: 75-84
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 10th International Conference on Mobile Learning 2014, Mlearning 2014, 28 February - 2 March, 2014, Madrid, Spain
Publisher: IADIS (International Association for Development of the Information Society)
Decision-Centric Architecture Reviews

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Van Heesch, U., Eloranta, V., Avgeriou, P., Koskimies, K., Harrison, N.
Number of pages: 6
Pages: 69-76
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: IEEE Software
Volume: 31
Issue number: 1
ISSN (Print): 0740-7459
Ratings:
Scopus rating (2016): CiteScore 1.87 SJR 0.584 SNIP 1.966
Scopus rating (2015): SJR 0.472 SNIP 1.659 CiteScore 1.86
Scopus rating (2014): SJR 0.556 SNIP 1.808 CiteScore 1.53
Scopus rating (2013): SJR 0.617 SNIP 1.78 CiteScore 1.55
Scopus rating (2012): SJR 0.664 SNIP 1.844 CiteScore 1.52
Scopus rating (2011): SJR 0.721 SNIP 2.415 CiteScore 1.59
Scopus rating (2010): SJR 0.437 SNIP 2.085
Scopus rating (2009): SJR 0.643 SNIP 2.186
Scopus rating (2008): SJR 0.664 SNIP 3.079
Scopus rating (2007): SJR 0.811 SNIP 2.824
Scopus rating (2006): SJR 0.762 SNIP 3.004
Scopus rating (2005): SJR 1.265 SNIP 2.578
Scopus rating (2004): SJR 0.868 SNIP 2.649
Scopus rating (2003): SJR 0.937 SNIP 2.468
Scopus rating (2002): SJR 0.875 SNIP 2.237
Scopus rating (2001): SJR 0.587 SNIP 1.434
Scopus rating (2000): SJR 0.42 SNIP 1.917
Scopus rating (1999): SJR 0.681 SNIP 2.652
Original language: English
DOI: 10.1109/MS.2013.22
Links:
http://www.computer.org/csdl/mags/so/preprint/06449237-abs.html
Distributed Indoor Positioning System With Inertial Measurements and Map Matching

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: MAT Positioning, Department of Pervasive Computing, Department of Automation Science and Engineering, Signal Processing Research Community (SPRC), Wireless Communications and Positioning (WICO)
Authors: Perttula, A., Leppäkoski, H., Kirkko-Jaakkola, M., Davidson, P., Collin, J., Takala, J.
Number of pages: 14
Pages: 2682-2695
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: IEEE Transactions on Instrumentation and Measurement
Volume: 63
Issue number: 11
ISSN (Print): 0018-9456
Ratings:
Scopus rating (2016): CiteScore 2.8 SJR 0.926 SNIP 1.614
Scopus rating (2015): SJR 0.949 SNIP 1.931 CiteScore 2.78
Scopus rating (2014): SJR 0.765 SNIP 2.102 CiteScore 2.5
Scopus rating (2013): SJR 0.736 SNIP 2.145 CiteScore 2.67
Scopus rating (2012): SJR 0.737 SNIP 1.835 CiteScore 2.21
Scopus rating (2011): SJR 0.669 SNIP 1.763 CiteScore 1.93
Scopus rating (2010): SJR 0.55 SNIP 1.235
Scopus rating (2009): SJR 0.486 SNIP 1.502
Scopus rating (2008): SJR 0.641 SNIP 1.198
Scopus rating (2007): SJR 0.716 SNIP 1.587
Scopus rating (2006): SJR 0.707 SNIP 1.269
Scopus rating (2005): SJR 0.589 SNIP 1.58
Scopus rating (2004): SJR 0.66 SNIP 1.252
Scopus rating (2003): SJR 0.673 SNIP 1.402
Scopus rating (2002): SJR 0.656 SNIP 1.258
Scopus rating (2001): SJR 0.705 SNIP 1.405
Scopus rating (2000): SJR 0.669 SNIP 0.862
Scopus rating (1999): SJR 0.626 SNIP 0.947
Original language: English
DOIs:
10.1109/TIM.2014.2313951
Links:
http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6805607&isnumber=6917240
Distributed Knowledge Management Architecture and Rule Based Reasoning for Mobile Machine Operator Performance Assessment

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Smart Energy Systems (SES)
Authors: Kannisto, P., Hästbacka, D., Palmroth, L., Kuikka, S.
Number of pages: 10
Pages: 440-449
Publication date: 2014

Host publication information
Title of host publication: ICEIS 2014 - Proceedings of 16th International Conference on Enterprise Information Systems, 27-30 April, Lisbon, Portugal
ISBN (Print): 978-989-758-027-7
DOIs: 10.5220/0004870004400449

Editorial on Mobile and Panoramic Video in Education
Issue Title: Special Issue: Special Section on Intergenerational learning and digital technologies and Special Section on Mobile and Panoramic Video in Education

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: University of Helsinki
Authors: Multisilta, J.
Number of pages: 3
Pages: 565-567
Publication date: 2014
Peer-reviewed: No

Publication information
Journal: Education and Information Technologies
Volume: 19
Issue number: July
ISSN (Print): 1360-2357
Ratings:
Scopus rating (2016): SJR 0.485 SNIP 0.94 CiteScore 1.06
Scopus rating (2015): SJR 0.457 SNIP 0.791 CiteScore 0.97
Scopus rating (2014): SJR 0.358 SNIP 0.66 CiteScore 0.85
Scopus rating (2013): SJR 0.403 SNIP 0.617 CiteScore 0.57
Scopus rating (2012): SJR 0.216 SNIP 0.612 CiteScore 0.5
Scopus rating (2011): SJR 0.438 SNIP 0.803 CiteScore 0.59
Scopus rating (2010): SJR 0.378 SNIP 0.558
Scopus rating (2009): SJR 0.356 SNIP 0.88
Scopus rating (2008): SJR 0.226 SNIP 0.58
Scopus rating (2007): SJR 0.319 SNIP 0.651
Efficient Architecture Mapping of FFT/IFFT for Cognitive Radio Networks

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Wang, G., Yin, B., Cho, I., Cavallaro, J. R., Bhattacharyya, S., Takala, J.
Number of pages: 5
Pages: 3961-3965
Publication date: 2014

Host publication information
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-2893-4

Publication series
Name: IEEE International Conference on Acoustics, Speech and Signal Processing
Publisher: IEEE
ISSN (Print): 1520-6149
Links:
http://www.icassp2014.org/home.html

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 1787
Research output: Scientific - peer-review › Conference contribution

Efficient Mode Decision Schemes for HEVC Inter Prediction

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Vanne, J., Viitanen, M., Hämäläinen, T. D.
Number of pages: 15
Pages: 1579-1593
Publication date: 2014
Peer-reviewed: Yes

Publication information
Efficient Software Synthesis of Dynamic Dataflow Programs

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Yviquel, H., Sanchez, A., Jääskeläinen, P., Takala, J., Raulet, M., Casseau, E.
Number of pages: 5
Pages: 5021-5025
Publication date: 2014

Host publication information
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-2893-4

Publication series
Name: IEEE International Conference on Acoustics, Speech and Signal Processing
Publisher: IEEE
ISSN (Print): 1520-8149
Links: http://www.icassp2014.org/home.html

Bibliographical note
Experience-Driven Design of Traveler Services in the Smart City

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Väänänen-Vainio-Mattila, K., Ojala, J., Laaksonen, J., Korhonen, H., Pakkanen, T., Raisamo, R.

Enabling Global, Dynamic Web-Based Software Reuse - Mashware Revisited

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Mikkonen, T., Salminen, A., Taivalsaari, A.
Number of pages: 4
Pages: 475-478
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 40th Euromicro Conference on Software Engineering and Advanced Applications, SEAA 2014, August 27-29, 2014, Verona, Italy
Publisher: IEEE
ISBN (Print): 978-1-4799-5794-1

Publication series
Name: Euromicro conference on software engineering and advanced applications
DOIs: 10.1109/SEAA.2014.14

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1082
Research output: Scientific - peer-review » Conference contribution
Experiences from System-on-Chip design courses

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Matilainen, L., Salminen, E., Hämäläinen, T. D.
Number of pages: 6
Pages: 37-42
Publication date: 2014

Host publication information
Title of host publication: 10th European Workshop on Microelectronics Education (EWME), 14-16 May 2014, Tallinn, Estonia
Publisher: Institute of Electrical and Electronics Engineers IEEE
ISBN (Print): 978-1-4799-4016-5

Publication series
Name: European Workshop on Microelectronics Education
DOIs:
10.1109/EWME.2014.6877391
Links:
http://ati.ttu.ee/ewme2014/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-11-20<br/>Publisher name: Institute of Electrical and Electronics Engineers IEEE
Source: researchoutputwizard
Source-ID: 1052
Research output: Scientific - peer-review › Conference contribution

Exploring online customization of a high involvement experience product

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Nurkka, P., Jumisko-Pyykkö, S.
Number of pages: 10
Pages: 505-514
Exploring the Augmented Home Window – User Perceptions of the Concept

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Ventä-Olkkonen, L., Häkkilä, J., Väänänen-Vainio-Mattila, K.
Number of pages: 9
Pages: 190-198
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 13th International Conference on Mobile and Ubiquitous Multimedia, MUM2014, November 25-28, 2014, Melbourne, Australia
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3304-7

DOI: 10.1145/2677972.2677994

Links:
http://dl.acm.org/citation.cfm?id=2677972.2677994&coll=DL&dl=ACM&CFID=462246156&CFTOKEN=37033666

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 1720
Research output: Scientific - peer-review › Conference contribution

Expressing Security Requirements: Usability of Taxonomy-based Requirement Identification Scheme

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Takahashi, T., Kannisto, J., Harju, J., Kanaoka, A., Takano, Y., Matsuo, S.
Number of pages: 8
Pages: 121-128
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 13th International Conference on Mobile and Ubiquitous Multimedia, MUM2014, November 25-28, 2014, Melbourne, Australia
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3304-7

DOI: 10.1145/2677972.2677994

Links:
http://dl.acm.org/citation.cfm?id=2677972.2677994&coll=DL&dl=ACM&CFID=462246156&CFTOKEN=37033666

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 1720
Research output: Scientific - peer-review › Conference contribution
**Eye Tracking in Game-based Learning Research and Game Design**

**General information**
State: Published  
Ministry of Education publication type: A1 Journal article-refereed  
Organisations: Pori Department  
Authors: Kiili, K., Ketamo, H., Kickmeier-Rust, M. D.  
Number of pages: 15  
Pages: 51-65  
Publication date: 2014  
Peer-reviewed: Yes

**Publication information**
Journal: International Journal of Serious Games  
Volume: 1  
Issue number: 2  
ISSN (Print): 2384-8766  
Original language: English  
DOIs:  
10.17083/ijsg.v1i2.15

**Bibliographical note**
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: IEEE  
Source: researchoutputwizard  
Source-ID: 1593  
Research output: Scientific - peer-review › Conference contribution

**First Hand Developer Experiences of Social Devices**

**General information**
State: Published  
Ministry of Education publication type: A4 Article in a conference publication  
Organisations: Department of Pervasive Computing, Managing digital industrial transformation (mDIT)  
Authors: Mäkitalo, N., Aaltonen, T., Mikkonen, T.  
Number of pages: 11  
Pages: 233-243  
Publication date: 2014

**Host publication information**
Title of host publication: Advances in Service-Oriented and Cloud Computing. Workshops of ESOCC 2013, Malaga, Spain, September 11-13, 2013, Revised Selected Papers  
Place of publication: Berlin Heidelberg  
Publisher: Springer  
ISBN (Print): 978-3-642-45363-2  
ISBN (Electronic): 978-3-642-45364-9

**Publication series**
Flow Experience as a Quality Measure in Evaluating Physically Activating Collaborative Serious Games

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Pori Department
Authors: Kiili, K., Perttula, A., Lindstedt, A., Arnab, S., Suominen, M.
Number of pages: 15
Pages: 35-49
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: International Journal of Serious Games
Volume: 1
Issue number: 3
ISSN (Print): 2384-8766
Original language: English
DOI: 10.17083/ijsg.v1i3.23

Bibliographical note
Contribution: organisation=pla,FACT1=1
Portfolio EDEND: 2014-12-10
Publisher name: Serious Games Society
Source-ID: 716
Research output: Scientific - peer-review » Article

Flow Experience as a Quality Measure in Evaluating Physically Activating Serious Games

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department, Regulation of learning and active learning methods (REALMEE)
Authors: Kiili, K., Perttula, A., Arnab, S., Suominen, M.
Number of pages: 12
Pages: 200-212
Publication date: 2014

Host publication information
Title of host publication: Games and Learning Alliance, Second International Conference, GALA 2013, Paris, France, October 23-25, 2013
Publisher: Springer
Editor: De Gloria, A.
ISBN (Print): 978-3-319-12156-7
ISBN (Electronic): 978-3-319-12157-4

Publication series
Name: Lecture Notes in Computer Science
Volume: 8605
Flow in SGs

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Pori Department
Authors: Kiili, K., Perttula, A.
Number of pages: 46
Publication date: 2014

Publication information
Publisher: Game and Learning Alliance GALA
Original language: English
Links:
http://www.galanoe.eu/index.php?option=com_content&view=article&id=700&Itemid=182&dir=JSROOT%5CDeliverables%5CYear+4%5DEL_WP2+%2B+TC+Reports

Bibliographical note
Contribution: organisation=pla,FACT1=1<br/>Portfolio EDEND: 2014-12-10<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 715
Research output: Scientific - peer-review › Conference contribution

From Agile Software Development to Mercury Business

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Järvinen, J., Huomo, T., Mikkonen, T., Tyrväinen, P.
Number of pages: 14
Pages: 58-71
Publication date: 2014

Host publication information
Publisher: Springer International Publishing
ISBN (Print): 978-3-319-08737-5
ISBN (Electronic): 978-3-319-08738-2

Publication series
Name: Lecture Notes in Business Information Processing
Volume: 182
ISSN (Print): 1865-1348
DOIs:
10.1007/978-3-319-08738-2_5
Links:
http://link.springer.com/chapter/10.1007/978-3-319-08738-2_5

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: Springer International Publishing
From architectural requirements towards an open architecture for web and mobile societal applications

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Vogel, B., Kurti, A., Mikkonen, T., Milrad, M.
Number of pages: 4
Pages: 20-23
Publication date: 2014

Host publication information
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-2855-5

Publication series
Name: IEEE/ACM International Conference on Software Engineering
Publisher: ACM
ISSN (Print): 0270-5257
ISSN (Electronic): 1558-1225
DOIs: 10.1145/2593761.2593768
Links: http://dl.acm.org/citation.cfm?id=2593768

Bibliographical note
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 1760
Research output: Scientific - peer-review › Conference contribution

From Mashup Applications to Open Data Ecosystems

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Managing digital industrial transformation (mDIT)
Authors: Aaltonen, T., Mikkonen, T., Peltola, H., Salminen, A.
Number of pages: 15
Pages: 1-15
Publication date: 2014

Host publication information
Title of host publication: Proceedings of The International Symposium on Open Collaboration, OpenSym 2014, August 27-29, 2014, Berlin, Germany
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3016-9

Publication series
Name: OpenSym
DOIs: 10.1145/2641580.2641599
Gamification of System-on-Chip Design

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Hämäläinen, T. D., Salminen, E.
Number of pages: 8
Pages: 1-8
Publication date: 2014

Host publication information
Title of host publication: International Symposium on System-on-Chip, SoC 2014, October 28-29, 2014, Tampere, Finland
Place of publication: Piscataway, NJ
Publisher: IEEE
Editors: Nurmi, J., Ellervee, P., Milojevic, D., Daniel, O., Paakki, T.
ISBN (Print): 978-1-4799-6889-3

Publication series
Name: International Symposium on System-on-Chip
Links:

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-11-30<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 404
Research output: Scientific - peer-review › Conference contribution

Green Software: Greening What and How Much?

