

### **Tailored gamification: A review of literature**

Klock, A. C. T., Gasparini, I., Pimenta, M. S. & Hamari, J., 1 Dec 2020, In : International Journal of Human Computer Studies. 144, 102495.

Research output: Contribution to journal › Review Article › Scientific › peer-review

### **The effect of challenge-based gamification on learning: An experiment in the context of statistics education**

Legaki, N. Z., Xi, N., Hamari, J., Karpouzis, K. & Assimakopoulos, V., 1 Dec 2020, In : International Journal of Human Computer Studies. 144, 102496.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Some SonarQube issues have a significant but small effect on faults and changes. A large-scale empirical study**

Lenarduzzi, V., Saarimäki, N. & Taibi, D., Dec 2020, In : Journal of Systems and Software. 170, 15 p., 110750.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Necessary and sufficient conditions for the existence of solution of generalized fuzzy relation equations $A \Leftrightarrow X = B$**

Turunen, E., 1 Oct 2020, In : Information Sciences. 536, p. 351-357 7 p.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Using Deep Learning for price prediction by exploiting stationary limit order book features**

Tsantekidis, A., Passalis, N., Tefas, A., Kannianen, J., Gabbouj, M. & Iosifidis, A., 1 Aug 2020, In : Applied Soft Computing Journal. 93, 106401.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Flow-bounded trajectory-scaling algorithm for hydraulic robotic manipulators**

Lampinen, S., Niemi, J. & Mattila, J., 1 Jul 2020, *2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics, AIM 2020*. IEEE, p. 619-624 6 p. (IEEE/ASME International Conference on Advanced Intelligent Mechatronics, AIM).

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **On the zeros of the partial Hosoya polynomial of graphs**

Ghorbani, M., Dehmer, M., Cao, S., Feng, L., Tao, J. & Emmert-Streib, F., 1 Jul 2020, In : Information Sciences. 524, p. 199-215 17 p.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Kvazaar 2.0: Fast and efficient open-source HEVC inter encoder**

Lemmetti, A., Viitanen, M., Mercat, A. & Vanne, J., 27 May 2020, *MMSys 2020 - Proceedings of the 2020 Multimedia Systems Conference*. ACM, p. 237-242 6 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Adaptive Normalization for Forecasting Limit Order Book Data Using Convolutional Neural Networks**

Passalis, N., Tefas, A., Kannianen, J., Gabbouj, M. & Iosifidis, A., 1 May 2020, *2020 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2020 - Proceedings*. IEEE, p. 1713-1717 5 p. (ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing - Proceedings; vol. 2020-May).

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Peer to Peer Offloading with Delayed Feedback: An Adversary Bandit Approach**

Yang, M., Zhu, H., Wang, H., Koucheryavy, Y., Samouylov, K. & Qian, H., 1 May 2020, *2020 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2020 - Proceedings*. IEEE, p. 5035-5039 5 p. (ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing - Proceedings; vol. 2020-May).

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **SeCon-NG: Implementing a lightweight cryptographic library based on ECDH and ECDSA for the development of secure and privacy-preserving protocols in contiki-NG**

Frimpong, E. & Michalas, A., 30 Mar 2020, *35th Annual ACM Symposium on Applied Computing, SAC 2020*. ACM, p. 767-769 3 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Gaussian mixture models for signal mapping and positioning**

Raitoharju, M., García-Fernández, F., Hostettler, R., Piché, R. & Särkkä, S., 1 Mar 2020, In : *Signal Processing*. 168, 107330.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Serverless: What it Is, What to Do and What Not to Do**

Nupponen, J. & Taibi, D., 1 Mar 2020, *2020 IEEE International Conference on Software Architecture Companion, ICSA-C 2020*. IEEE, p. 49-50 2 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **A custom processor for protocol-independent packet parsing**

Zolfaghari, H., Rossi, D. & Nurmi, J., 1 Feb 2020, In : *Microprocessors and Microsystems*. 72, 11 p.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Are SonarQube Rules Inducing Bugs?**

