Guest Editorial Advanced Mechatronics in Research and Industrial Applications

MECHATRONICS has evolved during the last few decades to become well recognized as a philosophy of design and an engineering discipline. It has emerged through the philosophy of concurrent design of mechanics, electronics, and computer of a system for an integrated and efficient approach to system design. Most universities nowadays offer a degree in mechatronics. This stems from the fact that as technology progresses, the traditional barriers between engineering disciplines are dimensioning. Mechatronics evolution went through many stages to reach its current advanced stage. The IEEE Industrial Electronics Society held the mechatronics conference IEEE-ICM 2017 at Gippsland Campus of Federation University Australia in February 2017. IEEE-ICM 2017 was a landmark in this biannual conference series. It contained a variety of technical sessions, an industry forum, and a workshop, in addition to keynote addresses by world-renowned mechatronists.

Highly ranked papers in the conference review process were selected by the conference technical committee and were invited for further review and possible inclusion in this Special Section. Through the rigorous review process and due to the page limits, only six papers could be included in this Special Section. The papers included in this Special Section provide a variety of advanced mechatronics research topics and applications. The included papers demonstrate the current advances in the mechatronics field that directly serve both humans and industry.

Advanced Mechatronics in Service of Humanity

There are two papers in this Special Section dealing with projects related to advanced mechatronics applications in direct service of humanity. Those papers are as follows.

1) *Design and Evaluation of a Remote Actuated Finger Exoskeleton Using Motion-Copying System for Tendon Rehabilitation:* This paper describes the work done for the design of one actuated degree-of-freedom for hands tendons rehabilitation. In this paper, the authors tested the design against certain criteria such as repeatability and accuracy of position estimation.
2) *Human Motion Analysis and Its Application to Walking Stabilization With COG and ZMP:* In this paper, the authors describe the work done to produce a stability index based on center of gravity and zero moment point. People can wear this stability-assisting system to prevent them from falling.

Advanced Mechatronics in Service of Industry

The Special Section also includes four papers discussing advanced mechatronics research and application in industry. Those papers are as follows.

1) *An Efficient Iterative Learning Approach to Time-Optimal Path Tracking for Industrial Robots:* This paper presents research work done for the development of an algorithm to achieve optimal-time tracking of industrial robots. Iterative learning approach was used to improve the tracking performance.
2) *Interpolation of a Clothoid Curve Based on Iterative True-Value Prediction Considering the Discretization Error:* The research in this paper addresses the problem of discretization errors when interpolating point-to-point such as in CNC application.
3) *Data-Based Predictive Hybrid Driven Control (DPHDC) for a Class of Imperfect Networked Systems:* This paper describes the work done in the development of DPHDC for a class of networked control systems under random delays, packet dropouts, and disturbances.
4) *A Friction Model-Based Frequency Response Analysis for Frictional Servo Systems:* The research work presented in this paper addresses the problem of discretization errors when interpolating point-to-point such as in CNC application.

We hope the papers presented in this Special Section give the reader a taste of the current research advances and applications in the field of mechatronics. We wish to take this opportunity to thank all the authors who made this Special Section possible. Many good papers did not make it into this Special Section due to different reasons. We wish the reader an interesting journey through this sample of the current advances in mechatronics research and applications.

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