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Sierszecki, K., Mikkonen, T., Steffens, M., Fogdal, T., Savolainen, J.
Number of pages: 5
Pages: 64-68
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: IEEE Software
Volume: 31
Issue number: 3
ISSN (Print): 0740-7459
Ratings:
Scopus rating (2016): CiteScore 1.87 SJR 0.584 SNIP 1.966
Scopus rating (2015): SJR 0.472 SNIP 1.659 CiteScore 1.86
Scopus rating (2014): SJR 0.556 SNIP 1.808 CiteScore 1.53
Scopus rating (2013): SJR 0.617 SNIP 1.78 CiteScore 1.55
Scopus rating (2012): SJR 0.664 SNIP 1.844 CiteScore 1.52
Scopus rating (2011): SJR 0.721 SNIP 2.415 CiteScore 1.59
Scopus rating (2010): SJR 0.437 SNIP 2.085
Scopus rating (2009): SJR 0.643 SNIP 2.186

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 39
Research output: Scientific - peer-review › Conference contribution
Grover: Looking for Performance Improvement by Disabling Local Memory Usage in OpenCL Kernels

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Fang, J., Sips, H., Jääskeläinen, P., Varbanescu, A. L.
Number of pages: 10
Pages: 162-171
Publication date: 2014

**Host publication information**
Title of host publication: The 43rd International Conference on Parallel Processing, ICPP 2014, September 9-12, 2014, Minneapolis, MN, USA
Publisher: IEEE
ISBN (Print): 978-1-4799-5618-0

**Publication series**
Name: International Conference on Parallel Processing
DOIs:
10.1109/ICPP.2014.25
Links:
http://icpp.cs.umn.edu/

**Bibliographical note**
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-30<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 291
Research output: Scientific - peer-review › Conference contribution

Handbook of the Secure Agile Software Development Life Cycle

**General information**
State: Published
Ministry of Education publication type: D5 Text book, professional manual or guide or a dictionary
Organisations: Department of Pervasive Computing, Research area: Information security, Ericsson, Aalto University, University of Helsinki, Ericsson Research, F-Secure, Tampere Univ Technol, Tampere University of Technology
Number of pages: 88
Publication date: 2014
Heuristics for Greedy Transport Triggered Architecture Interconnect Exploration

Most power dissipation in Very Large Instruction Word (VLIW) processors occurs in their large, multi-port register files. Transport Triggered Architecture (TTA) is a VLIW variant whose exposed datapath reduces the need for RF accesses and ports. However, the comparative advantage of TTAs suffers in practice from a wide instruction word and complex interconnection network (IC). We argue that these issues are at least partly due to suboptimal design choices. The design space of possible TTA architectures is very large, and previous automated and ad-hoc design methods often produce inefficient architectures. We propose a reduced design space where efficient TTAs can be generated in a short time using execution trace-driven greedy exploration. The proposed approach is evaluated by optimizing the equivalent of a 4-issue VLIW architecture. The algorithm finishes quickly and produces a processor with 10% reduced core energy compared to a fully-connected TTA. Since the generated processor has low IC power and a shorter instruction word than a typical 4-issue VLIW, the results support the hypothesis that these drawbacks of TTA can be worked around with efficient IC design.
How Can Wearables Support Co-Located Social Interaction?

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Prabhu, V., Olsson, T., Väänänen-Vainio-Mattila, K., Jarusriboonchai, P.
Number of pages: 4
Pages: 1-4
Publication date: 2014

Host publication information
Title of host publication: Workshop on Designing Mobile Interactions for Co-located Interaction Technologies, in conjunction with NordiCHI 2014, The 8th Nordic Conference on Human-Computer Interaction, 26.-30.10.2014, Helsinki, Finland
Publisher: Workshop on Designing Mobile Interactions for Co-located Interaction Technologies

Publication series
Name: Nordic Conference on Human-Computer Interaction
Links:
http://personalorsocial.wordpress.com

Bibliographical note
How novices tackle their first lines of code in an IDE: analysis of programming session traces

While computing educators have put plenty of effort into researching and developing programming environments that make it easier for students to create their first programs, these tools often have only little resemblance with the tools used in the industry. We report on a study, where students with no previous programming experience started to program directly using an industry strength programming environment. The programming environment was augmented with logging capability that recorded every keystroke and event within the system, which provided a view on how the novices tackle their first lines of code. Our results show that while at first, the students struggle with syntax - as is typical with learning a new language - no evidence can be found that suggests that learning to use the programming environment is hard. In a two-week period, the students learned to use the basic features of the programming environment such as specific shortcuts. Although we observed students using copy-paste-programming relatively often, most of the pasted code is from their own previous work. Finally, when considering the compilation errors and error distributions, we hypothesize that the errors are a product of three factors; the exercises, the environment, and the data logging granularity.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Regulation of learning and active learning methods (REALMEE)
Authors: Vihavainen, A., Helminen, J., Ihantola, P.
Number of pages: 8
Pages: 109-116
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 14th Koli Calling International Conference on Computing Education Research, Koli, Finland, November 20-23, 2014
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3065-7

Publication series
Name: Koli calling - international conference on computing education research
DOIs: 10.1145/2674683.2674692

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: Workshop on Designing Mobile Interactions for Co-located Interaction Technologies
Source: researchoutputwizard
Source-ID: 1303
Research output: Scientific - peer-review › Conference contribution

Identifying the User Experience Factors of a Multi-Component Sports Product

Multi-component products employ multiple devices and services to support users' tasks. In order to design for good user experience (UX) for such products, designers need to gain feedback on how the different components contribute to the overall UX. In this study, we evaluated the long-term UX of a multi-component product from the sports domain over an eight-week period. The goal is to identify the UX factors of the overall UX evaluation of the multi-component product. The results show that the number of negative experiences related to the main component has the greatest effect on the overall evaluation of the multi-component product compared to the other components. Positive experience items were mostly related to utility and satisfaction, whereas negative experience items were mostly related to ineffectiveness, dissatisfaction, and missing functionalities. After the initial learning phase, the need for new functionalities increased over time.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, Augmented Human Activities (AHA)
Authors: Sahar, F., Varsaluoma, J. T., Kujala, S., Väänänen, K. A.
Number of pages: 8
Pages: 85-92
Increasing Adoption of Smart Learning Content for Computer Science Education

Computer science educators are increasingly using interactive learning content to enrich and enhance the pedagogy of their courses. A plethora of such learning content, specifically designed for computer science education, such as visualization, simulation, and web-based environments for learning programming, are now available for various courses. We call such content smart learning content. However, such learning content is seldom used outside its host site despite the benefits it could offer to learners everywhere. In this paper, we investigate the factors that impede dissemination of such content among the wider computer science education community. To accomplish this we surveyed educators, existing tools and recent research literature to identify the current state of the art and analyzed the characteristics of a large number of smart learning content examples along canonical dimensions. In our analysis we focused on examining the technical issues that must be resolved to support finding, integrating and customizing smart learning content in computer science courses. Finally, we propose a new architecture for hosting, integrating and disseminating smart learning content and discuss how it could be implemented based on existing protocols and standards.
Integrated model-in-the-loop simulations to model-driven development in industrial control

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering
Authors: Vepsäläinen, T., Kuikka, S.
Number of pages: 17
Pages: 1295-1311
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Simulation: Transactions of the Society for Modeling and Simulation International
Volume: 90
Issue number: 12
ISSN (Print): 0037-5497
Ratings:
Scopus rating (2016): SJR 0.309 SNIP 0.874 CiteScore 1.01
Scopus rating (2015): SJR 0.324 SNIP 0.871 CiteScore 0.97
Scopus rating (2014): SJR 0.459 SNIP 1.218 CiteScore 1.18
Scopus rating (2013): SJR 0.417 SNIP 1.134 CiteScore 1.31
Scopus rating (2012): SJR 0.436 SNIP 1.395 CiteScore 0.97
Scopus rating (2011): SJR 0.31 SNIP 0.938 CiteScore 0.8
Scopus rating (2010): SJR 0.341 SNIP 1.233
Scopus rating (2009): SJR 0.279 SNIP 0.832
Scopus rating (2008): SJR 0.319 SNIP 0.913
Scopus rating (2007): SJR 0.314 SNIP 0.814
Scopus rating (2006): SJR 0.348 SNIP 0.713
Scopus rating (2005): SJR 0.227 SNIP 0.496
Scopus rating (2004): SJR 0.14 SNIP 0.296
Scopus rating (2003): SJR 0.183 SNIP 0.435
Scopus rating (2002): SJR 0.264 SNIP 0.496
Scopus rating (2001): SJR 0.267 SNIP 0.833
Scopus rating (2000): SJR 0.276 SNIP 0.788
Scopus rating (1999): SJR 0.176 SNIP 0.999
Original language: English
DOIs:
10.1177/0037549714553229
Links:
http://www.sagepublications.com

Bibliographical note
Contribution: organisation=ase,FACT1=1
Portfolio EDEND: 2014-12-26
Publisher name: Sage Publications
Source: researchoutputwizard
Source-ID: 1723
Research output: Scientific - peer-review › Article
Intercultural Collaboration in Virtual Environment

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems, University of Maribor, Slovenia, University of York
Authors: Welzer, T., Jaakkola, H., Hölbl, M., Druzovec, M., Ward, A. E.
Number of pages: 8
Pages: 457-463
Publication date: 2014

Host publication information
Title of host publication: Information Modelling and Knowledge Bases XXVI
Place of publication: Amsterdam
Publisher: IOS Press
Editors: Thalheim, B., Jaakkola, H., Kiyoki, Y., Yoshida, N.
ISBN (Print): 978-1-61499-471-8

Publication series
Name: Frontiers in Artificial Intelligence and Applications
Publisher: IOS Press
Volume: 272
ISSN (Print): 0922-6389
ISSN (Electronic): 1879-8314
DOI:
10.3233/978-1-61499-472-5-457

Bibliographical note
JUFOID=56381
Research output: Scientific - peer-review › Chapter


General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Department of Electronics and Communications Engineering
Publication date: 2014

Publication information
Publisher: IEEE
ISBN (Print): 978-1-4799-6889-3
Original language: English
Links:
http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=6961602

Bibliographical note
Contribution: organisation=elt,FACT1=1
Portfolio EDEND: 2014-12-15
Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1162
Research output: Scientific - peer-review › Anthology

Knowledge transfer in collaborative teams: experiences from a two-week code camp

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Managing digital industrial transformation (mDIT)
Authors: Kilamo, T., Nieminen, A., Lautamäki, J., Aho, T., Koskinen, J., Palviainen, J., Mikkonen, T.
Lively3D: Building a 3D Desktop Environment as a Single Page Application

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Voutilainen, J., Mattila, A., Mikkonen, T.
Number of pages: 16
Pages: 291-306
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Acta Cybernetica
Volume: 21
Issue number: 3
ISSN (Print): 0324-721X
Ratings:
Scopus rating (2016): SJR 0.177 SNIP 0.275 CiteScore 0.39
Scopus rating (2015): SJR 0.171 SNIP 0.911 CiteScore 0.46
Scopus rating (2014): SJR 0.158 SNIP 0.597 CiteScore 0.31
Scopus rating (2013): SJR 0.139 SNIP 0.264 CiteScore 0.29
Scopus rating (2012): SJR 0.197 SNIP 0.438 CiteScore 0.41
Scopus rating (2011): SJR 0.202 SNIP 0.686 CiteScore 0.33
Scopus rating (2010): SJR 0.176 SNIP 0.228
Scopus rating (2009): SJR 0.184 SNIP 0.496
Scopus rating (2008): SJR 0.197 SNIP 0.092
Scopus rating (2007): SJR 0.149 SNIP 0.275
Scopus rating (2006): SJR 0.239 SNIP 0.501
Scopus rating (2005): SJR 0.225 SNIP 0.34
Scopus rating (2004): SJR 0.186 SNIP 0.292
Scopus rating (2003): SJR 0.205 SNIP 0.74
Scopus rating (2002): SJR 0.425 SNIP 0.79
Scopus rating (2001): SJR 0.227 SNIP 0.471
Scopus rating (2000): SJR 0.165 SNIP 0.279
Scopus rating (1999): SJR 0.209 SNIP 0.412
Original language: English
Links:

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-08-27<br/>Publisher name: University of Szeged
Location Sharing Patterns of Parents and Their Children

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Pervasive Computing
Authors: Helenius, M., Kannisto, J., Kiljander, H., Nore, V.
Number of pages: 3
Pages: 19-21
Publication date: 2014
Peer-reviewed: Unknown

Publication information
Journal: Internet of Things Finland
Issue number: 1
Original language: English
Links:
http://internetofthings.fi/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31
Source: researchoutputwizard
Source-ID: 452
Research output: Professional › Article

Measuring Energy Consumption for RESTful Interactions in 3GPP IoT Nodes

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Savolainen, T., Javed, N., Silverajan, B.
Number of pages: 8
Pages: 1-8
Publication date: 2014

Host publication information
Publisher: IEEE
ISBN (Print): 978-1-4799-3060-9

Publication series
Name: Joint IFIP wireless mobile networking conference
DOIs:
10.1109/WMNC.2014.6878863
Links:
http://wmnc2014.uc.pt/Program/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1470
Research output: Scientific - peer-review › Conference contribution

Measuring Retrospective User Experience of Non-Powered Hand Tools: Exploratory Remote Study with UX Curve

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Mobile panoramic video applications for learning