Lenarduzzi, V., Lomio, F., Huttunen, H. & Taibi, D., 1 Feb 2020, *SANER 2020 - Proceedings of the 2020 IEEE 27th International Conference on Software Analysis, Evolution, and Reengineering*. Kontogiannis, K., Khomh, F., Chatzigeorgiou, A., Fokaefs, M-E. & Zhou, M. (eds.). IEEE, p. 501-511 11 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **A preliminary network analysis on steam game tags: Another way of understanding game genres**

Li, X. & Zhang, B., 29 Jan 2020, *AcademicMindtrek 2020 - Proceedings of the 23rd International Academic Mindtrek Conference: January 29-30, 2020, Tampere, Finland*. ACM, p. 65-73 9 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Color game: A collaborative social robotic game for icebreaking; Towards the design of robotic ambiances as part of smart building services**

Beheshtian, N., Kaipainen, K., Kähkönen, K. & Ahtinen, A., 29 Jan 2020, *AcademicMindtrek 2020 - Proceedings of the 23rd International Academic Mindtrek Conference: January 2020, Tampere*. ACM, p. 10-19 10 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Demographic differences in accumulated types of capital in massively multiplayer online role-playing games**

Korkeila, H., Koivisto, J. & Hamari, J., 29 Jan 2020, *AcademicMindtrek 2020 - Proceedings of the 23rd International Academic Mindtrek Conference: January 2020, Tampere*. ACM, p. 74-82 9 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Innovation challenges as a novel multidisciplinary learning platform**

Jokiniemi, S., Myllärniemi, J., Poranen, T. & Vuorenmaa, M., 29 Jan 2020, *AcademicMindtrek 2020 - Proceedings of the 23rd International Academic Mindtrek Conference: January 2020, Tampere*. ACM, p. 145-148 4 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Satisfaction and willingness to consume immersive journalism: Experiment of differences between VR, 360 video, and article**

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Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Social human-robot interaction in the wild: A workshop proposal for academic mindtrek 2020**

Niemelä, M., Ahtinen, A. & Turunen, M., 29 Jan 2020, *AcademicMindtrek 2020 - Proceedings of the 23rd International Academic Mindtrek Conference: January 2020, Tampere*. ACM, p. 168-169 2 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific

### **"The superhero of the university": Experience-driven design and field study of the university guidance robot**

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### **Anthropometric clothing measurements from 3D body scans**

Yan, S., Wirta, J. & Kämäräinen, J.-K., 2020, In : Machine Vision and Applications. 31, 1-2, 11 p., 7.

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### **Censor-Based Cooperative Multi-Antenna Spectrum Sensing with Imperfect Reporting Channels**

Li, M., Alhussein, O., Sofotasios, P. C., Muhaidat, S., Yoo, P. D., Liang, J. & Wang, A., 2020, In : IEEE Transactions on Sustainable Computing. 5, 1, p. 48-60 13 p.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Compressive sensed video recovery via iterative thresholding with random transforms**

Belyaev, E., Codreanu, M., Juntti, M. & Egiazarian, K., 2020, In : IET Image Processing. 14, 6, p. 1187-1200 14 p.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Does code quality affect pull request acceptance? An empirical study**

Lenarduzzi, V., Nikkola, V., Saarimäki, N. & Taibi, D., 2020, In : Journal of Systems and Software. 171, 14 p., 110806.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Does migrating a monolithic system to microservices decrease the technical debt?**

Lenarduzzi, V., Lomio, F., Saarimäki, N. & Taibi, D., 2020, In : Journal of Systems and Software. 169, 16 p., 110710.

Research output: Contribution to journal › Review Article › Scientific › peer-review

### **Exploration and exploitation of sensorimotor contingencies for a cognitive embodied agent**

Houbre, Q., Angleraud, A. & Pieters, R., 2020, *ICAART 2020 - Proceedings of the 12th International Conference on Agents and Artificial Intelligence*. Rocha, A., Steels, L. & van den Herik, J. (eds.). SCITEPRESS, Vol. 2. p. 546-554 9 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **FinnForest dataset: A forest landscape for visual SLAM**

Ali, I., Durmush, A., Suominen, O., Yli-Hietanen, J., Peltonen, S., Collin, J. & Gotchev, A., 2020, In : ROBOTICS AND AUTONOMOUS SYSTEMS. 132, 13 p., 103610.

