Editorial

S. Demidenko*

Massey University,
New Zealand

Monash University,
Australia
E-mail: S.N.Demidenko@ieee.org
*Corresponding author

S. Mukhopadhyay

Massey University,
New Zealand
E-mail: S.C.Mukhopadhyay@massey.ac.nz

Gourab Sen Gupta

Singapore Polytechnic,
Singapore

Massey University,
New Zealand
E-mail: SenGupta@sp.edu.sg

Biographical notes: Serge Demidenko is a Chair of Electronic Engineering and Associate Head of Institute of Information Sciences and Technology at Wellington Campus of Massey University, New Zealand as well as an Honorary Research Associate at the Department of Electrical and Computer Systems Engineering of Monash University, Clayton Campus, Victoria, Australia. He received his ME from the Belarusian State University of Informatics and Radio Electronics (1977) and PhD from the Belarusian Academy of Sciences (1984). During his career in the country, he progressed from an engineer to Head of Joint (Industry-Academy) Test Laboratory of a large electronic manufacturing company (around 12,000 staff) and Head of Department posts by working for academia and industry. Starting from 1990s he has been on the academic staff of institutions of higher learning of several countries. His research areas include electronic design and test, fault-tolerance and signal processing. He is an author of four books, more than 100 papers and holds 25 patents. He is a Fellow of IEEE and IEE, and UK Chartered Engineer. He is an Associate Editor of six international journals including *International Journal of Intelligent Systems Technologies and Applications (IJISTA), JETTA: Journal of Electronic Testing: Theory and Applications and the IEEE Transactions on Instrumentation and Measurement*.

Gourab Sen Gupta received his BE (Electronics) from the University of Indore, India in 1982 and Masters of Electronics Engineering (MEE) from Philips International Institute, Eindhoven, Holland in 1984. After five years as a

Software Engineer in Philips India, he joined Singapore Polytechnic in 1989 as a Senior Lecturer in the School of Electrical and Electronic Engineering. Currently, he is a Visiting Senior Lecturer at the Institute of Information Sciences and Technology, Massey University. His research interests include embedded systems, robotics, real-time vision processing, behaviour programming for multiagent collaboration and automated testing and measurement systems.

Subhas Mukhopadhyay graduated from Jadavpur University, Calcutta, India in 1987 with a Gold medal and received the Master of Electrical Engineering degree from Indian Institute of Science, Bangalore, India in 1989. He obtained the PhD (Eng.) degree from Jadavpur University, India in 1994 and Doctor of Engineering degree from Kanazawa University, Japan in 2000. He joined the Institute of Information Sciences and Technology, Massey University, New Zealand in September 2000 where he is currently an Associate Professor. His fields of interest include electromagnetics, control, electrical machines and numerical field calculations. He has published over 150 papers in international journals and conferences. He is a Fellow of IEE, Senior Member of IEEE and an associate editor of *IEEE Sensors Journal.*

The need to monitor, measure, analyse and respond to various physical, chemical and other phenomena such as temperature, vibration, acceleration, strain, humidity, acidity, visual images, sounds, etc. is of paramount importance in virtually every area of the modern world – industrial manufacturing, agriculture, construction, healthcare, transportation, defence, meteorology, etc. Recent advances in the emerging field of information and communication technology (first of all, in microelectronic and microsystem design and fabrication, high performance and embedded computing, as well as in advanced digital communications) have made possible the development and production of sensors belonging to a new generation – so-called intelligent sensors. They are characterised as having significant data processing, storing and analysing power. These intelligent sensors can be used as autonomous systems or deployed in large numbers to form powerful data and signal acquisition networks. The sensor networks may depend on multiple embedded processors to simultaneously gather and handle information from many sources. They are often flexible, self-reconfigurable and fault-tolerant thus making such sensors and sensor networks well suited for mission critical applications.

There has been increasing interest to the area of design, development and applications of advanced and intelligent sensors and sensor networks. The proposed Special Issue is our contribution towards addressing the demand for the relevant information. The majority of the manuscripts featured in this Special Issue have been carefully selected from over 100 qualified submissions presented at the 1st International Conference of Sensing Technology, 21–23 November 2005 in Palmerston North, New Zealand. They have been subjected to substantial enhancement and re-edition by the authors as well as independent reviewing process in order to ensure the high quality required for journal publications.

The issue is opened by the paper by R. Weir et al. from New Zealand proposing system architecture for integrating sensors, controllers, actuators and instrumentation within a common framework. A scalable infrared sensor network for multiple

three-dimensional indoor targets localisation aimed at urban search and rescue tasks is presented in the next paper, which is authored by N. Kirchner and T. Furukawa (Australia).

This is followed by three papers related to gas sensors area. The first of them authored by E. Hawe et al. is the result of work of an international team that includes researchers from Ireland, UK, Germany and Italy. This paper describes an optical fibre sensor for detection of particular gases in the exhaust system of a road vehicle. The next paper (by K. Sato et al. from Japan) presents a novel high-performance hydrogen gas sensor, while the third contribution in this group (written by L. Bissi et al.) is again a result of team efforts of group of researchers from two Italian institutions working towards developing a smart gas sensor for environmental monitoring.

The next paper of the Special Issue is a substation analysis of inaccuracies in measurement of contact stresses between elastic bodies carried out by the colleagues from Austria – K. Hoffmann and K. Decker.

Two papers in the set are related to the field of magneto-resistance. The first one (by M.J. Haji-Sheikh and Y. Yoo, USA) presents a method to model a magneto-resistive Wheatstone bridge using a new model for magneto-resistive elements in saturation, while the second paper (by T. Somsak et al., Japan) employs a spin-valve giant magneto-resistance effect for recognition of micro non-magnetic (conductive) and ferromagnetic materials.

Paper number nine of this Special Issue is related to the field of optical fibre sensor networks. It is co-authored by I. del Villar, I. Matias and F. Arregui representing Spain. The tenth paper (by G. Senaratne et al. from New Zealand) presents an in-vivo detection method to estimate the size and the position of a breast tumour using microwave frequencies.

Finally, the Special Issue is concluded with a very interesting paper by New Zealand–US team of R. Webb and N. MacDonald presenting an efficient implementation of an electrometer that is based on the use of microelectro-mechanical system as DC electrical metrology reference.

We are very happy to get such a diverse Special Issue both in terms of its topical coverage and geographic representation. We do hope that the readers would find it interesting, thought provocative and useful in their research and practical engineering work. And of course, we would be glad to hear from the audience with their comments, recommendations and proposals on how the intelligent sensor research and engineering community could be served better.