The use of videos on the internet has grown significantly in the last few years. For example, Khan Academy has a large collection of educational videos, especially on STEM subjects, available for free on the internet. Professional panoramic video cameras are expensive and usually not easy to carry because of the large size of the equipment. Recently, at least two companies have launched a new type of product that enabled panoramic video for certain smartphone users. The aim of this article is to analyze how panoramic video can be adopted, how attractive it is for actual everyday use, how it is used today, and how technology and other solutions should develop to become popular and accessible for mainstream users in learning applications. This research is based on the qualitative research method, namely content analysis. The analysis involved 1595 panoramic videos that users posted to two panoramic video sites. The videos represent a snapshot of videos from the beginning of the panoramic video sites. The videos were classified in 22 groups. In addition, the comments and discussions related to each of the videos were analyzed. Based on the study, it is concluded that panoramic videos are not yet widely used for learning, even though they have much potential for this purpose. Panoramic videos are good for documenting complex interaction situations in settings where a lower image quality is sufficient. Typical social media features are present in panoramic video sites, but they do not provide any extra support for learning or collaboration. © 2013 Springer Science+Business Media New York.
Modeling the Multicultural Issues in Software Engineering Processes

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Pori Department
Authors: Statkaityte, R., Jaakkola, H.
Number of pages: 10
Pages: 190-199
Publication date: 2014

Host publication information
Title of host publication: Information Modelling and Knowledge Bases XXV
Place of publication: Amsterdam
Publisher: IOS Press
Editors: Tokuda, T., Kiyoki, Y., Jaakkola, H., Yoshida, N.
ISBN (Print): 978-1-61499-360-5

Publication series
Name: Frontiers in Artificial Intelligence and Applications
Publisher: IOS Press
Volume: 260
ISSN (Print): 0922-6389
ISSN (Electronic): 1879-8314
DOIs:
10.3233/978-1-61499-361-2-190

Bibliographical note
Contribution: organisation=pla,FACT1=1<br/>Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 1546
Research output: Scientific - peer-review › Chapter
Multicultural Adaptive Systems

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Pori Department, Research group: Software Engineering and Intelligent Systems, Christian-Albrechts-Universität zu Kiel
Authors: Jaakkola, H., Thalheim, B.
Number of pages: 20
Pages: 172-191
Publication date: 2014

Host publication information
Title of host publication: Information Modelling and Knowledge Bases XXVI
Place of publication: Amsterdam
Publisher: IOS Press
Editors: Thalheim, B., Jaakkola, H., Kiyoki, Y., Yoshida, N.
ISBN (Print): 978-1-61499-471-8

Publication series
Name: Frontiers in Artificial Intelligence and Applications
Publisher: IOS Press
Volume: 272
ISSN (Print): 0922-6389
ISSN (Electronic): 1879-8314
DOIs: 10.3233/978-1-61499-472-5-172

Bibliographical note
JUFOID=56381
Research output: Scientific - peer-review › Chapter

On Designing UX for Mobile Enterprise Apps

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Kuusinen, K., Mikkonen, T.
Number of pages: 9
Pages: 221-228
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 40th Euromicro Conference on Software Engineering and Advanced Applications, SEAA 2014, August 27-29, 2014, Verona, Italy
Publisher: IEEE
ISBN (Print): 978-1-4799-5794-1

Publication series
Name: Euromicro conference on software engineering and advanced applications
DOIs: 10.1109/SEAA.2014.17
Links: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6928815

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 838
Research output: Scientific - peer-review › Conference contribution
Open Data - Opportunities and Challenges

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Pori Department
Authors: Jaakkola, H., Mäkinen, T., Eteläaho, A.
Number of pages: 15
Pages: 25-39
Publication date: 2014

Host publication information
Place of publication: New York, NY
Publisher: Association for Computer Machinery ACM
Editors: Rachev, B., Smrikarov, A.
ISBN (Electronic): 978-1-4503-2753-4
DOIs: 10.1145/2659532.2659594

Bibliographical note
Contribution: organisation=pla,FACT1=1<br/>Portfolio EDEND: 2014-12-30
Source: researchoutputwizard
Source-ID: 552
Research output: Scientific - peer-review › Conference contribution

Opiskelun etenemisen kartoitushanke tietotekniikan koulutushjelmaissa

Opportunities and Challenges of Mobile Applications as "Tickets-to-Talk": A Scenario-Based User Study

This paper presents a scenario-based user study of mobile application concepts that would encourage interaction between people within close proximity. The scenarios demonstrate three themes of digital tickets-to-talk: informing who and what are around, augmenting self-expression, and online interaction encouraging physical interaction. Our interview study explored the opportunities and challenges of such applications in developing into further face-to-face interactions between strangers. Tickets that are related to activities that convey a solid intention that would lead to practical collaboration, such as playing sports or studying together, have the best potential to advance to meaningful face-to-face interaction. Augmenting self-expression and online interaction encouraging physical interaction were found to have potential to create curiosity but seen less credible by our 42 interview participants to motivate face-to-face interaction between strangers. We conclude by discussing the potential of each theme of ticket-to-talk based on our findings as well as related literature.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Jarusriboonchai, P., Olsson, T., Ojala, J., Väänänen-Vainio-Mattila, K.
Number of pages: 9
Pages: 89-97
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 13th International Conference on Mobile and Ubiquitous Multimedia, MUM2014, November 25-28, 2014, Melbourne, Australia
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3304-7

Publication series
Name: International conference on mobile and ubiquitous multimedia
ASJC Scopus subject areas: Human-Computer Interaction, Computer Networks and Communications, Computer Vision and Pattern Recognition, Software
Keywords: Awareness system, Co-located interaction, Faceto-face interaction, Mobile technology, Scenarios, Storyboards, User experience, User study
DOIs: 10.1145/2677972.2677993
Links: http://www.scopus.com/inward/record.url?scp=84943175665&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
Contribution: organisation=tie,FACT1=1<br>Portfolio EDEND: 2014-12-31<br>Publisher name: ACM
Source-ID: 575
Research output: Scientific - peer-review › Conference contribution

Parallel programming of a symmetric Transport-Triggered Architecture with applications in flexible LDPC encoding
Patterns for Sharing Safety System Operation Responsibilities between Humans and Machines

Nowadays, startups have been of growing significance in software business. After the publication of the seminal work of Eric Ries, the Lean Startup concept has been a popular trend. Startup companies have especially been popping up in the volatile fields of web applications and games. Startups have even been dubbed to be the saviors of declining western economies.

In this paper, we describe patterns that are a part of a larger pattern language for software start-up companies. The patterns were collected during autumn 2013. These particular patterns help start-up companies to focus on the hardships of the starting up a start-up; knowing that your idea is worth of our effort and how to finance your vision.
General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: Software engineering
Authors: Leppänen, M.
Number of pages: 7
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 19th European Conference on Pattern Languages of Programs - EuroPLoP '14
Publisher: ACM
Article number: 25
ISBN (Electronic): 978-1-4503-3416-7
Keywords: lean start-up, organization, organizational patterns, patterns, software product, team
DOIs:
10.1145/2721956.2721971
Research output: Scientific - peer-review › Conference contribution

Peleillä liikettä, luovutta ja yhteisöllisyyttä koulupäivään

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Pori Department
Authors: Kiili, K., Tuomi, P., Perttula, A., Kiili, C.
Number of pages: 15
Pages: 238-252
Publication date: 2014

Host publication information
Title of host publication: Rajaton luokkahuone
Place of publication: Jyväskylä
Publisher: PS-kustannus
Editors: Niemi, H., Multisilta, J.
ISBN (Print): 978-952-451-618-1

Bibliographical note
Contribution: organisation=pla,FACT1=1<br/>Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 718
Research output: Scientific › Chapter

Programmable In-loop Deblock Filter Processor for Video Decoders

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Janhunen, J., Jääskeläinen, P., Hannuksela, J., Rintaluoma, T., Kuusela, A.
Number of pages: 6
Pages: 1-6
Publication date: 2014

Host publication information
Publisher: IEEE
ISBN (Print): 978-14799-6588-5

Publication series
Name: IEEE Workshop on Signal Processing Systems
DOIs:
10.1109/SiPS.2014.6986071
Links:
Quality Management of User-Generated Content in Participatory Journalism

Newsrooms utilize increasing amounts of user-generated content (UGC) in news making. However, managing the quality of UGC is challenging. Our three-phase study identifies qualities of newsworthy UGC, and ways to enhance the quality of contributions by online feedback. Review of 31 UGC-driven websites revealed as the most used methods of improving the quality of contributions flagging of inappropriate content, counts of sharing to social media services, ratings, user’s activity statistics, and badges. Interviews of news editors and reader reporters showed a conceptual difference in the qualities of good news content. Interviewed reader reporters expressed the feedback from the newsroom as the most important for their development in addition to seeing the examples by other reader reporters. Content was perceived as more important than competition in case of readers’ UGC. Communal quality management conventions, online community elements, and guidelines for developing quality management are presented.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Jumisko-Pyykö, S., Väätäjä, H., Jaakola, M.
Number of pages: 10
Pages: 1-10
Publication date: 2014

Host publication information
Title of host publication: Proceedings of OzCHI 2014, Annual conference of the australian computer-human interaction special interest group, December 2-5, 2014, Sydney, Australia
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-0653-9

Publication series
Name: Annual conference of the australian computer-human interaction special interest group
Keywords: quality, content, MEDIA, quality management, news, photograph, participatory journalism, crowdsourcing
Electronic versions:
QualityManagement_NewsContent
DOIs:
10.1145/2686612.2686690
Links:
http://urn.fi/URN:NBN:fi:tty-201605033929

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 616
Research output: Scientific - peer-review › Conference contribution

Research Plan: Visualizations for Software Analytics

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Mattila, A., Mikkonen, T.
Number of pages: 4
Pages: 22-25
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 15th International Conference, PROFES 2014, Helsinki, Finland, December 10-12, 2014
Resource Description for End-User Driven Service Compositions

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Hylli, O., Lahtinen, S., Systä, K., Ruokonen, A.
Number of pages: 7
Pages: 11-17
Publication date: 2014

Host publication information
Title of host publication: 2014 IEEE 10th World Congress on Services, SERVICES, June 27 2014-July 2, 2014, Anchorage, AK, USA
Publisher: IEEE
ISBN (Print): 978-1-4799-5068-3

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: University of Helsinki, Department of Computer Science
Source: researchoutputwizard
Source-ID: 1053
Research output: Scientific - peer-review › Conference contribution

Safety Patterns in Model-Driven Development

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering
Authors: Vepsäläinen, T., Kuikka, S.
Number of pages: 7
Pages: 233-239
Publication date: 2014

Host publication information
Title of host publication: ICSEA 2014, The Ninth International Conference on Software Engineering Advances, October 12-16, 2014, Nice, France
Publisher: IARIA
Editors: Mannaert, H., Lavazza, L., Oberhauser, R., Kajko-Mattsson, M., Gebhart, M.
ISBN (Print): 978-1-61208-367-4

Bibliographical note
Contribution: organisation=ase,FACT1=1<br/>Portfolio EDEND: 2014-12-02
Service Composition for End-Users

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Managing digital industrial transformation (mDIT)
Authors: Hylli, O., Lahtinen, S., Systä, K., Ruokonen, A.
Number of pages: 17
Pages: 383-399
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Acta Cybernetica
Volume: 21
Issue number: 3
ISSN (Print): 0324-721X
Ratings:
Scopus rating (2016): SJR 0.177 SNIP 0.275 CiteScore 0.39
Scopus rating (2015): SJR 0.171 SNIP 0.911 CiteScore 0.46
Scopus rating (2014): SJR 0.158 SNIP 0.597 CiteScore 0.31
Scopus rating (2013): SJR 0.139 SNIP 0.264 CiteScore 0.29
Scopus rating (2012): SJR 0.197 SNIP 0.438 CiteScore 0.41
Scopus rating (2011): SJR 0.202 SNIP 0.686 CiteScore 0.33
Scopus rating (2010): SJR 0.176 SNIP 0.228
Scopus rating (2009): SJR 0.184 SNIP 0.496
Scopus rating (2008): SJR 0.197 SNIP 0.092
Scopus rating (2007): SJR 0.149 SNIP 0.275
Scopus rating (2006): SJR 0.239 SNIP 0.501
Scopus rating (2005): SJR 0.225 SNIP 0.34
Scopus rating (2004): SJR 0.186 SNIP 0.292
Scopus rating (2003): SJR 0.205 SNIP 0.74
Scopus rating (2002): SJR 0.425 SNIP 0.79
Scopus rating (2001): SJR 0.227 SNIP 0.471
Scopus rating (2000): SJR 0.165 SNIP 0.279
Scopus rating (1999): SJR 0.209 SNIP 0.412
Original language: English
Links:
http://osl.sed.hu/actacybernetica/edb/vol21n3/starten.xml

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-11-26<br/>Publisher name: Szegedi Tudomanyegyetem
Source: researchoutputwizard
Source-ID: 527
Research output: Scientific - peer-review › Article

Social Index: A Content Discovery Application for Ad Hoc Communicating Smart Phones

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Socio-Technical Congruence in the Ruby Ecosystem

General Information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Syeed, M. M. M., Hansen, K. M., Hammouda, I., Manikas, K.
Number of pages: 9
Pages: 1-9
Publication date: 2014

Host publication information
Title of host publication: Proceedings of The International Symposium on Open Collaboration, OpenSym 2014, August 27-29, 2014, Berlin, Germany
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3016-9

Publication series
Name: International Symposium on Open Collaboration
DOIs: 10.1145/2641580.2641586

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: ACM
Source-ID: 1576
Research output: Scientific - peer-review › Conference contribution

Socio-Technical Dependencies in Forked OSS Projects: Revealing Evidence from BSD Family

General Information
State: Published
Software Startup Patterns - An Empirical Study
This report gives an account of the results of a joint research effort between Tampere University of Technology, Department of Pervasive Computing and University of Applied Sciences and Arts Northwestern Switzerland, School of Engineering. The research was integrated with a seminar participated by PhD students at TUT. The aim was to identify working practices in software startups through interviews and formulate them as patterns. The results consist of the set of 63 found practices, their relationships, and a set of 14 patterns formulated for a selected set of the practices.