Research output: Contribution to journal › Article › Scientific › peer-review

### **IoT-CryptoDiet: Implementing a lightweight cryptographic library based on ecdh and ecdsa for the development of secure and privacy-preserving protocols in contiki-ng**

Frimpong, E. & Michalas, A., 2020, *IoTBDS 2020 - Proceedings of the 5th International Conference on Internet of Things, Big Data and Security*. Wills, G., Kacsuk, P. & Chang, V. (eds.). SCITEPRESS, p. 101-111 11 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Multimodal subspace support vector data description**

Sohrab, F., Raitoharju, J., Iosifidis, A. & Gabbouj, M., 2020, In : Pattern Recognition. 110, 13 p., 107648.

Research output: Contribution to journal › Article › Scientific › peer-review

### **On the diffuseness of technical debt items and accuracy of remediation time when using SonarQube**

Baldassarre, M. T., Lenarduzzi, V., Romano, S. & Saarimäki, N., 2020, In : Information and Software Technology. 128, 18 p., 106377.

Research output: Contribution to journal › Article › Scientific › peer-review

### **Patterns for serverless functions (Function-as-a-Service): A multivocal literature review**

Taibi, D., El Ioini, N., Pahl, C. & Niederkofler, J. R. S., 2020, *CLOSER 2020 - Proceedings of the 10th International Conference on Cloud Computing and Services Science*. Ferguson, D., Helfert, M. & Pahl, C. (eds.). SCITEPRESS, Vol. 1. p. 181-192 12 p.

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#### **Redundancy-based visual tool center point pose estimation for long-reach manipulators**

Mäkinen, P., Mustalahti, P., Launis, S. & Mattila, J., 2020, *2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics, AIM 2020*. IEEE, p. 1387-1393 7 p. (IEEE/ASME International Conference on Advanced Intelligent Mechatronics).

Research output: Chapter in Book/Report/Conference proceeding > Conference contribution > Scientific > peer-review

#### **Shearlet Transform-Based Light Field Compression under Low Bitrates**

Ahmad, W., Vagharshakyan, S., Sjoström, M., Gotchev, A., Bregovic, R. & Olsson, R., 2020, In : *IEEE Transactions on Image Processing*. 29, p. 4269-4280 12 p.

Research output: Contribution to journal > Article > Scientific > peer-review

#### **User experience of stereo and spatial audio in 360° live music videos**

Holm, J., Väänänen, K. & Battah, A., 2020, *AcademicMindtrek 2020 - Proceedings of the 23rd International Academic Mindtrek Conference: January 2020, Tampere*. ACM, p. 134-141 8 p.

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#### **Validating effectiveness of safety requirements' compliance evaluation in process assessments**

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#### **Bayesian receiver operating characteristic metric for linear classifiers**

Hassan, S. S., Huttunen, H., Niemi, J. & Tohka, J., 1 Dec 2019, In : *Pattern Recognition Letters*. 128, p. 52-59 8 p.

Research output: Contribution to journal > Article > Scientific > peer-review

#### **Software architecture design in global software development: An empirical study**

Sievi-Korte, O., Richardson, I. & Beecham, S., 1 Dec 2019, In : *Journal of Systems and Software*. 158, 110400.

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#### **Promoting local culture and enriching airport experiences through interactive storytelling**

Burova, A., Kelling, C., Keskinen, T., Hakulinen, J., Kallioniemi, P., Väättäjä, H. & Turunen, M., 26 Nov 2019, *MUM 2019 - 18th International Conference on Mobile and Ubiquitous Multimedia, Proceedings*. Jacucci, G., Paterno, F., Rohs, M. & Santoro, C. (eds.). Association for Computing Machinery, 7 p. 3365640. (ACM International Conference Proceeding Series).

Research output: Chapter in Book/Report/Conference proceeding > Conference contribution > Scientific > peer-review

#### **Programming languages for data-intensive HPC applications: A systematic mapping study**

Amaral, V., Norberto, B., Goulão, M., Aldinucci, M., Benkner, S., Bracciali, A., Carreira, P., Celms, E., Correia, L., Grelck, C., Karatza, H., Kessler, C., Kilpatrick, P., Martiniano, H., Mavridis, I., Pillana, S., Respício, A., Simão, J., Veiga, L. & Visa, A., 8 Nov 2019, In : *Parallel Computing*. 91, 17 p., 102584.

