

## Guest Editorial: Selected papers from Future-ICT 2021

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In the future, ICT will play a highly important role in convergence of fast computing together with high-speed communications, and all other smart computational sciences and application and ICT also will influence the future world's various areas, including science, engineering, industry, business, law, politics, culture, medicine, and so on. However, there still exist lots of challenges in future ICT. Future ICT 2021 is intended to bring up the dissemination of state-of-the-art research in all future ICT areas, including their models, services, and novel smart applications associated with their utilization.

The main goal of this special issue is to provide an opportunity for all practitioners to contribute with their original research and review papers, particularly focusing on Intelligent 5G/5GB/6G, urgent ICT technology and their related theories and applications.

Outstanding papers have been selected from those accepted by and presented in Future ICT 2021. Each selected paper is substantially extended with at least 40% of difference from its conference version. In this special issue, five high quality papers are selected.

The first one entitled “Efficient  $(k, n)$ -threshold secret sharing method with cheater prevention for QR code application” by Peng-Cheng Huang, Ching-Chun Chang and Yung-Hui Li presents an efficient  $(k, n)$ -threshold secret sharing approach with the functionality of cheater identification using meaningful QR codes. A secret message is split into  $k$  pieces, and used as the coefficients of polynomial function to generate  $n$  shares. These shares would be concealed into cover QR codes based on its fault tolerance to generate meaningful QR code shares. The legitimacy of QR code share would be verified before secret reconstruction to prevent cheater in secret revealing procedure. Authors claimed that their experimental results show that the proposed scheme is efficient, highly secure and highly robust, and it also achieves a higher embedding capacity compared to previous methods.

The second paper “A Novel Predictor for Exploring PM2.5 Spatiotemporal Propagation by Using Convolutional Recursive Neural Networks” by Hsing-Chung Chen, Karisma Trinanda Putra, Chien-Erh Weng, Jerry Chun-Wei Lin proposes a novel scheme to generate propagation heat maps of PM2.5 prediction by using spatiotemporal datasets. In this scheme, the deep learning model is implemented to extract spatiotemporal features on these datasets. This research is conducted by using the dataset of air quality monitoring systems in Taiwan. Moreover, a robust model based on the Convolutional Recursive Neural Network (CRNN) is presented to generate the propagation maps of PM2.5 concentration. This study would also like to develop an intelligence-based predictor by using CRNN model for predicting the PM2.5 propagation with uncertain spread and

density. It is one of key technologies of software and hardware co-design for massive IoT applications. At last, the proposed model provides accurately predictive results over time by taking into account the spatiotemporal relationship among sensory nodes.

The third paper “IoT based Smart Aquaculture System with Automatic Aerating and Water Quality Monitoring” by Kun-Lin Tsai, Li-Woei Chen, Li-Jun Yang, Hung-Jr Shiu, and Han-Wei Chen proposes an IoT-based smart aquaculture system (ISAS) for detecting the water quality of an aquafarm and providing automatic aeration to increase the survival rate of aquatics. In the ISAS, the parameters used for detecting water quality are temperature, pH value, dissolved oxygen, and water hardness, which are recorded using different sensors. Users can check the condition of an aquafarm from the sensed data. The ISAS can also automatically control the aerator and feeder of an aquarium on the basis of sensed data and predefined fuzzy rules. Authors claimed that their experiments revealed that under the same environmental conditions, the shrimp survival rate in an ISAS-based aquarium increased by 33.3% compared with that in conventional aquariums.

In the fourth paper named “Intelligent Sensing for Internet of Things Systems” by Li-Ling Hung, a model for improving the flexibility of sensors is proposed to enhance the intelligence of IoT. This model defines the quality levels of events and monitors all types of sensed data. Data or events of different levels have different transmission priorities. To reduce energy consumption for event detection and data transmission, sensors' detecting periods can be set to a longer time when the monitored status is normal. In the model's application, when necessary, the sensors shorten the event detection and reaction time to enhance monitor efficiency. Author's evaluation demonstrates that their event detection and response time is shorter than those state-of-the-art mechanisms.

The fifth paper named “Edge based Lightweight Authentication Architecture using Deep Learning for Vehicular Networks” by Hyunhee Park presents an edge-computing-based lightweight authentication architecture using a deep learning algorithm for road safety applications in vehicle networks. This architecture enables vehicles that are physically separated to form a vehicular cloud in which vehicle-to-vehicle communications can be secured. In addition, an edge-based cloud data center performs deep learning to detect car hacking attempts, and then delivers the detection results to a vehicular cloud. Author's simulations demonstrated that this architecture significantly enhances the security level and has 94.51–99.8% F1-score depending on the number of vehicles in the intrusion detection system using control area network traffic.

We strongly believe that all papers included in this Special Issue will have a significant importance for future scientific research works, and also make the contributions to the studies conducted by other researchers, engineers, practitioners and people from industry and business, who work in advanced areas of ICT Technologies. We would like to express our sincere appreciation of the valuable contributions and efforts made by all authors. Special thanks go to Professor Han-Chieh Chao, Editor-in-Chief of the Journal of Internet Technology (JIT) for offering us a chance to publish this Special Issue, and for his highly supports throughout the entire publication process.

## Guest Editors



**Fang-Yie Leu** received his bachelor, master and Ph.D. degrees all from National Taiwan University of Science and Technology, Taiwan, in 1983, 1986 and 1991, respectively. His research interests include wireless communication, network security, Grid applications and Sensor Network. He is currently a distinguished professor of Computer Science Department, TungHai University, Taiwan. He also acts as one of the editorial board members of at least 5 journals and serves as the TPC member of at least 10 international conferences. Prof. Leu now organizes MCNCS, CWECS, FutureICT and MobiSec international workshops. He is an IEEE member and was also a visiting scholar of Pittsburg University.



**Lidia Ogiela** is a professor and head of Division of Information Fusion and Human Centered Systems at Pedagogical University of Krakow, Poland. She received Ph.D. in Computer Science and Engineering at AGH University of Science and Technology, Poland in 2005. In 2018 she received the other Ph.D. in Computer Science and Telecommunication at Hosei University, Japan. Lidia is an author of more than 230 scientific international publications on cognitive informatics, information systems, and computational intelligence methods. She is a Lifetime Senior Member of SPIE, IEEE Senior Member, Member of SIAM, ACM, OSA, CSS and Information Processing Society of Japan.



**Kangbin Yim** received the B.S., M.S., and Ph.D. degrees from the Department of Electronics Engineering, Ajou University, South Korea, in 1992, 1994, and 2001, respectively. He is currently a Full Professor with the Department of Information Security Engineering, Soonchunhyang University. His research interests include vulnerability assessment, malware analysis, leakage prevention, secure architecture, especially on mobile network, industrial control systems, and vehicular platforms. Dr. Yim has served as an Executive Board Member of the Korea Institute of Information Security and Cryptology, the Korean Society for Internet Information,

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