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Information Management and Logistics, Department of Pervasive Computing
Number of pages: 71
Publication date: 2014

Publication information
Place of publication: Tampere
Publisher: Tampere University of Technology. Department of Pervasive Computing
Original language: English

Publication series
Name: Tampere University of Technology. Department of Pervasive Computing. Report
Publisher: Tampere University of Technology
Volume: 4
Strategic Research Agenda for Cyber Trust

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Pervasive Computing
Number of pages: 45
Publication date: 2014

Publication information
Publisher: DIGILE
Original language: English

Publication series
Name: DIGILE Board of Directors
Publisher: DIGILE
Links:

Bibliographical note
Accepted by DIGILE Board of Directors at 12.6.2014<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-12-31
Source: researchoutputwizard
Source-ID: 62
Research output: Professional › Commissioned report

Strategies for Hazard Management Process

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Research area: Information Systems in Automation
Authors: Rauhamäki, J., Kuikka, S.
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 19th European Conference on Pattern Languages of Programs
Publisher: ACM
Article number: 31
ISBN (Print): 978-1-4503-3416-7
DOIs: 10.1145/2721956.2721966
Research output: Scientific - peer-review › Conference contribution

Studying the User Experience of a Tablet Based Math Game

General information
Publication information
Journal: International Journal of Game-Based Learning
Volume: 4
Issue number: 1
ISSN (Print): 2155-6849
Ratings:
Scopus rating (2016): SJR 0.236 SNIP 0.235 CiteScore 0.48
Scopus rating (2015): SJR 0.182 SNIP 0.45 CiteScore 0.41
Scopus rating (2014): SJR 0.311 SNIP 0.585 CiteScore 0.71
Scopus rating (2013): SJR 0.275 SNIP 0.967 CiteScore 0.88
Scopus rating (2012): SJR 0.339 SNIP 0.511
Original language: English
DOIs:
10.4018/IJGBL.2014010104

Bibliographical note
Contribution: organisation=pla,FACT1=1<br/>Portfolio EDEND: 2014-06-30<br/>Publisher name: IGI Global
Source: researchoutputwizard
Source-ID: 712
Research output: Scientific - peer-review › Article

Teknologian hyväksyttävyys älykkäiden koneiden työläisössä. Loppuraportti Työsuojelurahaston tutkimus- ja kehittämishankkeesta (hankenumero 113103)

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Partala, T., Saari, T.
Number of pages: 21
Publication date: 2014

Publication information
Place of publication: Tampere
Publisher: Tampereen teknillinen yliopisto. Tietotekniikan laitos
Original language: Finnish

Publication series
Name: Tampereen teknillinen yliopisto. Tietotekniikan laitos. Raportti
Publisher: Tampereen teknillinen yliopisto. Tietotekniikan laitos
Volume: 5
ISSN (Print): 2323-9174
Electronic versions:
partala_saari_teknologian_hyvaksyttavyyys.pdf
Links:

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2015-02-27
Source: researchoutputwizard
Source-ID: 1233
Research output: Professional › Commissioned report
Towards an Open Architecture Model for Web and Mobile Software: Characteristics and Validity Properties

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Vogel, B., Kurti, A., Mikkonen, T., Milrad, M.
Number of pages: 10
Pages: 476-485
Publication date: 2014

Host publication information
Publisher: IEEE
ISBN (Print): 978-1-4799-3574-1

Publication series
Name: IEEE Annual Computer Software and Applications Conference
DOI: 10.1109/COMPSAC.2014.70
Links: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6899251\&tag=1

Bibliographical note
Contribution: organisation=tie,FACT1=1\<br\>/Portfolio EDEND: 2014-12-31\<br\>/Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1761
Research output: Scientific - peer-review › Conference contribution

Towards a Pattern Language for Software Start-ups

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Eloranta, V.
Number of pages: 11
Pages: 24:1-24:11
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 19th European Conference on Pattern Languages of Programs
Towards green power electronics: software controllers and domain knowledge

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Sierszecki, K., Steffens, M., Fogdal, T., Savolainen, J., Mikkonen, T.
Number of pages: 6
Pages: 17-22
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 3rd International Workshop on Green and Sustainable Software, Greens 2014, in conjunction with the 36th International Conference on Software Engineering, ICSE 2014, Hyderabad, India, May 31-June 7, 2014
Place of publication: New York, NY, USA
Publisher: ACM
ISBN (Print): 978-1-4503-2844-9

Publication series
Name: IEEE/ACM International Conference on Software Engineering
Publisher: ACM
ISSN (Print): 0270-5257
ISSN (Electronic): 1558-1225
DOIs:
10.1145/2593743.2593746
Links:
http://dl.acm.org/citation.cfm?id=2593746

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>
Portfolio EDEND: 2014-06-30
Source: researchoutputwizard
Source-ID: 1504
Research output: Scientific - peer-review › Conference contribution

Usefulness of Long-Term User Experience Evaluation to Product Development: Practitioners' Views from Three Case Studies

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Varsaluoma, J., Sahar, F.
Number of pages: 10
Pages: 79-88
Publication date: 2014

Host publication information
Title of host publication: NordiCHI 2014, The 8th Nordic Conference on Human-Computer Interaction, 26.-30.10.2014, Helsinki, Finland
User-Created Content as Mediator of Co-located Social Experiences

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Ojala, J., Väänänen-Vainio-Mattila, K., Olsson, T.
Number of pages: 4
Pages: 1-4
Publication date: 2014

Host publication information
Title of host publication: Workshop on Designing Mobile Interactions for Co-located Interaction Technologies, in conjunction with NordiCHI 2014, The 8th Nordic Conference on Human-Computer Interaction, 26.-30.10.2014, Helsinki, Finland
Publisher: Workshop on Designing Mobile Interactions for Co-located Interaction Technologies

Publication series
Name: Nordic Conference on Human-Computer Interaction
Links:
http://personalorsocial.wordpress.com

Bibliographical note
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2014-12-31
Publisher name: Workshop on Designing Mobile Interactions for Co-located Interaction Technologies
Source: researchoutputwizard
Source-ID: 1183
Research output: Scientific - peer-review › Conference contribution

User experience and expectations of haptic feedback in in-car interaction

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Väänänen-Vainio-Mattila, K., Heikkinen, J., Farooq, A., Evreinov, G., Mäkinen, E., Raisamo, R.
Number of pages: 4
Pages: 248-251
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 13th International Conference on Mobile and Ubiquitous Multimedia, MUM2014, November 25-28, 2014, Melbourne, Australia
Place of publication: New York, NY
Publisher: ACM
User Experience of Proactive Audio-Based Social Devices: a Wizard-of-Oz Study

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Jarusriboonchai, P., Olsson, T., Väänänen-Vainio-Mattila, K.
Number of pages: 9
Pages: 98-106
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 13th International Conference on Mobile and Ubiquitous Multimedia, MUM2014, November 25-28, 2014, Melbourne, Australia
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-3304-7

Using Adaptive Avatars for Visualizing Recent Music Listening History and Supporting Music Discovery

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience
Authors: Lehtiniemi, A., Ojala, J.
Publication date: 2014

Host publication information
Title of host publication: ACE ’14 Proceedings of the 11th Conference on Advances in Computer Entertainment Technology
Place of publication: New York, NY
Publisher: ACM
Article number: 18
ISBN (Print): 978-1-4503-2945-3
DOIs:
10.1145/2663806.2663820
Using Constraint Satisfaction and Optimization for Pattern-Based Software Design

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Managing digital industrial transformation (mDIT)
Authors: Vathsavayi, S. H., Sievi-Korte, O., Koskimies, K., Systä, K.
Number of pages: 9
Pages: 29-37
Publication date: 2014

Host publication information
Title of host publication: The 23rd Australasian Software Engineering Conference, ASWEC 2014, Sydney, Australia, April 7-10, 2014
Publisher: IEEE
ISBN (Print): 978-1-4799-3149-1

Publication series
Name: Australasian Software Engineering Conference
DOIs:
10.1109/ASWEC.2014.35
Links:
http://www.aswec2014.org/programme/accepted-papers/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2014-07-16<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1712
Research output: Scientific - peer-review › Conference contribution

Variable Length Instruction Compression on Transport Triggered Architectures
The SRAM memories used for embedded micro-processor devices consume a large portion of the system's power. The power dissipation of the instruction memory can be limited by using code compression methods, which may require the use of variable length instruction formats in the processor. The power-efficient design of variable length instruction fetch and decode is challenging for static multiple-issue processors, which aim for low power consumption on embedded platforms. The power saved using compression is easily lost on inefficient processor design. We propose an implementation for instruction template -based compression and two instruction fetch alternatives for variable length instruction encoding on Transport Triggered Architecture, a static multiple-issue exposed data path architecture. The compression approach reaches an average program size reduction of 44% at best. We show that the variable length fetch designs are sufficiently low-power oriented for the system to benefit from the code compression, which reduces the program memory size.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Helkala, J., Viitanen, T., Kultala, H., Jääskeläinen, P., Takala, J., Zetterman, T., Berg, H.
Number of pages: 7
Pages: 149-155
Publication date: 2014

Host publication information
Publisher: Institute of Electrical and Electronics Engineers IEEE
ISBN (Print): 978-1-4799-3770-7
Electronic versions:
White Knights of the Smart City

In this paper we will demonstrate how a science fiction storyboard was used as a means for delivering and discussing future technology and design innovations. We present a case in which an illustrated storyboard exemplified the interactions of an experienced-centered technology design concept - a winter caretaking system for a smart city and two devices that could assist its citizens. In the science fiction introduced, the emphasis is on the experience-centered design approach, particularly experiences relating to nurture, sympathy and control.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Research area: User experience, VTT Tech Res Ctr Finland, VTT Technical Research Center Finland, Human Factors Complex Syst
Authors: Kymäläinen, T., Sahar, F., Palviainen, J.
Number of pages: 12
Pages: 223-234
Publication date: 2014

Host publication information
Title of host publication: Workshop Proceedings of the 10th International Conference on Intelligent Environments
Publisher: IOS Press
Editors: Augusto, J., Zhang, T.
ISBN (Print): 978-1-61499-410-7

Publication series
Name: Ambient Intelligence and Smart Environments
Publisher: IOS PRESS
Volume: 18
ISSN (Print): 1875-4163
Keywords: Science-fiction prototype, storyboard, intelligent city, user experience design, experience-centered design
DOI: 10.3233/978-1-61499-411-4-223
Source: WOS
Source-ID: 000360238400028
Research output: Scientific - peer-review › Conference contribution

Who Contributes to What? Exploring Hidden Relationships between FLOSS Projects

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Syeed, M. M. M., Hammouda, I.
Number of pages: 10
Pages: 21-30
Publication date: 2014

Host publication information
Publisher: Springer
ISBN (Print): 978-3-642-55127-7
ISBN (Electronic): 978-3-642-55128-4
WOKE: A novel workflow model editor

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Salminen, E., Honkonen, M., Matilainen, L., Hämäläinen, T. D.
Number of pages: 8
Pages: 1-8
Publication date: 2014

Host publication information
Title of host publication: International Symposium on System-on-Chip, SoC 2014, October 28-29, 2014, Tampere, Finland
Place of publication: Piscataway, NJ
Publisher: IEEE
Editors: Nurmi, J., Ellervee, P., Milojevic, D., Daniel, O., Paakki, T.
ISBN (Print): 978-1-4799-6889-3

Publication series
Name: International Symposium on System-on-Chip

Bibliographical note
Contribution: organisation=tlie,FACT1=1<br/>Portfolio EDEND: 2014-11-30<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1442
Research output: Scientific - peer-review › Conference contribution

A Core-Periphery-Legality Architectural Style for Open Source System Development

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Lokhman, A., Mikkonen, T., Hammouda, I., Kazman, R., Chen, H.
Number of pages: 10
Pages: 3148-3157
Publication date: 2013

Host publication information
Title of host publication: 46th Hawaii International Conference on System Sciences, HICSS 2013, 7.-10.1.2013, Wailea, HI, USA
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4673-5933-7
ISBN (Electronic): 978-0-7695-4892-0
A field trial on mobile crowdsourcing of news content: Factors influencing participation

We conducted a five-week field trial on mobile crowdsourcing of hyperlocal news content to 1) understand the readers’ experiences and 2) explore factors affecting their participation. In the end of the study the participants were surveyed with an online questionnaire (17/104 respondents) and five participants were interviewed. Although respondents and interviewees were enthusiastic about the trial, the activity in the trial was low. Results indicate that participant characteristics (age, gender, participation motivations and hobbyist background in photography) and task characteristics in terms of the subjectively perceived task significance (possible impact on important issues in the environment or on community), task relevance (related to the background and participation motivation), and task engagingness have an effect on the participation. In addition, participation was influenced by the estimated needed effort vs. the expected benefit (monetary benefit or having a possibility to influence), vicinity to the assignment location, enjoyment of the activity, and the monetary reward. To plan and manage the crowdsourcing activity the news publishers need information about the characteristics of the participants, participation patterns and motivations that could be provided by the crowdsourcing platform.
A light-weight mixed method tool for remote UX evaluation: A case study of premium sports watch users

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Nurkka, P., Jumisko-Pyykkö, S.
Number of pages: 10
Pages: 539-548
Publication date: 2013

**Host publication information**
Place of publication: Berlin, Germany
Publisher: Technische Universität Berlin
Editors: Dittrich, E., Doria, L., Gross, A., Günztler, T., Smieszek, H.

