Editorial

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Biographical notes: N.P. Mahalik received his UG, PG and PhD in the year 1989, 1993 and 1998, respectively. He completed his Post-doctoral Research in 2002. He also worked as an invited faculty in Muscow State Technological University, Russia, Gwangju Institute of Science and Technology (GIST), South Korea between 2001 and 2004, respectively. He has published more than 80 papers and 5 books. He served as Editor, Guest Editor, Committee Member in several journals and conferences. He is also a recipient of National Overseas Scholarship and Brain-Korea fellowships for pursuing research especially in the field of interdisciplinary areas. He is the Member of many professional societies.

Mo M. Jamshidi (F-IEEE, F-ASME, F-AAAS, F-NYAS, F-TWAS) received a PhD in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1971. He received three Honorary Doctorates and is Lutcher Brown Endowed Chaired Professor at the University of Texas System at San Antonio Campus, San Antonio, TX, USA, Founding Director of the 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.

Advanced manufacturing brings out high quality products at a very reasonable cost. The integration between Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) plays major roles in achieving the intended objective cited above. This Issue begins with a research paper that focuses on the concept of Computer Aided Process Planning (CAPP) in terms of an assistance system called STAMPing CAM (STAMPCAM) which facilitates to achieve automatic drawing process of cylindrical parts within the manufacturing environment. It is shown that the new generation CAPP methodology is relatively ideal that can reduce design time and hence increase productivity. The implementation is based on AutoCAD system using a conventional PC and advanced Graphical User Interface (GUI) environment.

The scope of automation and control is not complete without the involvement of soft-computing tools and methods. In the following paper, the influence of cross-point level of membership functions in fuzzy two-term (PI or PD) control is studied. Although, in the past, the researchers had considered fuzzy sets with cross-point level less as well as more than 0.5 to show the simulation results of a first order plant with a time-delay in which the controller performance is relatively good, the authors of this paper have shown that whenever membership functions are considered with cross-point level less than 0.5, control output generated by two-term controller (PI/PD) is piecewise continuous and the controller performance is inferior as long as the cross-point level is less than 0.5. A mathematical model for fuzzy two-term controllers has been analytically established by employing triangular membership functions with variable cross-point level.

The chemical plants must be environmentally sustainable and energy efficient over a wide range of operating conditions. The third paper in this Issue discusses the controllability issues of several exemplar chemical plants keeping in view of assessing the state of their operating conditions. The motivation behind this research is that the industrial goal is the need to enhance the production and quality of a wide variety of high value products. The traditional synthesis methodologies, by and large, assume that all design and operating conditions are invariables, thus overlooking controllability issues. This paper presents controllability measures through a simple but comprehensive methodology that enables determining a more controllable plant and the state of operating conditions. The authors have addressed the issues of two chemical plants, an HDA plant and an acrylic acid plant.

Research interest in studying the dynamical behaviour of complex systems that are composed of a large number of subsystems is growing. Systems of this nature have found many applications including flexible manufacturing, industrial processes, water distribution networks, and so on. In those multi-agent systems, decentralised, reduced-order linear functional observers can be designed to reproduce global state-feedback control signals. In multirobot systems, for instance, a solution to the global state feedback control problem can be based on the design of reduced-order functional observers to estimate asymptotically the global control signals by using only the corresponding local output information subject to the condition of no information cross flows. In this research, new existence conditions for the reduced-order decentralised observers are derived and design procedures are presented and illustrated.

Automatic control for load despatch problem is taking momentum due to the ever increasing dimension of interconnection of power generating stations. Dynamic Economic Despatch (DED) determines the optimal operation of generating units with predicted load demands over a certain period of time with an objective to minimise total production cost while the system is operating. There comes the application of optimisation theory. Optimisation is becoming an embedded principle in many applications including power systems. Its usefulness is either in design or operational stage to ensure minimum cost, which is of prime concern especially in thermal units. A paper has been dedicated to present a keynote on automatic load despatching and DED control with valve point loading based on Particle Swarm Optimisation (PSO) algorithm for the determination of the global or near global optimum despatch solution. Numerical results for a sample test system are presented to demonstrate the performance and applicability of the method.

Abrasive waterjet cutting represents a tooling technology that has greatly improved the accuracy, quality and productivity. The sixth paper deals with experiment, research

and evaluation of the influence of pressure and traverse rate to acoustic sound pressure level in abrasive waterjet machining of 15 and 20 mm thick stainless steel. Results show that traverse rate is the dominating factor which influences the noisiness of working environment.

Microscopic application is one of the important areas in the field of visual inspection systems in industry. An application domain can include analysis of microscopic wear particle. A monitoring engineer uses this information to diagnose wear modes and thus attempt to predict wear failures in machines. Paper seven discusses the analysis process of wear particle using a relation-based classification of wear attributes. The methodology used in this paper is based on integration of system process information obtained through an image processing system, with an evolving knowledge database. The proposed visualisation technique enables accurate diagnosis to predict future wear modes.

In the following paper, the concept of parametric robust control is applied to the hot-dip galvanising control system. The work considers a mathematical model of the plant in which the inputs are used to regulate the output. A multivariable PI controller, which is tuned by applying the Ziegler and Nichols method, is used and the maximum parametric uncertainty is computed in order to guarantee the stability property of the close loop control system.

The final paper of this issue presents thermo-electro-mechanical model of a typical smart shell. The research is motivated by the fact that there is a requirement to study the damping of unwanted vibration due to thermal loading of large shell like space structures. Passive damping for such structure is normally not possible. This paper describes vibration control through embedded piezoelectric actuators and sensors. A shear flexible nine-node degenerated solid finite element with five mechanical DOF per node is formulated for modelling both static and dynamic response of laminated composite shell structure containing distributed piezoelectric layers. The authors have shown that the voltage induced due to pyroelectric effect has no effect on damping for steady state temperature excitation. While paraboloid shell curvature and height influences the effectiveness of controlling action, the vibration of standard paraboloid shell is damped more effectively, followed by shallow and deep shells.

Well, it never ends here. Dear readers, please have patience, we promise you to bring the cutting edge technology based new innovative research results in our forthcoming issues.