Research output: Contribution to journal > Article > Scientific > peer-review

#### **Action-Oriented Programming Model: Collective Executions and Interactions in the Fog**

Mäkitalo, N., Aaltonen, T., Raatikainen, M., Ometov, A., Andreev, S., Koucheryavy, Y. & Mikkonen, T., 1 Nov 2019, In : *Journal of Systems and Software*. 157, 110391.

Research output: Contribution to journal > Article > Scientific > peer-review

#### **Feasibility of FPGA accelerated IPsec on cloud**

Vajaranta, M., Oinonen, A., Hämäläinen, T. D., Viitamäki, V., Markunmäki, J. & Kulmala, A., 1 Nov 2019, In : *Microprocessors and Microsystems*. 71, 102861.

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#### **An icon that everyone wants to click: How perceived aesthetic qualities predict app icon successfulness**

Jylhä, H. & Hamari, J., 1 Oct 2019, In : *International Journal of Human Computer Studies*. 130, p. 73-85 13 p.

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**Automatic word count estimation from daylong child-centered recordings in various language environments using language-independent syllabification of speech**

Räsänen, O., Seshadri, S., Karadayi, J., Riebling, E., Bunce, J., Cristia, A., Metze, F., Casillas, M., Rosemberg, C., Bergelson, E. & Soderstrom, M., 1 Oct 2019, In : *Speech Communication*. 113, p. 63-80 18 p.

Research output: Contribution to journal › Article › Scientific › peer-review

**DevOps in practice: A multiple case study of five companies**

Lwakatare, L. E., Kilamo, T., Karvonen, T., Sauvola, T., Heikkilä, V., Itkonen, J., Kuvaja, P., Mikkonen, T., Oivo, M. & Lassenius, C., 1 Oct 2019, In : *Information and Software Technology*. 114, p. 217-230 14 p.

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**The Double Shadowed  $\kappa$ - $\mu$  Fading Model**

Simmons, N., Nogueira Da Silva, C. R., Cotton, S. L., Sofotasios, P. C., Ki Yoo, S. & Yacoub, M. D., 1 Oct 2019, *2019 International Conference on Wireless and Mobile Computing, Networking and Communications, WiMob 2019*. IEEE, (International Conference on Wireless and Mobile Computing, Networking and Communications).

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

**Tunable VVC Frame Partitioning based on Lightweight Machine Learning**

Amestoy, T., Mercat, A., Hamidouche, W., Menard, D. & Bergeron, C., 6 Sep 2019, In : *IEEE Transactions on Image Processing*.

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**Model checking and validity in propositional and modal inclusion logics**

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**Performance analysis of single-query 6-DoF camera pose estimation in self-driving setups**

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Research output: Contribution to journal › Article › Scientific › peer-review

**Game postmortems vs. developer Reddit AMAs: Computational analysis of developer communication**

Lu, C., Peltonen, J. & Nummenmaa, T., 26 Aug 2019, *Proceedings of the 14th International Conference on the Foundations of Digital Games, FDG 2019*. Khosmood, F., Pirker, J., Apperley, T. & Deterding, S. (eds.). ACM, 22

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**Social features in hybrid board game marketing material**

Nummenmaa, T. & Kankainen, V., 26 Aug 2019, *Proceedings of the 14th International Conference on the Foundations of Digital Games, FDG 2019*. Khosmood, F., Pirker, J., Apperley, T. & Deterding, S. (eds.). ACM, 67

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**Are architectural smells independent from code smells? An empirical study**

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**Enabling cybersecurity incident reporting and coordinated handling for maritime sector**

Silverajan, B. & Vistiaho, P., 1 Aug 2019, *2019 14th Asia Joint Conference on Information Security, AsiaJCIS 2019*. IEEE, p. 88-95 8 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

**Hermitian normalized Laplacian matrix for directed networks**

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#### **Real-time online drilling vibration analysis using data mining**