**Publication series**
Name: Berlin Workshop on Human-Machine Systems

**Bibliographical note**
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: Technische Universität Berlin
Source: researchoutputwizard
Source-ID: 3011
Research output: Scientific - peer-review › Conference contribution

---

All Linear-Time Congruences for Familiar Operators

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
Authors: Valmari, A.
Number of pages: 34
Pages: 1-34
Publication date: 2013
Peer-reviewed: Yes

**Publication information**
Journal: Logical Methods in Computer Science
Volume: 9
Issue number: 4
Article number: 11
ISSN (Print): 1860-5974
Ratings:
Scopus rating (2016): SJR 0.493 SNIP 1.149 CiteScore 1.02
Scopus rating (2015): SJR 0.579 SNIP 1.179 CiteScore 1.11
A mixed methods approach to a longitudinal study of user experience in the metals and engineering industry

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Väätäjä, H., Oja, T.
Number of pages: 6
Publication date: 2013

Host publication information
Place of publication: Berlin, Germany
Publisher: Technische Universität Berlin

Publication series
Name: Berlin Workshop on Human-Machine Systems
Keywords: user experience, longitudinal study, manufacturing, metals and engineering industry, MMS, human-computer interaction, human-technology interaction, work, user

An Accountable Security Mechanism based on Security Service Level Agreement

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Takahashi, T., Kannisto, J., Heikkinen, S., Silverajan, B., Helenius, M., Matsuo, S., Harju, J.
Number of pages: 7
Publication date: 2013
An Action-Oriented Programming Model for Pervasive Computing in a Device Cloud

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Managing digital industrial transformation (mDIT)
Authors: Aaltonen, T., Myllärniemi, V., Raatikainen, M., Mäkitalo, N., Pääkkö, J.
Number of pages: 9
Pages: 467-475
Publication date: 2013

Host publication information
Title of host publication: The 20th Asia-Pacific Software Engineering Conference, APSEC 2013, Bangkok, Thailand, December 2-5, 2013
Publisher: IEEE
ISBN (Print): 978-0-4799-2144-7

Publication series
Name: Asia-Pacific Software Engineering Conference
ISSN (Print): 1530-1362
Links:

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1865
Research output: Scientific - peer-review › Conference contribution

An Embedded Cloud Design for Internet-of-Things

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Laukkarinen, T., Suhonen, J., Hännikäinen, M.
Number of pages: 13
Pages: 1-13
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: International Journal of Distributed Sensor Networks
Volume: 2013
Article number: 790130
ISSN (Print): 1550-1329
Ratings:
Applying Lehman's laws to game evolution

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Mathematical modelling with wide societal impact (MathImpact)
Authors: Nummenmaa, T., Kultima, A., Alha, K., Mikkonen, T.
Number of pages: 7
Pages: 11-17
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 2013 International Workshop on Principles of Software Evolution, IWPSE 2013, August 19-20, 2013, Saint Petersburg, Russia
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-2311-6

Publication series
Name: International Workshop on Principles of Software Evolution
DOIs:
10.1145/2501543.2501546
Links:
http://dl.acm.org/citation.cfm?id=2501546

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 3008
Research output: Scientific - peer-review › Conference contribution

A secure OSGi environment for untrusted web applications

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Aho, T., Koskinen, J., Nieminen, A.
Number of pages: 7
A User-Centric View of Intelligent Environments: User Expectations, User Experience and User Role in Building Intelligent Environments

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Kaasinen, E., Kymäläinen, T., Niemelä, M., Olsson, T., Kanerva, M., Ikonen, V.
Number of pages: 33
Pages: 1-33
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Computers
Volume: 2
Issue number: 1
ISSN (Print): 2073-431X
Original language: English
DOI: 10.3390/computers2010001
Links:
http://www.mdpi.com/2073-431X/2/1/1

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: MDPI
Source: researchoutputwizard
Source-ID: 2450
Research output: Scientific - peer-review › Article

Bayesian analysis of GUHA hypotheses

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering, Department of Mathematics, Research group: Positioning, Research Community on Data-to-Decision (D2D), Wireless Communications and Positioning (WICO)
Authors: Piche, R., Järvenpää, M., Turunen, E., Simunek, M.
Number of pages: 28
Pages: 47-73
Publication date: 2013
City Scene: Field Trial of a Mobile Street-imagery-based Navigation Service

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Vaittinen, T., Salminen, M., Olsson, T.
Number of pages: 10
Pages: 193-202
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 15th International Conference on Human-Computer Interaction with Mobile Devices and Services, MobileHCI 2013, August 27-30, 2013, Munich, Germany
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-2273-7

Publication series
Name: International Conference on Human-Computer Interaction with Mobile Devices and Services
Cloud Browser: Enhancing the Web Browser with Cloud Sessions and Downloadable User Interface

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Taivalsaari, A., Mikkonen, T., Systä, K.
Number of pages: 10
Pages: 224-233
Publication date: 2013

Host publication Information
Title of host publication: Grid and Pervasive Computing, 8th International Conference, GPC 2013 and Collocated Workshops, Seoul, Korea, May 9-11, 2013
Place of publication: Berlin
Publisher: Springer
Editors: Park, J., Arabnia, H., Kim, C., Shi, W., Gil, J.
ISBN (Print): 978-3-642-38026-6
ISBN (Electronic): 978-3-642-38027-3

Publication series
Name: Lecture Notes in Computer Science
Volume: 7861
ISSN (Print): 0302-9743
ISSN (Electronic): 1611-3349
DOIs:
10.1007/978-3-642-38027-3_24

Bibliographical note
Ei UT:ta 8/13
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 3496
Research output: Scientific - peer-review › Conference contribution

Cloud computing and its impact on mobile software development: Two roads diverged

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Mikkonen, T., Taivalsaari, A.
Number of pages: 3
Pages: 2318-2320
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Systems and Software
Volume: 86
Issue number: 9
ISSN (Print): 0164-1212
Ratings:
Code Oriented Approach to 3D Widgets

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Mattila, A.
Number of pages: 15
Pages: 126-140
Publication date: 2013

Host publication information
Title of host publication: SPLST '13, 13th Symposium on Programming Languages and Software Tools, August 26-27, 2013, Szeged, Hungary
Place of publication: Szeged, Hungary
Publisher: University of Szeged
Editor: Kiss, A.
ISBN (Print): 978-963-306-228-9

Publication series
Name: Symposium on Programming Languages and Software Tools
Links:
http://www.inf.u-szeged.hu/splst13/splst13proc.pdf

Cognitive styles and visual quality
Constructing Minimal Coverability Sets

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
Authors: Piipponen, A., Valmari, A.
Number of pages: 13
Pages: 183-195
Publication date: 2013

Host publication information
Title of host publication: Reachability Problems. Proceedings of the 7th International Workshop, RP 2013, Uppsala, Sweden, September 24-26, 2013
Place of publication: Berlin Heidelberg
Publisher: Springer
Editors: Abdulla, P. A., Potapov, I.
ISBN (Print): 978-3-642-41035-2
ISBN (Electronic): 978-3-642-41036-9

Publication series
Name: Lecture Notes in Computer Science
Volume: 8169
ISSN (Print): 0302-9743
DOI: 10.1007/978-3-642-41036-9_17

Bibliographical note
Contribution: organisation=mat,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 3152
Research output: Scientific - peer-review › Conference contribution

Customized TTA Processor for Efficient Implementation of Variable Length FFT in SDR Systems

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Patyk, T., Guevorkian, D., Pitkänen, T., Takala, J.
Number of pages: 7
Pages: 239-245
Publication date: 2013

Host publication information
Place of publication: Reston, VA
Publisher: The Wireless Innovation Forum
Editors: Glossner, J., Pucker, L., Hamill, S.

Publication series
Name: Wireless Innovation Forum Conference on Wireless Communications Technologies and Software Defined Radio
Links:
http://groups.winnforum.org/2013-URC-Regulatory-workshop

Bibliographical note
Conference Proceedings available December 2013<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: The Wireless Innovation Forum
Source: researchoutputwizard
Source-ID: 3108
Research output: Scientific - peer-review › Conference contribution
General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Pervasive Computing
Authors: Varsaluoma, J., Kentta, V.
Number of pages: 1
Pages: 9-9
Publication date: 2013
Peer-reviewed: No

Publication information
Journal: Interactions
Volume: XX.5
ISSN (Print): 1072-5520
Ratings:
Scopus rating (2016): SJR 1.382 SNIP 1.006 CiteScore 1.23
Scopus rating (2015): SJR 0.401 SNIP 1.718 CiteScore 1.19
Scopus rating (2014): SJR 0.424 SNIP 1.999 CiteScore 1.09
Scopus rating (2013): SJR 0.367 SNIP 1.473 CiteScore 0.97
Scopus rating (2012): SJR 0.407 SNIP 1.624 CiteScore 0.86
Scopus rating (2011): SJR 0.276 SNIP 1.063 CiteScore 0.57
Scopus rating (2010): SJR 0.323 SNIP 1.167
Scopus rating (2009): SJR 0.205 SNIP 0.955
Scopus rating (2008): SJR 0.151 SNIP 0.601
Scopus rating (2007): SJR 0.164 SNIP 0.425
Scopus rating (2000): SJR 0.485 SNIP 1.522
Scopus rating (1999): SJR 0.147 SNIP 0
Original language: English
Links:
http://acm.org/uist

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 3651
Research output: Scientific › Article

Dependency Analysis and Visualization Tool for Kactus2 IP-XACT Design Framework

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Määttä, J., Honkonen, M., Korhonen, T., Salminen, E., Hämäläinen, T. D.
Number of pages: 6
Pages: 1-6
Publication date: 2013

Host publication information
Title of host publication: International Symposium on System-on-Chip, SOC 2013, Tampere, Finland, October 23-24, 2013
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-1189-9

Publication series
Name: International Symposium on System-on-Chip
DOIs:
10.1109/ISSoC.2013.6675261
Designing a 3D Widget Library for WebGL Enabled Browsers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Mattila, A., Mikkonen, T.
Number of pages: 4
Pages: 757-760
Publication date: 2013

Host publication information
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-1656-9

Publication series
Name: ACM Symposium On Applied Computing
DOIs: 10.1145/2480362.2480506
Links: http://www.acm.org/conferences/sac/sac2013/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: ACM
Source-ID: 2904
Research output: Scientific - peer-review › Conference contribution

Designing for Presence in Social Television Interaction

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Palviainen, J., Kuusinen, K., Väänänen-Vainio-Mattila, K.
Number of pages: 10
Pages: 1-10
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 12th International Conference on Mobile and Ubiquitous Multimedia, MUM 2013, December 2-5 2013, Luleå, Sweden
Publisher: ACM
ISBN (Print): 978-1-4503-2648-3

Publication series
Name: International Conference on Mobile and Ubiquitous Multimedia
DOIs: 10.1145/2541831.2541860
Links: http://www.mum2013.org/program.html

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: IEEE
Source-ID: 2842
Research output: Scientific - peer-review › Conference contribution
Designing User Experience for Mobile Apps: Long-Term Product Owner Perspective

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Kuusinen, K., Mikkonen, T.
Number of pages: 6
Pages: 535-540
Publication date: 2013

Host publication information
Title of host publication: The 20th Asia-Pacific Software Engineering Conference, APSEC 2013, Bangkok, Thailand, December 2-5, 2013
Publisher: IEEE
ISBN (Print): 978-0-4799-2144-7

Publication series
Name: Asia-Pacific Software Engineering Conference
ISSN (Print): 1530-1362
Links:

Developing Client-Side Mashups: Experiences, Guidelines and Reference Architecture

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Salminen, A., Mikkonen, T., Nyrhinen, F., Taivalsaari, A.
Number of pages: 19
Pages: 34-52
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: International Journal of Ambient Computing and Intelligence
Volume: 5
Issue number: 1
ISSN (Print): 1941-6237
Ratings:
Scopus rating (2016): SJR 0.125 SNIP 0.33 CiteScore 0.35
Scopus rating (2015): SJR 0.116 SNIP 0.381 CiteScore 0.48
Scopus rating (2014): SJR 0.121 SNIP 0.416 CiteScore 0.41
Scopus rating (2013): SJR 0.165 SNIP 0.666 CiteScore 0.45
Scopus rating (2012): SJR 0.164 SNIP 0.546 CiteScore 0.36
Scopus rating (2011): SJR 0.144 SNIP 0.326 CiteScore 0.25
Scopus rating (2010): SJR 0.134 SNIP 0.27
Original language: English
DOIs:
10.4018/jaci.2013010103
Developing Modern Industrial Control Applications: On Information Models, Methods and Processes for Distributed Engineering

Control applications are used in automation and control of manufacturing and processing facilities to run the process. Development of industrial control applications is engineering with multidisciplinary characteristics and it is often performed as a part of a larger project, e.g. constructing a facility. It is closely interwoven with several related engineering disciplines between which information exchange is required. The control domain has several requirements and characteristics that need to be considered when developing new means to improve quality and efficiency of engineering. In this thesis control application development is studied concerning model information content, methods for enhancing development, and improvement of engineering process management. Based on requirements for information content in control application models, improvements to the UML Automation Profile (UML AP) are presented. UML AP requirement modeling is developed to enable concerns of related engineering to be taken into account. Domain-specific UML AP constructs are also developed for modeling platform independent functions and execution platform features. To improve development of control applications, model-driven methods are proposed and applied using UML AP elements. In the approach, a workflow from requirements to functional models, and finally to executable applications, is developed. The approach has been designed so that tools can be provided for automating capturing of requirements and assisting in model transformations. For development of control applications the approach promotes reusable, platform independent solutions while maintaining support for existing well-proven implementation platforms. Methods are proposed for extending modeling with ontology descriptions based on Semantic Web technologies. Using these, a layer is constructed on top of the application model which is used to enhance interoperability and understandability of the concepts. The semantic descriptions enable automatic reasoning and inferences to be used in model analysis and provision of material supporting engineering. As a supplement to traditional modeling the descriptions provide semantics beyond those of a metamodel. Given that the information content is standardized and the development methods are defined, the engineering processes can be improved concerning information exchange and process management. Organizing engineering tasks into services is proposed, and a service infrastructure is developed to facilitate utilization of these services and integration of information systems. Business process modeling is used to describe the engineering processes and to compose the services. By executing the business processes with information systems the management of engineering activities is improved and automation of some of the tasks is enabled. Engineering is not limited to the design phase of a facility. It is performed throughout the plant lifecycle in, for example, operation and maintenance (O&M). A service framework providing access to relevant data is also beneficial for O&M tasks. To meet the business demands a business process driven approach for development of O&M information systems is proposed. The approach is based on composition of
services, and enables flexible reconfiguration of processes as well as integration of systems.

