# Editorial

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**Biographical notes:** Nitaigour P. Mahalik received his BE, an ME and a PhD in the years 1989, 1993 and 1998, respectively and completed Postdoctoral research in May 2002. He served at the University College of Engineering, Burla and was invited to Moscow State Technological University, Russia as well as Gwangju Institute of Science and Technology, South Korea during 1990–2006. He is a recipient of the National Overseas Scholarship and Brain-Korea fellowships for pursuing research, especially in the field of interdisciplinary areas. Currently, he is a Faculty Member in the College of Agricultural Sciences and Technology, California State University, Fresno, USA. His recent research areas fall under food processing and packaging automation technology. He has published more than 80 papers and five books and served as Editor, Guest Editor, Committee Member in several journals and conferences.

Mo Jamshidi received the PhD in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1971. He holds three honorary doctorate degrees and is Lutcher Brown Endowed Chaired professor at the University of Texas System at San Antonio Campus, San Antonio, TX, USA. Founding Director of Center for Autonomous Control Engineering (ACE) at the University of New Mexico (UNM). Director of the National Consortium on System of Systems Engineering. He has over 550 technical publications including 58 books and edited volumes. He is the Founding Editor/Co-editor of five journals and one magazine.

The publication of the inaugural volume went successfully. It accommodated 24 research papers spanning 4 issues. Because of space constraints many papers which could not be published in the inaugural volume did appear in Vol. 2; No. 1 and the rest would appear in the following issues including this. In order to draw researchers' attention the papers for the inaugural volume were very selective, and also it was important in terms of covering the scope of the journal. Apparently, the modern day research activities in the domain of Automation and Control have been so wide that it was impossible to accommodate the representative papers in one volume. As a matter of fact Volume 2 of

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this journal would facilitate publishing more interesting papers strictly in line with the scope. The editorial team is eagerly waiting to observe the emerging research trends in this exciting domain.

As time proceeds, new researchers are merging into the field. This journal serves as an interface between all the researchers regardless of new or old. Their valuable works become important to the novice researchers. Thanks to Inderscience Publishers for giving this opportunity to a wide range of researchers who have been waiting to contribute to our technology-based society. Above and all we appreciate the potential authors whose papers have appeared in this Issue. This issue contains 10 papers plus the editorial. We are sure the readers will enjoy reading Volume 4, No. 2.

The first paper in this issue provides details of an adaptive backstepping control algorithm to control the speed and flux of an induction motor under the conditions of time-varying load torque and rotor resistance uncertainty. The authors have designed the algorithm to estimate the time-varying load torque and unknown rotor resistance. The controller is designed based on measurements of speed and stator current. The designed partial state feedback controller is *singularity* free and guarantees asymptotic tracking of smooth reference trajectories for the speed of the motor. The rotor flux modulus asymptotically tracks a desired reference trajectory.

Paper 2 is a review type paper where the reader can find comprehensive information about the advances in food processing and packaging technology. Bearing in mind that food processing and packaging is a multitrillion dollar businesses and about 15 million people work in this industry, this paper provides abundance information with regard to food plant operation scenario and management. Starting from general definition to complex systems have been presented in a chronological order.

In paper 3, a heuristic approach to robust control is proposed by the authors. Its application to the regulation of the dc-dc converters of the boost type has been researched. The controller provides an additional tuning parameter which can be used to modify the output response. The additional tuning parameter reflects the trade-off between stability robustness and time domain performance. The system stability in the presence of uncertain load and line voltage is also studied. The controller attenuates a selected group of harmonic components in the audible range contained in the output. Numerical and simulation results to illustrate the features are also presented. The authors claim that the method is having a faster recovery of the steady state with lower overshoot.

Fuzzy logic cannot be ignored when we attempt to study a specific feature of automation and control, especially, in the areas of adaptive methodology. The presented work in the fourth paper makes the adaptive fuzzy system adaptable after learning through the data. In view of making the additive fuzzy systems adaptive, EM algorithm has been used for updating the model parameters. The resulting model can be applied successfully to a benchmark data to validate the model. The performance index of the model is quite better and encouraging, as reported. Further, a comparison is discussed with the latest available additive fuzzy model.

