Foreword

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Biographical notes: Tai-Hoon Kim received his PhD in the School of Information and Computer Science from University of Tasmania, Australia. After working with Technical Institute of Shindoricoh as a researcher and working at the Korea Information Security Agency as a senior researcher, he worked at the DSC (Defense Security Command). After working with Hannam University four and a half years as an associate professor, now he is currently working at Sungshin W. University. He has published about 200 papers.

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ComSoc, Supervisor of the Smart Health FabLab at Lakehead University, and Editor in Chief of the IGI Global *International Journal of Extreme Automation and Connectivity in Healthcare* (*IJEACH*). His research interest includes the internet of things, artificial intelligence, web intelligence and health informatics.

Carlos Ramos got his BSc and PhD degrees in Electrical and Computer Engineering in 1986 and 1993, at the University of Porto (UP), Portugal. Between 1986 and 1995 he was Assistant and Professor of UP. In 1993 he joined the Institute of Engineering of the Polytechnic of Porto where he is now Full Professor. From 2010 to 2018 he was Vice-President of the Polytechnic Porto for the areas of research, innovation and internationalisation. His R&D areas are centred around artificial intelligence with applications to Manufacturing and Energy. He has more than 500 publications.

Wai Chi Fang is a Full Professor in the Electronics Engineering Department of National Chiao Tung University, Taiwan. He was an engineer and manager with NASA's Jet Propulsion Laboratory (JPL), USA from 1985 to 2009. He has authored more than 200 technical papers and holds 24 patents and 13 NASA new technologies. He is an IEEE Fellow and was a member of the Board of Governors of the IEEE Circuits and Systems Society (2004–2009), Vice President of the IEEE Systems Council (2008–2010), and Chair of the IEEE CAS Technical Committee on Biomedical and Life Science Circuits and Systems (2011–2013).

We are very happy to publish this issue special issue of the *International Journal of Reliability and Safety*. The issue contains nine articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and external reviewers. We take this opportunity to thank them for their great support and cooperation.

In 'Topology optimisation design of mechanical tee backsheet', the stress distribution of backsheet under pretension force load is obtained through strength analysis, and based on this, a topology optimisation calculation of backsheet is analysed. According to the topology optimisation results, the backsheet structure is redesigned and finite element analysis shows that by reducing the volume of the model of the backsheet while improving its stress distribution, the maximum equivalent stress is reduced and the chip reliability is enhanced.

In 'The probabilistic analysis of fatigue crack effect based on magnetic flux leakage', a probabilistic analysis on the fatigue crack effect was investigated by applying the Metal Magnetic Memory (MMM) method, based on Self-Magnetic Leakage Field (SMLF) signals on the surface of metal components. The 2P-Weibull distribution function was used as a probabilistic approach to identify the precision of the data analysis from the predicted and experimental fatigue lives, thereby showing that all points are placed within the range of a factor of 2. Additionally, the characteristics of PDF, CDF, failure rate and failure probability data analysis were plotted and described. Therefore, a 2P-Weibull probability distribution approach is determined to be an appropriate method to determine the accuracy of data analysis for MMM signals in a fatigue test for metal components.

The paper 'Reliability assessment of pressure vessel design methods' proposes a reliability analysis method to assess three pressure vessel design methods: stress categorisation method, limit-load analysis in ASME code and DBA-L method, which was recently proposed by the present authors. It was concluded that with the same input variables into the three analyses, the responses of calculated results of the three methods were different, which provided an effective guidance to assess and choose the proper design method in engineering practice.

In 'Multi-state system reliability analysis methods based on Bayesian networks merging dynamic and fuzzy fault information', the proposed method expands the traditional BNs and effectively solves the deficiencies of existing reliability analysis methods based on BNs incorporating fuzziness and fault information. The proposed methods proved to be feasible in capturing the fuzzy and dynamic information in real-world systems.

In 'Reliability allocation technique for complex system of systems', representing the complex SoS and generalisation of a universal model which could be adapted to any domain, for the purposes of reliability allocation during the initial phases of design are the main objectives, which are set forth, while conceptualising the model. Verification of the model under various boundary conditions has been carried out. While the proposed model is aimed for general usage, it has been validated with the available data in the aerospace domain. Results obtained are found to achieve the target goal set for the platform, which is a complex SoS.

In the paper 'New component-based reliability model to predict the reliability of component-based software', the authors propose a reliability estimation model noted as component-based reliability model to assess the reliability of individual components and after integration of components, i.e. based on two factors: component reliability and average number of interaction failures.

In 'Risk-energy aware service level agreement assessment for computing quickest path in computer networks', a new variant of the quickest path problem is addressed with additional factors of risk and energy which leads to the evaluation of risk-energy constrained quickest path problem computation. The proposed algorithm is able to solve the risk-energy constrained quickest path problem for the continuity of communication. The SLA fulfils the needs of a multi-constrained path whereas its time-complexity is of the order of the Dijkstra's algorithm. Finally, variation of penalty time and risk variation helps to find the high-performance value of the allowed delay time toward success of the SLA.

In the paper 'Emergency braking mechanism for an elevator using hydraulic and pneumatic actuation', the proposed idea aims at replacing the current safety mechanisms used by the elevators (i.e. governors), which are rope-based safety mechanisms, to a rope-independent mechanism, actuated by pneumatic and hydraulic cylinder. The proposed safety mechanism is lightweight and mounted on the top of the elevator. The mechanism involves a pneumatic cylinder actuating a hydraulic master cylinder using a class 1 lever for mechanical advantage. Analyses of parts are done by considering maximum forces acting on a hydraulic calliper mount and lever arm for varying thickness. Through calculations and analyses, the proposed system was found to be safe and reliable.

In the paper ‘A hybrid fault tolerance framework for SaaS services based on hidden Markov model’, a hybrid fault tolerance framework that uses replication and design diversity techniques for SaaS service is proposed. The results show that the mixed fault simulator is flexible for simulating various faults in a cloud environment, and both temporal and spatial redundancy has better effect on the availability and reliability improvement of the SaaS service.