**General information**
State: Published
Ministry of Education publication type: G4 Doctoral dissertation (monograph)
Organisations: Department of Automation Science and Engineering
Authors: Hästbacka, D.
Number of pages: 135
Publication date: 2013

**Publication information**
Publisher: Tampere University of Technology
Original language: English

**Publication series**
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
No.: 1143
ISSN (Print): 1459-2045
Electronic versions:

**Bibliographical note**
Awarding institution: Tampere University of Technology
Source: researchoutputwizard
Source-ID: 2250
Research output: Monograph › Doctoral Thesis

**Energy Recovery and Logical Reversibility in Adiabatic CMOS Multiplier**

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Former organisation of the author
Authors: Hänninen, I., Lu, H., Lent, C. S., Snider, G. L.
Number of pages: 11
Pages: 25-35
Publication date: 2013

**Host publication information**
Title of host publication: Reversible Computation, 5th International Conference, RC 2013, Victoria, BC, Canada, July 4-5, 2013. Proceedings. Lecture Notes in Computer Science
Place of publication: Berlin
Publisher: Springer
ISBN (Print): 978-3-642-38985-6
ISBN (Electronic): 978-3-642-38986-3

**Publication series**
Name: Lecture Notes in Computer Science
Volume: 7948
ISSN (Print): 0302-9743
DOIs:
10.1007/978-3-642-38986-3_3
Links:
http://link.springer.com/chapter/10.1007/978-3-642-38986-3_3

**Bibliographical note**
TTY ei affiliationa<br/>
Contribution: organisation=tie,FACT1=1<br/>
Portfolio EDEND: 2013-11-29<br/>
Publisher name: Springer
Source: researchoutputwizard
Source-ID: 2234
Research output: Scientific - peer-review › Conference contribution
Ministry of Education publication type: **A4 Article in a conference publication**  
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)  
Authors: Valmari, A.  
Number of pages: 45  
Pages: 255-299  
Publication date: 2013

**Host publication information**  
Title of host publication: The 5th Advanced Course on Petri Nets, September 2010, Rostock, Germany, Transactions on Petri Nets and Other Models of Concurrency VII.  
Place of publication: Berlin, Heidelberg  
Publisher: Springer  
Editors: Jensen, K., van der Aalst, W. M. P., Balbo, G., Koutny, M., Wolf, K.  
ISBN (Print): 978-3-642-38142-3  
ISBN (Electronic): 978-3-642-38143-0

**Publication series**  
Name: Lecture Notes in Computer Science  
Volume: 7480  
ISSN (Print): 0302-9743  
DOIs:  
10.1007/978-3-642-38143-0_7

**Bibliographical note**  
Contribution: organisation=mat,FACT1=1  
Portfolio EDEND: 2013-11-29  
Publisher name: Springer  
Source: researchoutputwizard  
Source-ID: 3640  
Research output: Scientific - peer-review › Conference contribution

---

**Framework for Industrial Embedded System Product Development and Management**

**General information**  
State: Published  
Ministry of Education publication type: **A4 Article in a conference publication**  
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)  
Authors: Leppäkoski, A., Salminen, E., Hämäläinen, T. D.  
Number of pages: 6  
Pages: 1-6  
Publication date: 2013

**Host publication information**  
Title of host publication: International Symposium on System-on-Chip, SOC 2013, Tampere, Finland, October 23-24, 2013  
Place of publication: Piscataway, NJ  
Publisher: IEEE  
ISBN (Print): 978-1-4799-1189-9

**Publication series**  
Name: International Symposium on System-on-Chip  
DOIs:  
10.1109/ISSoC.2013.6675265  
Links:  
https://www.conftool.pro/soc2013/index.php?page=browseSessions&form_session=13&CTSID_SOC2013=IZ2S7pZSj3vz0gGlIlsEGuip4w,e

**Bibliographical note**  
Contribution: organisation=tie,FACT1=1  
Portfolio EDEND: 2013-11-29  
Publisher name: IEEE  
Source: researchoutputwizard  
Source-ID: 2766  
Research output: Scientific - peer-review › Conference contribution

---

**General-Purpose DSP Processors**

**General information**
Implementing artificial intelligence: a generic approach with software support

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Department of Mathematics
Authors: Heinimäki, T. J., Vanhatupa, J.
Pages: 27-38
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Proceedings of the Estonian Academy of Sciences
Volume: 62
Issue number: 1
ISSN (Print): 1736-6046

Ratings:
Scopus rating (2016): CiteScore 0.52 SJR 0.238 SNIP 0.45
Scopus rating (2015): SJR 0.195 SNIP 0.863 CiteScore 0.77
Scopus rating (2014): SJR 0.198 SNIP 0.581 CiteScore 0.42
Scopus rating (2013): SJR 0.218 SNIP 0.671 CiteScore 0.52
Scopus rating (2012): SJR 0.199 SNIP 0.474 CiteScore 0.53
Scopus rating (2011): SJR 0.312 SNIP 0.644 CiteScore 0.66
Scopus rating (2010): SJR 0.289 SNIP 0.438
Scopus rating (2009): SJR 0.19 SNIP 0.246
Scopus rating (2008): SJR 0.104 SNIP 0.185
Scopus rating (2007): SJR 0.104 SNIP 0.192
Original language: English

DOIs:
10.3176/proc.2013.1.04

Links:
http://www.eap.ee/21831/

Bibliographical note
Poistettu tupla r=1173; Tehisintellekti rakendus: Üldine lähenemine koos tarkvaratoega<br/>Contribution: organisation=tie,FACT1=0.5<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: Estonian Academy Publishers
Source: researchoutputwizard
Source-ID: 2264
Research output: Scientific - peer-review › Article

Indoor 3D Navigation and Positioning of Vehicles in Multi-Storey Parking Garages

We propose a novel method for three-dimensional navigation and localization of a land vehicle in a multi-storey parking garage. In order to navigate or localize in 3D space we also need height information in addition to 2D position.

Conventionally, an altimeter is used to get the floor level/height information. The solution presented in this paper uses low cost gyro and odometer sensors, combined with a 3D map by means of particle filtering and collision detection techniques to localize the vehicle in a parking garage. This eliminates the necessity of an altimeter or other additional aiding sources such as radio signaling. Thus the proposed solution can be used without any additional infrastructure devices. Other sources of information, such as WLAN signals, can be used to complement the solution if and when available.

General information
State: Published
Recent embedded DSPs are incorporating IEEE-compliant floating point arithmetic to ease the development of, e.g., multiple antenna MIMO in software-defined radio. An obvious choice of FPU architecture in DSP is to include a fused multiply-add (FMA) operation, which accelerates most DSP applications. Another advantage of FMA is that it enables fast software algorithms for, e.g., division and square root without much additional hardware. However, these algorithms are nontrivial to perform at the target accuracy to get the correctly rounded result without danger of overflow. Previous FMA-
Based systems either rely on a powerhungry wide intermediate format or forego correct rounding. A wide format is unattractive in a power-sensitive embedded environment since it requires enlarged register files, wider data buses and possibly a larger multiplier. We present provably correct algorithms for efficient IEEE-compliant division and square root with only a 32-bit format using hardware prescaling and postscaling steps. The required hardware has approximately 8% of area and power footprint of a single FMA unit.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Viitanen, T., Jääskeläinen, P., Takala, J.
Number of pages: 6
Pages: 159-164
Publication date: 2013

**Host publication information**
Title of host publication: 2013 IEEE Workshop on Signal Processing Systems in Taipei, Taiwan, October 16th-18th, SIPS 2013
Publisher: Institute of Electrical and Electronics Engineers IEEE
ISBN (Print): 978-1-4673-6238-2

**Publication series**
Name: IEEE Workshop on Signal Processing Systems
ISSN (Print): 2162-3562
Electronic versions: viitanen_inexpensive_correctly_rounded Floating point.pdf
Links:
http://www.sips2013.org/
http://urn.fi/URN:NBN:fi:tty-201311251473

**Bibliographical note**
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: Institute of Electrical and Electronics Engineers IEEE
Source: researchoutputwizard
Source-ID: 3689
Research output: Scientific - peer-review › Conference contribution

**Instruction Set Extensions for Matrix Decompositions on Software Defined Radio Architectures**

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Senthilvelan, M., Sima, M., Iancu, D., Schulte, M., Glossner, J.
Number of pages: 15
Pages: 289-303
Publication date: 2013
Peer-reviewed: Yes

**Publication information**
Journal: Journal of Signal Processing Systems
Volume: 70
Issue number: 3
ISSN (Print): 1939-8018
Ratings:
Scopus rating (2016): CiteScore 0.78 SJR 0.226 SNIP 0.625
Scopus rating (2015): SJR 0.228 SNIP 0.639 CiteScore 0.7
Scopus rating (2014): SJR 0.292 SNIP 1 CiteScore 0.99
Scopus rating (2013): SJR 0.27 SNIP 0.858 CiteScore 0.97
Scopus rating (2012): SJR 0.281 SNIP 0.869 CiteScore 1.04
Scopus rating (2011): SJR 0.252 SNIP 0.717 CiteScore 0.92
Scopus rating (2010): SJR 0.288 SNIP 0.829
Scopus rating (2009): SJR 0.293 SNIP 0.849
Interaction with Dynamic Large Bodies in Efficient, Real-Time Water Simulation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Kellomäki, T.
Number of pages: 10
Pages: 117-126
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of WSCG
Volume: 21
Issue number: 2
ISSN (Print): 1213-6972
Ratings:
Scopus rating (2016): SJR 0.144 SNIP 0.244 CiteScore 0.35
Scopus rating (2015): SJR 0.139 SNIP 0.508 CiteScore 0.62
Scopus rating (2014): SJR 0.167 SNIP 0.381 CiteScore 0.33
Scopus rating (2013): SJR 0.128 SNIP 0.059 CiteScore 0.23
Scopus rating (2012): SJR 0.16 SNIP 0.372 CiteScore 0.29
Scopus rating (2011): SJR 0.176 SNIP 0.291 CiteScore 0.6
Scopus rating (2010): SJR 0.122 SNIP 0.041
Original language: English

Bibliographical note
Poistettu tupla r=4617<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 3390
Research output: Scientific - peer-review › Article

Interleaving human and search-based software architecture design
Key Success Factors in Control System Software Architecture

The amount of the control system software used in the mobile work machines has increased radically during the last ten years. The software enables development of new features and further automation. Consequently, the productivity of the work machines increases, bringing cost savings. However, the development of control system software is challenging because they have special characteristics, such as close dependency to hardware, strict real-time requirements, distribution, and long life-cycle of the products. In addition, standards and regulations dictate how functional safety should be taken into account.

In software engineering, architecture is often seen as the key element of the system enabling high quality design and implementation. Good software architecture helps the developer to easily maintain and further develop the code through the life cycle of the system. Therefore, in this paper we clarify which quality properties and constraints are important now and in the future from the point of view of the software architects of the work machine control systems. The study is based on the questionnaire targeted to the experts of the field and various interview surveys we have carried out during several years in the leading international work machine manufacturers.
Landmarks for the User Experience in the Cloud

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Department of Pervasive Computing
Number of pages: 83
Publication date: 2013

Publication information
Place of publication: Helsinki
Publisher: CLOUD SOFTWARE FINLAND
ISBN (Print): 978-952-93-2753-9
Original language: English
Links:
https://www.cloudsoftwareprogram.org/rs/3391/6e620c3b-438c-425c-bfcc-a70731023c59/e05/fd/1/filename/landmarks.pdf
https://www.cloudsoftwareprogram.org/results/deliverables-and-other-reports/i/29051/1941/landmarks-for-the-user-experience-in-the-cloud

Bibliographical note
On johdanto<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29
Source: researchoutputwizard
Source-ID: 3692
Research output: Scientific - peer-review » Anthology

Little Backpackers - Studying Children's Psychological Needs in an Interactive Exhibition Context

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Saarinen, P., Partala, T., Väänänen-Vainio-Mattila, K.
Number of pages: 4
Pages: 415-418
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 12th International Conference on Interaction Design and Children, IDC’13, 24-27 June, 2013, New York, NY, USA
Place of publication: New York, NY, USA
Publisher: ACM
ISBN (Print): 978-1-4503-1918-8

Publication series
Name: International Conference on Interaction Design and Children
DOI:
10.1145/2485760.2485844

Bibliographical note
Poistettu tupla r=932<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 3327
Research output: Scientific - peer-review » Conference contribution

Long-Term Product Line Sustainability with Planned Staged Investments
Low Complexity Algorithm for Inversion of Special Matrices in SDR Systems

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Savolainen, J., Niu, N., Mikkonen, T., Fogdal, T.
Number of pages: 7
Pages: 63-69
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Software
Volume: 30
Issue number: 6
ISSN (Print): 0740-7459
Ratings:
Scopus rating (2016): CiteScore 1.87 SJR 0.584 SNIP 1.966
Scopus rating (2015): SJR 0.472 SNIP 1.659 CiteScore 1.86
Scopus rating (2014): SJR 0.556 SNIP 1.808 CiteScore 1.53
Scopus rating (2013): SJR 0.617 SNIP 1.78 CiteScore 1.55
Scopus rating (2012): SJR 0.664 SNIP 1.844 CiteScore 1.52
Scopus rating (2011): SJR 0.721 SNIP 2.415 CiteScore 1.59
Scopus rating (2010): SJR 0.437 SNIP 2.085
Scopus rating (2009): SJR 0.643 SNIP 2.186
Scopus rating (2008): SJR 0.664 SNIP 3.079
Scopus rating (2007): SJR 0.811 SNIP 2.824
Scopus rating (2006): SJR 0.762 SNIP 3.004
Scopus rating (2005): SJR 1.265 SNIP 2.578
Scopus rating (2004): SJR 0.868 SNIP 2.649
Scopus rating (2003): SJR 0.937 SNIP 2.468
Scopus rating (2002): SJR 0.875 SNIP 2.237
Scopus rating (2001): SJR 0.587 SNIP 1.434
Scopus rating (2000): SJR 0.42 SNIP 1.917
Scopus rating (1999): SJR 0.681 SNIP 2.652
Original language: English
DOIs: 10.1109/MS.2013.96
Links: http://www.computer.org/csdl/mags/so/2013/06/mso2013060063-abs.html

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3375
Research output: Scientific - peer-review › Article

Low Complexity Algorithm for Inversion of Special Matrices in SDR Systems

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Guevorkian, D., Raunioja, K., Takala, J.
Number of pages: 5
Pages: 48-53
Publication date: 2013

Host publication information
Place of publication: Reston, VA
Low-Power Application-Specific FFT Processor for LTE Applications

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Patyk, T., Guevorkian, D., Pitkänen, T., Jääskeläinen, P., Takala, J.
Number of pages: 5
Pages: 28-32
Publication date: 2013

Host publication information
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-0102-9
ISBN (Electronic): 978-1-4799-0103-6

Low-Power Wireless Sensor Network Platforms

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Pervasive Computing
Authors: Suhonen, J., Kohvakka, M., Kaseva, V., Hämäläinen, T. D., Hännikäinen, M.
Number of pages: 39
Pages: 381-419
Publication date: 2013

Host publication information
Title of host publication: Handbook of Signal Processing Systems, Part II
Publisher: Springer New York
Editors: Bhattacharyya, S. S., Deprettere, E. F., Leupers, R., Takala, J.
Media experience as a predictor of future news reading

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Järvelä, S., Kivikangas, M., Saari, T., Ravaja, N.
Number of pages: 8
Pages: 131-139
Publication date: 2013
Peer-reviewed: Yes

**Publication information**
Journal: Journal of Print and Media Technology Research
Volume: 2
Issue number: 3
ISSN (Print): 2223-8905
Original language: English
Links:

**Method to Convert Analog Filters to Digital Filters**

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Grama, L., Lodin, A., Rusu, C., Takala, J.
Number of pages: 6
Pages: 438-443
Publication date: 2013

**Host publication information**
Title of host publication: The 8th International Symposium on Image and Signal Processing and Analysis, ISPA 2013, September 4-6, 2013, Trieste, Italy
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-953-184-194-8

**Publication series**
Name: Image and Signal Processing and Analysis
ISSN (Print): 1845-5921
ISSN (Electronic): 1849-2266
DOIs:
10.1109/ISPA.2013.6703781