In the sequel, a paper is dedicated to present work on modelling the parameters of a Web Winding System (WWS). Modelling and the simulation of the non-linear dynamic behaviour of a web winding process during traction and by consideration the variations of the radius and inertia rollers is presented in Paper 5. The evolution of the industrial systems parameters and their functioning modes are necessary to guarantee a high productivity and assure a good quality of their final products. A Cold Rolling Mill

(CRM) industrial system can be used to reduce metals thickness. It allows transforming the metal initial thickness to a very fine one. The cold rolling mechanism consists in passing the metal to mill, several times, through the WWS of the CRM. The flatness of strip is a decisive parameter determining the CRM final product quality. The strip flatness property depends on material type that could be more or less elastic, deformable or fragile. Moreover, rolling velocity is an important parameter that determines the metal deformation. The main WWS parameters constituting the objective of their study are the traction forces, the winding/unwinding velocities and the web velocity. It was found that the WWS stability mainly depends on the rollers radius and motors inertias.

As the demand for more capable robotic platforms increases so does the complexity of the design and the need for higher level of control, coordination and intelligence. Paper 6 provides several ideas, issues and solutions pertaining to mobile robotic platform design. Furthermore, the design of a tracked robot is presented. This design includes reusable software, real-time control and layered design.

The major advantage of the fuzzy control method is to control processes that are too complex to be mathematically modelled in real time. The main tool of the fuzzy control systems is the fuzzy logic controller. This can be designed based on either software or hardware implementation. Since hardware systems are able to provide high speed processing and precision, such scenarios are very common. Due to the requirements of high speed, low power and reduced system chip size, CMOS-based designs is mostly preferred. Also current-mode circuit building blocks in analogue domain are very suitable. Paper 7 presents development of a novel CMOS-based analogue fuzzy logic controller. The authors claim that since analogue implementations offer simplicity and high FIPS, the basic fuzzy blocks in the controller have to be designed using analogue circuit structures. The behaviours of the controller are studied by using PSPICE simulations.

Paper 8 presents work on the mathematical model of the three-phase, cylindrical-rotor synchronous motor. The model can be used for analysis of symmetrical and asymmetrical transient as well as steady-state conditions. This model is represented as a set of differential equations. The stator differential equations are expressed in phase coordinates, while the rotor differential equations are expressed in direct and quadrature coordinates. Such combination of two systems of coordinates increases the number of differential equations by one. It also allows predicting the response in both symmetrical and asymmetrical modes of operation. The skin effect in the cylindrical rotor is considered by representing the rotor by two parallel-connected resistive-inductive circuits.

A distributed model for capacitance requirements for self-excited induction generators is presented in Paper 9. The main objective of this paper was to construct a distributed environment through which the capacitance requirements of self-excited induction generators could be monitored and controlled. A single-server/multiclient architecture is proposed which enables the self-excited induction generators to access the remote server at any time, with their respective data with minimum capacitance requirements. An Remote Method Invocation (RMI)-based distributed model obtains the system data simultaneously from the neighbouring self-excited induction generators which are the clients registered with it and the server send back the capacitance requirements as response to the respective clients. The server creates a new thread of control for every client request and hence complete distributed environment is exploited.

Last but not the least, the final paper of this issue presents a software-based pseudo real-time shaker controller that can replace the commonly used hardware based real-time controllers. The controller uses standard sound cards for digital input and output and has been developed using National Instruments LabVIEW development environment. A frequency domain self-tuning method was developed to produce a random Gaussian noise that conforms to a predefined profile. The profile of the Gaussian noise is then shaped using a bank of weighted parallel infinite impulse response filters. The weights of the filters are then tuned using a PID control algorithm. A spectrum estimator using Fast Fourier transformation is developed to determine the feedback profile for each of the discrete frequency bands. It was found that although the system is not running in a true real-time system due to non-deterministic operation, the controller still produces comparable results to those of hardware based real-time controller.