

Editorial

Mechatronics and Mechanical Engineering in Cyber-Physical Systems

**Minvydas Ragulskis,¹ Hongyuan Jiang,² Quan Quan,³
Algimantas Fedaravicius,¹ and Gongnan Xie⁴**

¹*Kaunas University of Technology, Kaunas, Lithuania*

²*Harbin Institute of Technology, Harbin, Heilongjiang, China*

³*Beijing University of Aeronautics and Astronautics, Beijing, China*

⁴*Northwestern Polytechnical University, Xi'an, Shaanxi, China*

Correspondence should be addressed to Minvydas Ragulskis; minvydas.ragulskis@ktu.lt

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Cyber-physical systems (CPS) are physical and engineered systems whose operations are monitored, coordinated, controlled, and integrated by a computing and communication core. This intimate coupling between the cyber and physical will be manifested from the nanoworld to large-scale wide-area systems of systems. CPS will transform how we interact with the physical world just like the Internet transformed how we interact with one another.

Meanwhile, mechatronics and mechanical engineering [1] play important roles in building CPS and developing real-life CPS applications. A challenge in the development of CPS is the gap between the various involved disciplines, like software and mechanical engineering [2]. Therefore, how to apply methods and tools emerging from mechatronics and mechanical engineering to CPS is still an open issue to us.

In this special issue, we mainly focus on the latest advancements in mechatronics and mechanical engineering towards CPS. We invite scientists and investigators to contribute to this special issue with original research articles and review articles on theories and key technologies for mechatronics and mechanical engineering in CPS, as well as their applications to conquer engineering problems. After peer-review, 19 papers from different countries were accepted and published in this special issue.

The research about robot especially industrial robot is a hot topic in the field of CPS. Papers “Design of a Redundant Manipulator for Playing Table Tennis towards Human-Like

Stroke Patterns,” “Research on Associative Memory Models of Emotional Robots,” and “Kinetostatic Analysis of Passively Adaptive Robotic Finger with Distributed Compliance” are just falling into this topic. Fuzzy-based or uncertain-based methods can be used to support CPS and papers “The Diagnosis of Abnormal Assembly Quality Based on Fuzzy Relation Equations,” “Using Fuzzy Hybrid Features to Classify Strokes in Interactive Sketches,” and “Aircraft Cockpit Ergonomic Layout Evaluation Based on Uncertain Linguistic Multiattribute Decision Making” are about this topic. Papers “A Cutting Parameters Selection Method in Milling Aero-Engine Parts Based on Process Condition Matching” and “Aircraft Cockpit Ergonomic Layout Evaluation Based on Uncertain Linguistic Multiattribute Decision Making” are mainly talking about how to solve the problem in aero- or aircraft. Optical research is also an important topic for CPS. In this special issue, papers “Computer Texture Mapping for Laser Texturing of Injection Mold” and “Compound Tension Control of an Optical-Fiber Coil System: A Cyber-Physical System View” are talking about this.

Some papers just focus on applied mechanics or physics, for example, “The Research Status and Progress of Heavy/Large Hydrostatic Thrust Bearing,” “A RE-Based Double Measurement Method for Unknown Rotor Profile of Screw Compressor,” “Surface Roughness and Residual Stresses of High Speed Turning 300 M Ultrahigh Strength Steel,” “Bifurcation of Periodic Solutions and Numerical

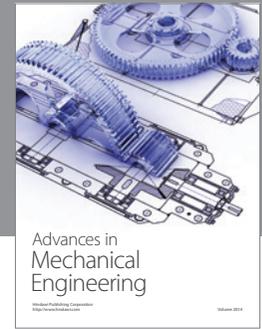
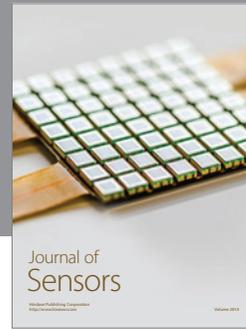
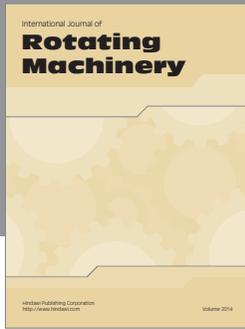
Simulation for the Viscoelastic Belt,” and “Compound Tension Control of an Optical-Fiber Coil System: A Cyber-Physical System View.” Moreover, there are a number of papers about industrial optimization, for example, “Real-Time Shop-Floor Production Performance Analysis Method for the Internet of Manufacturing Things,” “Assembly Operation Optimization Based on Social Radiation Algorithm for Autobody,” and “Study on the Extraction Method of Deformation Influence Factors of Flexible Material Processing Based on Information Entropy.” The rest of the papers like “Single-Sided Electromagnetic Induction Heating Based on IGBT,” “Parameters Design for a Parallel Hybrid Electric Bus Using Regenerative Brake Model,” and “Computer-Aided Simulations of Convective Heat Transfer in a Wedged Channel with Pin-Fins at Various Outlet Arrangements and Nonuniform Diameters” also talk about issues like magnetic, electric, and heat issues.

We hope that readers of this journal will find in this special issue not only the new ideas, cutting-edge information, and new technologies and applications of CPS but also a special emphasis on how to solve various engineering problems by using mechatronics and mechanical engineering.

Minvydas Ragulskis
Hongyuan Jiang
Quan Quan
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Gongnan Xie

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