**Bibliographical note**
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 3476
Research output: Scientific - peer-review › Chapter
Mobile Agents for the Internet of Things

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Järvenpää, L., Lintinen, M., Mattila, A., Mikkonen, T., Systä, K., Voutilainen, J.
Number of pages: 5
Pages: 763-767
Publication date: 2013

Host publication information
Title of host publication: 17th International Conference on System Theory, Control and Computing, ICSTCC 2013, Sinaia, Romania, October 11-13, 2013
Publisher: IEEE
ISBN (Print): 978-1-4799-2227-7

Publication series
Name: International Conference on System Theory, Control and Computing
DOIs:
10.1109/ICSTCC.2013.6689053
Links:
http://perun.pmf.uns.ac.rs/events/wasa2013/

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: IEEE
Source-ID: 2414
Research output: Scientific - peer-review › Conference contribution

Mobile Devices as Infotainment User Interfaces in the Car: Contextual Study and Design Implications

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Heikkinen, J., Mäkinen, E., Lylykangas, J., Pakkanen, T., Väänänen-Vainio-Mattila, K., Raisamo, R.
Number of pages: 10
Pages: 137-146
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 15th International Conference on Human-Computer Interaction with Mobile Devices and Services, MobileHCI 2013, August 27-30, 2013, Munich, Germany
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 978-1-4503-2273-7

Publication series
Name: International Conference on Human-Computer Interaction with Mobile Devices and Services
DOIs:
10.1145/2493190.2493224
Links:

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: ACM
Source: researchoutputwizard
Models of Irreversibility For Binary Adders

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Former organisation of the author
Authors: Hänninen, I., Lent, C. S., Snider, G. L.
Number of pages: 4
Pages: 1071-1074
Publication date: 2013

Host publication information
Title of host publication: Proceedings of IEEE International Midwest Symposium on Circuits and Systems (MWSCAS), Columbus, OH, U.S.A., August 4-7, 2013
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-0066-4

Publication series
Name: Midwest Symposium on Circuits and Systems
ISSN (Print): 1548-3746
ISSN (Electronic): 1558-3899
Links:
http://secs.ceas.uc.edu/mwscas2013/

Bibliographical note
TTY ei affiliaationa<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 2261
Research output: Scientific - peer-review › Conference contribution

Nobody other than me knows what I want: Customizing a sports watch

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Nurkka, P.
Number of pages: 19
Pages: 384-402
Publication date: 2013

Host publication information
Title of host publication: Human-Computer Interaction - INTERACT 2013, 14th IFIP TC 13 International Conference, Cape Town, South Africa, September 2-6, 2013, Proceedings, Part IV
Publisher: Springer
ISBN (Print): 978-3-642-40497-9
ISBN (Electronic): 978-3-642-40498-6

Publication series
Name: Lecture Notes in Computer Science
Volume: 8120
ISSN (Print): 0302-9743
DOIs:
10.1007/978-3-642-40498-6_30

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 2233
Research output: Scientific - peer-review › Conference contribution
On the Transition from the Web to the Cloud

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Tupamäki, J., Mikkonen, T.
Pages: 51-59
Publication date: 2013

Host publication information
Title of host publication: 15th IEEE International Symposium on Web Systems Evolution, WSE 2013, September 27, 2013, Eindhoven, The Netherlands
Place of publication: Piscataway, NJ
Publisher: IEEE

Publication series
Name: IEEE International Symposium on Web Systems Evolution
ISSN (Print): 2160-6153
DOIs: 10.1109/WSE.2013.6642417
Links: http://www.websiteevolution.org/2013/index.html

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3584
Research output: Scientific - peer-review › Conference contribution

Open Source Legality Compliance of Software Architecture, A Licensing Profile Approach

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Lokhman, A., Luoto, A., Hammouda, I., Mikkonen, T.
Number of pages: 8
Pages: 571-578
Publication date: 2013

Host publication information
Title of host publication: The Eighth International Conference on Software Engineering Advances, ICSEA 2013, October 27 - November 1, 2013, Venice, Italy
Publisher: IARIA
ISBN (Print): 978-1-61208-304-9

Publication series
Name: International Conference on Software Engineering Advances

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: IARIA
Source: researchoutputwizard
Source-ID: 2803
Research output: Scientific - peer-review › Conference contribution

Personal content in online sports communities: motivations to capture and share personal exercise data

General information
State: Published
Pipelined FFT for Wireless Communications Supporting 128-2048 / 1536 -Point Transforms

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Cho, I., Patyk, T., Guevorkian, D., Takala, J., Bhattacharyya, S.
Number of pages: 4
Pages: 1242-1245
Publication date: 2013
Host publication information
Title of host publication: 1st IEEE Global Conference on Signal and Information Processing, GlobalSIP 2013, December 3-5, 2013, Austin, TX, USA
Publisher: IEEE
ISBN (Electronic): 978-1-4799-0248-4
Publication series
Name: IEEE Global Conference on Signal and Information Processing
Links:
http://www.ieeeglobalsip.org/
Bibliographical note
IEEE Catalog Number: CFP13GLS-USB
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2013-12-29
Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 2043
Research output: Scientific - peer-review › Conference contribution

Planning Global Software Development Projects Using Genetic Algorithms

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Managing digital industrial transformation (mDIT)
Authors: Vathsavayi, S. H., Sievi-Korte, O., Koskimies, K., Systä, K.
Number of pages: 6
Pages: 269-274
Profiling EEMBC MultiBench Programs in 64-Core Machine

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Pervasive Computing
Authors: Chen, C., Joshi, A., Salminen, E.
Number of pages: 13
Pages: 1-13
Publication date: 2013
Peer-reviewed: No

Publication information
Journal: OCP-IP: White Papers
Original language: English
Links:
http://www.ocpip.org/white_papers.php

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 3655
Research output: Scientific › peer-review › Conference contribution

Recommendations for using Simulated Annealing in task mapping

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Orsila, H., Salminen, E., Hämäläinen, T.
Number of pages: 33
Pages: 1-33
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Design Automation for Embedded Systems
Reflections on Experience-Driven Design: a Case Study on Designing for Playful Experiences

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Olsson, T., Väänänen-Vainio-Mattila, K., Saari, T., Lucero, A.
Number of pages: 10
Pages: 165-174
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces, DPPI 2013, Newcastle upon Tyne, UK, September 3-5, 2013
Publisher: ACM
ISBN (Print): 978-1-4503-2192-1

Publication series
Name: ACM DPPI Designing Pleasurable Products and Interfaces
DOIs:
10.1145/2513506.2513524

Bibliographical note
Contribution: organisation=tie,FACT1=1</br>Portfolio EDEND: 2013-12-29</br>Publisher name: ACM
Source: researchoutputwizard
Source-ID: 3057
Research output: Scientific - peer-review › Conference contribution
Service Composition for End-Users

RESTful services are becoming a popular technology for providing and consuming cloud services. The idea of cloud computing is based on on-demand services and their agile usage. This implies that also personal service compositions and workflows should be supported. Some approaches for RESTful service compositions have been proposed. In practice, such compositions typically present mashup applications, which are composed in an ad-hoc manner. In addition, such approaches and tools are mainly targeted for programmers rather than end-users. In this paper, a user-driven approach for reusable RESTful service compositions is presented. Such compositions can be executed once or they can be configured to be executed repeatedly, for example, to get newest updates from a service once a week.

Simplified Floating-Point Division and Square Root

Digital Signal Processing (DSP) algorithms on low-power embedded platforms are often implemented using fixed-point arithmetic due to expected power and area savings over floating-point computation. However, recent research shows that floating-point arithmetic can be made competitive by using a reduced-precision format instead of, e.g., IEEE standard single precision, thereby avoiding the algorithm design and implementation difficulties associated with fixed-point arithmetic. This paper investigates the effects of simplified floating-point arithmetic applied to an FMA-based floating-point unit and the associated software division and square root operations. Software operations are proposed which attain near-exact precision with twice the performance of exact algorithms and resolve overflow-related errors with inexpensive exponent-manipulation special instructions.
Simulated Annealing for Aiding Genetic Algorithm in Software Architecture Synthesis

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Managing digital industrial transformation (mDIT)
Authors: Sievi-Korte, O., Mäkinen, E., Poranen, T.
Number of pages: 31
Pages: 235-265
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Acta Cybernetica
Volume: 21
Issue number: 2
ISSN (Print): 0324-721X
Ratings:
Scopus rating (2016): SJR 0.177 SNIP 0.275 CiteScore 0.39
Scopus rating (2015): SJR 0.171 SNIP 0.911 CiteScore 0.46
Scopus rating (2014): SJR 0.158 SNIP 0.597 CiteScore 0.31
Scopus rating (2013): SJR 0.139 SNIP 0.264 CiteScore 0.29
Scopus rating (2012): SJR 0.197 SNIP 0.438 CiteScore 0.41
Scopus rating (2011): SJR 0.202 SNIP 0.686 CiteScore 0.33
Scopus rating (2010): SJR 0.176 SNIP 0.228
Scopus rating (2009): SJR 0.184 SNIP 0.496
Scopus rating (2008): SJR 0.197 SNIP 0.092
Scopus rating (2007): SJR 0.149 SNIP 0.275
Scopus rating (2006): SJR 0.239 SNIP 0.501
Scopus rating (2005): SJR 0.225 SNIP 0.34
Scopus rating (2004): SJR 0.186 SNIP 0.292
Scopus rating (2003): SJR 0.205 SNIP 0.74
Scopus rating (2002): SJR 0.425 SNIP 0.79
Scopus rating (2001): SJR 0.227 SNIP 0.471
Six Enablers of Instant Photo Sharing Experiences in Small Groups Based on the Field Trial of Social Camera

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Ojala, J., Väänänen-Vainio-Mattila, K., Lehtiniemi, A.
Number of pages: 12
Pages: 344-355
Publication date: 2013

Host publication information
Publisher: Springer International Publishing
Editors: Reidsma, D., Katayose, H., Nijholt, A.
ISBN (Print): 978-3-319-03160-6
ISBN (Electronic): 978-3-319-03161-3

Publication series
Name: Lecture Notes in Computer Science
Volume: 8253
ISSN (Print): 0302-9743
DOIs:
10.1007/978-3-319-03161-3_25
Links:
http://download.springer.com/static/pdf/398/bok%253A978-3-319-03161-3_3.pdf?auth66=1387627131_152f481118c044a6e09dcfe2cbe75c1f&ext=.pdf

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: University of Szeged
Source: researchoutputwizard
Source-ID: 3415
Research output: Scientific - peer-review › Article

Social Devices as a New Type of Social System: Enjoyable or Embarrassing Experiences?

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Väänänen-Vainio-Mattila, K., Olsson, T., Palviainen, J., Jarusriboonchai, P.
Number of pages: 5
Pages: 1-5
Publication date: 2013

Host publication information
Title of host publication: CHI’13 Workshop: Experiencing Interactivity in Public Spaces, EIPS, Workshop at CHI’13, April 28th, 2013, Paris, France

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: Springer International Publishing
Source: researchoutputwizard
Source-ID: 3042
Research output: Scientific - peer-review › Conference contribution
Software Verification with Next Generation DisCo Specifications

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Nummenmaa, T., Mikkonen, T.
Number of pages: 8
Pages: 147-154
Publication date: 2013

Host publication information
Title of host publication: Quality Matters. Proceedings of SQM XX, August 21-23, 2012, Tampere, Finland
Place of publication: London, UK
Publisher: BRITISH COMPUTER SOCIETY
Editors: Berki, E., Valtanen, J., Nykänen, P., Ross, M., Staples, G., Systä, K.
ISBN (Print): 978-951-44-8900-6

Systematic Method to Convert of Analog Filters to Digital Filters

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Lodin, A., Grama, L., Rusu, C., Takala, J.
Number of pages: 6
Pages: 189-194
Publication date: 2013

Host publication information
Title of host publication: 2013 IEEE Workshop on Signal Processing Systems in Taipei, Taiwan, October 16th-18th, SIPS 2013
Publisher: Institute of Electrical and Electronics Engineers IEEE
ISBN (Print): 978-1-4673-6238-2
Tailored Security: Building Nonrepudiable Security Service-Level Agreements

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA)
Authors: Takahashi, T., Kannisto, J., Harju, J., Heikkinen, S., Silverajan, B., Helenius, M., Matsuo, S.
Number of pages: 9
Pages: 54-62
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Vehicular Technology Magazine
Volume: 8
Issue number: 3
ISSN (Print): 1556-6072
Ratings:
Scopus rating (2016): SJR 0.97 SNIP 1.933 CiteScore 3.53
Scopus rating (2015): SJR 0.762 SNIP 1.694 CiteScore 2.65
Scopus rating (2014): SJR 0.841 SNIP 1.479 CiteScore 1.85
Scopus rating (2013): SJR 0.75 SNIP 1.357 CiteScore 1.47
Scopus rating (2012): SJR 0.549 SNIP 1.359 CiteScore 1.37
Scopus rating (2011): SJR 0.418 SNIP 1.141 CiteScore 1.21
Scopus rating (2010): SJR 0.507 SNIP 1.163
Scopus rating (2009): SJR 0.69 SNIP 2.222
Scopus rating (2008): SJR 0.317 SNIP 1.86
Scopus rating (2007): SJR 0.213 SNIP 1.022
Original language: English
DOIs: 10.1109/MVT.2013.2277754

Bibliographical note
Ei UT-numeroa 14.3.2014
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2013-12-29
Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3497
Research output: Scientific - peer-review › Article

Teaching System-on-Chip design with FPGAs

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Salminen, E., Hämäläinen, T. D.
Number of pages: 7
Pages: 1-7
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 10th FPGAworld Conference, Stockholm and Copenhagen, September 10-12, 2013
Place of publication: New York, NY
The Asymptotic Behaviour of the Proportion of Hard Instances of the Halting Problem

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)

Publisher: ACM
ISBN (Print): 978-1-4503-2496-0

Publication series
Name: FPGA World Conference
DOIs: 10.1145/2513683.2513684
Links: http://dl.acm.org/citation.cfm?id=2513684

Bibliographical note
Contribution: organisation=ase,FACT1=1<br/>Portfolio EDEND: 2013-09-29<br/>Publisher name: Hindawi Publishing Corporation
Source: researchoutputwizard
Source-ID: 3563
Research output: Scientific - peer-review › Article

The Asymptotic Behaviour of the Proportion of Hard Instances of the Halting Problem

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
The Browser as a Host Environment for Visually Rich Applications

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Voutilainen, J., Mikkonen, T.
Number of pages: 15
Pages: 141-155
Publication date: 2013

Host publication information
Title of host publication: SPLST '13, 13th Symposium on Programming Languages and Software Tools, August 26-27, 2013, Szeged, Hungary
Place of publication: Szeged, Hungary
Publisher: University of Szeged
ISBN (Print): 978-963-306-228-9