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#### **High-performance SIMD implementation of the lattice-Boltzmann method on the Xeon Phi processor**

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#### **Detection of Typical Pronunciation Errors in Non-native English Speech Using Convolutional Recurrent Neural Networks**

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#### **User Experience Study of 360° Music Videos on Computer Monitor and Virtual Reality Goggles**

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Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

#### **Public and open HEVC encoding service in the cloud**

Altonen, A., Viitanen, M., Räsänen, J., Mercat, A. & Vanne, J., 18 Jun 2019, *Proceedings of the 10th ACM Multimedia Systems Conference, MMSys 2019*. ACM, p. 300-303 4 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

#### **Investigation of egocentric social structures for diversity-enhancing followee recommendations**

Skenderi, E., Olshannikova, E., Olsson, T., Huhtamäki, J., Koivunen, S., Yao, P. & Huttunen, H., 6 Jun 2019, *ACM UMAP 2019 Adjunct - Adjunct Publication of the 27th Conference on User Modeling, Adaptation and Personalization*. ACM, p. 257-261 5 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

#### **Facilitating the first move: Exploring inspirational design patterns for aiding initiation of social encounters**

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#### **Towards Efficient Code Generation for Exposed Datapath Architectures**

Vadivel, K., Jordans, R., Stuijk, S., Corporaal, H., Jääskeläinen, P. & Kultala, H., 27 May 2019, *Proceedings of the 22nd International Workshop on Software and Compilers for Embedded Systems, SCOPES 2019*. Stuijk, S. (ed.). ACM, p. 86-89 4 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

#### **1-D Convolutional Neural Networks for Signal Processing Applications**

Kiranyaz, S., Ince, T., Abdeljaber, O., Avci, O. & Gabbouj, M., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 8360-8364 5 p.

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#### **Deep Reinforcement Learning for Financial Trading Using Price Trailing**

Zarkias, K. S., Passalis, N., Tsantekidis, A. & Tefas, A., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 3067-3071 5 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Deep Temporal Logistic Bag-of-features for Forecasting High Frequency Limit Order Book Time Series**

Passalis, N., Tefas, A., Kannianen, J., Gabbouj, M. & Iosifidis, A., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 7545-7549 5 p.

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### **Low-latency Deep Clustering for Speech Separation**

Wang, S., Naithani, G. & Virtanen, T., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 76-80 5 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Random Forest Oriented Fast QTBT Frame Partitioning**

Amestoy, T., Mercat, A., Hamidouche, W., Bergeron, C. & Menard, D., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 1837-1841 5 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Time Difference of Arrival Estimation of Speech Signals Using Deep Neural Networks with Integrated Time-frequency Masking**

Pertilä, P. & Parviainen, M., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 436-440 5 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Variance Preserving Initialization for Training Deep Neuromorphic Photonic Networks with Sinusoidal Activations**

Passalis, N., Mourgias-Alexandris, G., Tsakyridis, A., Pleros, N. & Tefas, A., 1 May 2019, *2019 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2019 - Proceedings*. IEEE, p. 1483-1487 5 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **The FitOptiVis ECSEL Project: Highly Efficient Distributed Embedded Image/Video Processing in Cyber-Physical Systems Invited Paper**

Al-Ars, Z., Basten, T., Beer, A., Geilen, M., Goswami, D., Jääskeläinen, P., Kadlec, J., Alejandro, M. M., Palumbo, F., Peeren, G., Pomante, L., Linden, F. V., Saarinen, J., Sääntti, T., Sau, C. & Zedda, M. K., 30 Apr 2019, *ACM International Conference on Computing Frontiers 2019, CF 2019 - Proceedings*. ACM, p. 333-338 6 p.

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **How do academics experience use of recorded audio feedback in higher education? A thematic analysis**

Heimbirger, A., Isomottonen, V., Nieminen, P. & Keto, H., 4 Mar 2019, *Frontiers in Education: Fostering Innovation Through Diversity, FIE 2018 - Conference Proceedings*. IEEE, 8658635. (Proceedings - Frontiers in Education Conference).

Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review

### **Challenges of Multi-Factor Authentication for Securing Advanced IoT Applications**

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