

## Editorial Notes

It is the big question that every small to medium and large enterprise industrialist face every day, why we fail to ignite and sustain innovation in the majority of our business organisations? It is indeed the fact that culture of innovation it does not happen by accident. It must be created, adopted and rewarded. Changing the way our organisations do business requires imagination and creativity. An innovative organisation is run by, employees who can see all new opportunities, risks, technological challenges and are willing to accept and respond to every challenges in a professional conduct. The International Journal of Robotics and Mechatronics is the gate and online access data base for these organisations, to share, exchange knowledge and finding the possible innovative solutions for these challenges. The third issue of the journal presents selection of some of these technological challenges facing the industry and introduce some of the inventive researcher pioneering solutions and findings.

The first paper by *Mohammad Danesh, et al (Department of Mechanical Engineering, Isfahan University of Technology, Iran)* is focused on Sub-surface Stresses in Spur Gears under Mixed-lubrication Regime. One of the most important parameters in the gears' performance is the maximum shear stress that occurs below the surface. In this research work, a model that employs the load-sharing concept to predict the friction coefficient and film thickness for each point along the line of action is developed. The sub-surface stress field that is generated below the tooth surface is calculated based on the friction coefficient. The predicted sub-surface stresses are compared to the results obtained from the commercial finite element software ABAQUS. An acceptable agreement is observed in comparing the results from the two methods. A parametric study to study the effect of load, velocity, viscosity and surface hardness on the calculated maximum sub-surface shear stress and its location has also been conducted.

The next few papers deal with some of the existing industrial challenges in aerospace industry, control systems and world energy demand. They provide a number of ground-breaking solutions, for instant: The paper by *Yan Jin, et al (School of Mechanical and Aerospace Engineering, Queen's University Belfast, UK)* presents Parallel Kinematic Assisted Automated Aircraft Assembly. Aerospace enterprises are looking for flexible machines for automating aircraft assembly to revolutionize their existing cumbersome processes in order to lead the competitive edge. Recent study shows Parallel Kinematic Machine (PKM) could be the potential solution as it offers high flexibility, high stiffness and high accuracy that are required for the manufacturing system. This applied research work introduces an innovative integrated method for high precision machining of large aero structures with a PKM based manufacturing system, which includes: development of the PKM solution with light weight supporting frame, machine transportation method in a large work area, dust extraction system design, cutting tool selection and machining sequence design within process metrology support. Experiment findings show that the novel integrated solution is a success, which provides significant impetus for implementing the step change processes of aircraft assembly. *Humaira Salman, et al (Research Centre for Modeling and Simulation, National University of Sciences and Technology, Islamabad, Pakistan)* presents Stability Verification of a Control System using the Reachability Analysis. Model checking is a formal method technique used for the verification of safety critical and/or complex software and hardware systems. It provides accurate results by exhaustively exploring the abstract mathematical model of the system. This paper discusses the framework proposed for the verification of an under-actuated inverted pendulum based two-parallel wheeled vehicle. The physical model of the perceived system is designed for 2 DOF that is the pitch along x-axis and roll along y-axis. The mathematical model of the system is developed using the state-space approach and the system is analysed using MATLAB software tools. Stability is introduced in to the system using a Linear Quadratic Regulator (LQR) with an Observer. This controlled system is analysed and formally verified using the SpaceEx model checker. The stability verification of this system is performed using the reachability analysis. The model checker results shows the stability verification of the system over the convergence of infinite trajectories for a range of input values provided, showing advantage over simulation based techniques. The results also provide the phase portraits of the output variables in 2-D and 3-D planes. *Moglo Komlanvi, et al, (College of Engineering and Technology, University of Derby, UK)* introduces Micro-Hydro Generator using Eco-wheel system for Industrial Building Applications. The paper presents the preliminary part of ongoing research to develop a 3D sustainable renewable power station that is of high efficiency at affordable cost. The paper is focused on the optimization of a 1D micro hydropower system. The constant supply of green power is made possible through a combination of power plants using renewable energies resources. Research reveals that water wheels are not as efficient as turbines. But it could offer efficiency in excess of 80% for over and undershoot water wheels. The technical issues that limit the water wheel efficiency have been studied and a new design is presented in this paper. The simulation to the new design is hereby presented with some experimental measurements of the efficiency.

The final paper of this issue is focused on one of the 21<sup>st</sup> century blind and visually impaired people access to information technology (IT) resources. *Mahmoud Shafik (College of Engineering and Technology, University of Derby, UK)* presents how innovation in micro actuators and big data technology transform blind people daily life activity and improve their access to information technology resources. This research covers the current state of art of the micro actuators, latest development in the technology and other possible potential development that could be utilised to help this community and recover their disability. The paper also introduces the latest development of an innovative tactile graphical display using electro rheological fluid for visually impaired IT access applications.

We hope that all of you find the issue inspiring beneficial and has also given you a good on-site of the ongoing research and development in this fascinating fast-evolving area of innovation and technology. We look forward to receive your contribution to the future journal issues.