Publication series
Name: Symposium on Programming Languages and Software Tools
Links:
http://www.inf.u-szeged.hu/splst13/splst13proc.pdf

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: University of Szeged
Source-ID: 3722
Research output: Scientific - peer-review › Conference contribution

The Effect of Language in Answering Qualitative Questions in User Experience Evaluation Web-Surveys

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Walsh, T., Nurkka, P., Petrie, H., Olsson, J.
Number of pages: 10
Pages: 73-82
Publication date: 2013

Host publication information
Title of host publication: SPLST '13, 13th Symposium on Programming Languages and Software Tools, August 26-27, 2013, Szeged, Hungary
Place of publication: Szeged, Hungary
Publisher: University of Szeged
ISBN (Print): 978-963-306-228-9

Publication series
Name: Symposium on Programming Languages and Software Tools
Links:
http://www.inf.u-szeged.hu/splst13/splst13proc.pdf

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: University of Szeged
Source-ID: 3722
Research output: Scientific - peer-review › Conference contribution
The impact of user experience work on cloud software development

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Kuusinen, K.
Number of pages: 10
Pages: 1-10
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Communications of the Cloud Software
Volume: 2
Issue number: 1
ISSN (Print): 2242-5403
Original language: English
Links:
http://www.cloudsw.org/issues/2013/2/1/communications-of-the-cloud-software

The implications of Mobile Notifications for User Experience of a Social Network Service

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Vihavainen, S., Väänänen-Vainio-Mattila, K.
Number of pages: 9
Pages: 9-18
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: International Journal of Interactive Mobile Technologies
Volume: 7
Issue number: 2
ISSN (Print): 1865-7923
The Kraft Sum as a Monotone Function of the Refinement-Ordered Set of Uniquely Decipherable Codes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics
Authors: Foldes, S.
Number of pages: 4
Pages: 1-4
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Mathematics for Applications
Volume: 2
Issue number: 1
ISSN (Print): 1805-3610
Original language: English

Bibliographical note
Contribution: organisation=mat,FACT1=1
Portfolio EDEND: 2013-11-29
Publisher name: Institute of Mathematics, Brno University of Technology
Source-ID: 2142
Research output: Scientific - peer-review > Article

The role of community in exercise: cross-cultural study of online exercise diary users

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Malinen, S., Nurkka, P.
Number of pages: 9
Pages: 55-63
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 6th International Conference on Communities and Technologies (C&T ’13), 1-2 July 2013, Munich, Germany
Publisher: ACM
ISBN (Print): 978-1-4503-2104-4
Towards a Reference Architecture for Server-side Mashup Ecosystem

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Peltola, H., Salminen, A.
Number of pages: 12
Pages: 114-125
Publication date: 2013

Host publication information
Title of host publication: SPLST '13, 13th Symposium on Programming Languages and Software Tools, August 26-27, 2013, Szeged, Hungary
Place of publication: Szeged, Hungary
Publisher: University of Szeged
Editor: Kiss, A.
ISBN (Print): 978-963-306-228-9

Towards Model-driven, Simulation-assisted Control Application Engineering

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering
Authors: Vepsäläinen, T.
Number of pages: 8
Pages: 12-19
Publication date: 2013

Host publication information
Towards pervasive mashups in embedded devices: comparing procedural and declarative approach

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Salminen, A., Mikkonen, T.
Number of pages: 21
Pages: 195-215
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: International Journal of Communication Networks and Distributed Systems
Volume: 10
Issue number: 3
ISSN (Print): 1754-3916
Ratings:
Scopus rating (2016): SJR 0.178 SNIP 0.428 CiteScore 0.66
Scopus rating (2015): SJR 0.207 SNIP 0.402 CiteScore 0.6
Scopus rating (2014): SJR 0.213 SNIP 0.497 CiteScore 0.53
Scopus rating (2013): SJR 0.159 SNIP 0.399 CiteScore 0.32
Scopus rating (2012): SJR 0.129 SNIP 0.425 CiteScore 0.5
Scopus rating (2011): SJR 0.146 SNIP 0.26
Scopus rating (2010): SJR 0.197 SNIP 0.55
Scopus rating (2009): SJR 0.183 SNIP 0.775
Original language: English
DOIs: 10.1504/IJCNDS.2013.053077

Bibliographical note
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2013-06-29
Publisher name: Inderscience Publishers
Source: researchoutputwizard
Source-ID: 3343
Research output: Scientific - peer-review › Article

Towards run-time actor mapping of dynamic dataflow programs onto multi-core platforms

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Yviquel, H., Casseau, E., Raulet, M., Jääskeläinen, P., Takala, J.
Pages: 732-737
Publication date: 2013

Host publication information
Title of host publication: The 8th International Symposium on Image and Signal Processing and Analysis, ISPA 2013, September 4-6, 2013, Trieste, Italy
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-953-184-194-8

Publication series
Name: Image and Signal Processing and Analysis
ISSN (Print): 1845-5921
ISSN (Electronic): 1849-2266
DOIs: 10.1109/ISPA.2013.6703834
Turbo Decoding on Tailored OpenCL Processor

Turbo coding is commonly used in the current wireless standards such as 3G and 4G. However, due to the high computational requirements, its software-defined implementation is challenging. This paper proposes a static multi-issue exposed datapath processor design tailored for turbo decoding. In order to utilize the parallel processor datapath efficiently without resorting to low level assembly programming, the turbo decoder is implemented using OpenCL, a parallel programming standard for heterogeneous devices. The proposed implementation includes only a small set of Turbo-specific custom operations to accelerate the most critical parts of the algorithm. Most of the computation is performed using general-purpose integer operations. Thus, the processor design can be used as a general-purpose OpenCL accelerator for arbitrary integer workloads as well. The proposed processor design was evaluated both by implementing it using a Xilinx Virtex 6 FPGA and by ASIC synthesis using 130 nm and 40 nm technology libraries. The implementation achieves over 63 Mbps Turbo decoding throughput on a single low-power core. According to the ASIC synthesis, the maximum operating clock frequency is 344 MHz/1 050 MHz (130 nm/40 nm).
User Experience and Usage Scenarios of Audio-Tactile Interaction with Virtual Objects in a Physical Environment

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Väänänen-Vainio-Mattila, K., Suhonen, K., Laaksonen, J., Kildal, J., Ahmaniemi, T., Tahiroglu, T.
Number of pages: 10
Pages: 67-76
Publication date: 2013

Host publication information
Title of host publication: Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces, DPPI 2013, Newcastle upon Tyne, UK, September 3-5, 2013
Publisher: ACM
ISBN (Print): 978-1-4503-2192-1

Publication series
Name: ACM DPPI Designing Pleasurable Products and Interfaces
DOIs:
10.1145/2513506.2513514

Bibliographical note
Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: ACM
Source-ID: 3625
Research output: Scientific - peer-review › Conference contribution

User Experiences of Mobile Audio Conferencing with Spatial Audio, Haptics and Gestures

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Augmented Human Activities (AHA)
Authors: Rantala, J., Suhonen, K., Müller, S., Väänänen-Vainio-Mattila, K., Lantz, V., Raisamo, R.
Number of pages: 8
Pages: 59-66
Using aspects for testing of embedded software: experiences from two industrial case studies

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Pervasive Computing
Authors: Metsä, J., Maoz, S., Katara, M., Mikkonen, T.
Number of pages: 29
Pages: 1-21
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Software Quality Journal
ISSN (Print): 0963-9314
Ratings:
Scopus rating (2016): SJR 0.456 SNIP 1.873 CiteScore 1.67
Scopus rating (2015): SJR 0.444 SNIP 2.262 CiteScore 1.86
Scopus rating (2014): SJR 0.632 SNIP 2.156 CiteScore 1.91
Scopus rating (2013): SJR 0.401 SNIP 1.666 CiteScore 1.44
Scopus rating (2012): SJR 0.379 SNIP 1.077 CiteScore 1.06
Scopus rating (2011): SJR 0.37 SNIP 1.511 CiteScore 1.21
Scopus rating (2010): SJR 0.419 SNIP 1.19
Scopus rating (2009): SJR 0.514 SNIP 1.873
Scopus rating (2008): SJR 0.382 SNIP 1.634
Scopus rating (2007): SJR 0.381 SNIP 1.132
Scopus rating (2006): SJR 0.349 SNIP 1.326
Scopus rating (2005): SJR 0.257 SNIP 0.771
Scopus rating (2004): SJR 0.255 SNIP 0.686
Scopus rating (2003): SJR 0.163 SNIP 0.558
Scopus rating (2002): SJR 0.145 SNIP 0.228
Scopus rating (2001): SJR 0.287 SNIP 0.428
Scopus rating (2000): SJR 0.108 SNIP 0.139
Scopus rating (1999): SJR 0.128 SNIP 0.196
Original language: English
DOIs:
10.1007/s11219-012-9193-8
Links:
http://link.springer.com/article/10.1007/s11219-012-9193-8
Using Building Plans and Self-Contained Sensors with GNSS Initialization for Indoor Navigation

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Signal Processing Research Community (SPRC)
Authors: Kirkko-Jaakkola, M., Collin, J., Takala, J.
Number of pages: 5
Publication date: 2013

Host publication information
Title of host publication: IEEE 77th Vehicular Technology Conference: VTC2013-Spring, 2-5 June 2013, Dresden, Germany
Publisher: Institute of Electrical and Electronics Engineers

Bibliographical note
Ei UT-numeroa 7/2013<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Institute of Electrical and Electronics Engineers
Source: researchoutputwizard
Source-ID: 2568
Research output: Scientific - peer-review › Conference contribution

Visualizations as a Basis for Agile Software Process Improvement

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing, Regulation of learning and active learning methods (REALMEE)
Authors: Lehtonen, T., Eloranta, V., Leppänen, M., Isohanni, E.
Number of pages: 8
Pages: 495-502
Publication date: 2013

Host publication information
Title of host publication: The 20th Asia-Pacific Software Engineering Conference, APSEC 2013, Bangkok, Thailand, December 2-5, 2013
Publisher: IEEE
ISBN (Print): 978-0-4799-2144-7

Bibliographical note
Ei UT-numeroa 7/2013<br/>Contribution: organisation=tie,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 2754
Research output: Scientific - peer-review › Conference contribution
Without a Clue What Design It Leads to: Exploring and Understanding a City and Life within It by Walking

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Väätäjä, H.
Number of pages: 4
Publication date: 2013

Host publication information
Place of publication: Leicester, UK
Publisher: University of Leicester

Publication series
Name: ACM SIGCHI Conference on Human Factors in Computing Systems
Links:
http://www2.le.ac.uk/departments/computer-science/people/elaw/HCI-3T/P18Vaataja.pdf
http://www2.le.ac.uk/departments/computer-science/people/elaw/HCI-3T

Bibliographical note
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2013-07-29
Publisher name: University of Leicester
Source: researchoutputwizard
Source-ID: 3626
Research output: Scientific - peer-review » Conference contribution

Briefing news reporting with mobile assignments - Perceptions, needs and challenges
Mobile handheld devices are an increasing part of everyday fieldwork of news professionals. Mobile assignments delivered to mobile journalists' smartphones are one potential future development step. We present findings on using mobile assignments from two exploratory user studies in which smartphones were used as news reporting tools. Mobile assignments were perceived as handy for fast reporting situations and simple stories but challenging in case of more complex tasks. Structured information content of assignments, process phase based information and supporting situation and activity awareness would support the work of both editorial staff and mobile journalists. The locationing of reporters for sending location-based assignments was found acceptable for coordinating the work although some privacy concerns were expressed. The findings provide new information on using mobile assignments in work where carrying out tasks involves creativity and the tasks may be complex, not strictly limited or they may not have clear completion criteria. © 2012 ACM.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research area: User experience, Department of Software Systems, Augmented Human Activities (AHA), University of Central Lancashire
Authors: Väätäjä, H., Egglestone, P.
Number of pages: 10
Pages: 485-494
Publication date: 2012

Host publication information
Place of publication: New York, NY
Publisher: ACM
ISBN (Print): 9781450310864

Publication series
Name: ACM Conference on Computer Supported Cooperative Work
ASJC Scopus subject areas: Human-Computer Interaction, Software, Computer Networks and Communications
Keywords: assignment, crowdsourcing, journalist, location, mobile, news, privacy., professional, smartphone, task, work
DOIs:
10.1145/2145204.2145280
Comprehending co-evolution of OSS projects: Analytical methods and tool support

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Syeed, M. M.
Number of pages: 10
Pages: 1-10
Publication date: 2012

Host publication information
Tampere University of Technology. Department of Software Systems. Report
Place of publication: Tampere, Finland
Publisher: Tampere University of Technology
Editors: Stol, K., Schweik, C. M., Hammouda, I.

Publication series
Name: Open Source Systems Doctoral Consortium
Volume: 23
ISSN (Print): 1797-836X
Links:
http://works.bepress.com/cgi/viewcontent.cgi?article=1025&context=charles_schweik
http://works.bepress.com/charles_schweik/22/

Bibliographical note
Contribution: organisation=tie,FACT1=1
Portfolio EDEND: 2013-07-29
Publisher name: Tampere University of Technology
Source: researchoutputwizard
Source-ID: 5376
Research output: Scientific - peer-review › Conference contribution

Human Machine Interface Patterns For Distributed Machine Control Systems

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Pervasive Computing
Authors: Eloranta, V., Leppänen, M.
Number of pages: 18
Pages: 79-96
Publication date: 2012

Host publication information
Title of host publication: 17th European Conference on Pattern Languages of Programs, EuroPLoP 2012, Kloster Irsee, Germany, July 11-15, 2012
Place of publication: Munich, Germany
Publisher: Hillside Europe

Publication series
Name: European Conference on Pattern Languages of Programs
Links:
We studied the mobile users' preferences and concerns of using location-based assignments (LBA) and geotagging in crowdsourced news making. First, nine readers who had submitted reader's photos were interviewed about their perceptions of LBA and geotagging scenarios. Second, a quasi-experiment in field conditions was carried out with nineteen participants. After completing four LBA tasks with a mobile phone, participants were interviewed on their perceptions and asked to complete a questionnaire on their preferences for receiving LBA and usage of geotags. Findings indicate that the perceived benefits of LBA and geotagging are greater than the perceived risks. The task type, temporal context, preciseness of location query, proximity to the reporting location, parallel tasks, social context and incentives affected the participation preferences. We propose a framework for participation preferences to support further studies in location-based crowdsourcing and in the development of crowdsourcing processes and systems. Copyright © 2012 by the Association for Computing Machinery, Inc. (ACM).