MESA11 – Call for Papers

The 7^{th} ASME/IEEE International Conference on
Mechatronic and Embedded Systems and Applications
August 29-31, 2011 Washington, DC, USA
http://iel.ucdavis.edu/mesa/MESA11

Objectives: Mechanical and electrical systems show an increasing integration of mechanics with electronics and information processing. This integration is between the components (hardware) and the information-driven functions (software), resulting in integrated systems called mechatronic systems. The development of mechatronic systems involves finding an optimal balance between the basic mechanical structure, sensor and actuators, automatic digital information processing and control in which embedded systems play a key role. The goal of the 7^{th} ASME/IEEE MESA11, is to bring together experts from the fields of mechatronic and embedded systems, disseminate the recent advances made in the area, discuss future research directions, and exchange application experience. The conference is organized in a number of symposia under the umbrella of the ASME IDETC 2011.

Symposia and Chairs

Autonomous Systems and Ambient Intelligence
H.S. Ahn, Gwangju Institute of Technology, Korea
Y. Zhou, State Univ. of New York at Stony Brook, USA

Bio-Mechatronics
S. Xie, University of Aukland, New Zealand
L. Zuo, State Univ. of New York at Stony Brook, USA

Cyber-Physical Systems and Cooperative Systems
S. Nestinger, Worcester Polytechnic Institute, USA

Diagnosis and Monitoring in Mechatronic Systems
W. Chen, Wayne State University, USA

Design & Verification Tools for Embedded Systems
P. Rössler, UAS Technikum Wien, Austria
J. Brauer, RWTH Aachen, Germany

Embedded Systems Infrastructure and Theory
J. Xu, York University, Canada

Fractional Derivatives and Their Applications
D. Baleanu, Cankaya University, Turkey

Mechatronic Control & Electrical Vehicular Systems
Ch. Ma, UM-SJTU Joint Institute, China

Mechatronic and Embedded Energy Systems
U.A. Rosa, University of California at Davis, USA

Mechatronics and Embedded Systems Applications
E. Frontoni, Polytechnic Univ. of Marche, Italy

Mechatronics and Embedded Systems Education
Y.C. Chou, Chung Yuan Christian University, Taiwan
Z. Wang, Zhejiang Sci-Tech University, China

Robotics & Mobile Machines
X. Kong, Heriot-Watt University, UK
M. Zoppi, Univ. of Genua, Italy

Sensors & Actuators
J.Ch. Koo, Sungkyunkwan University, Korea
J.Y. Chang, Massey University, New Zealand

Sensor Networks & Networked Embedded Systems
B. Chen, Michigan Technological University, USA

Small Unmanned Aerial Vehicle Techn. & Applications
Y.Q. Chen, Utah State University, USA
Y. Zhang, Concordia University, Canada

Virtual Prototyping in Mechatronics
M. Germani & M. Mengoni, Polytechnic Univ. of Marche, Italy

Paper Submission: Manuscripts shall be no longer than 10 pages and shall adhere to the ASME author guidelines. Word and LaTeX templates are available from ASME to assist authors in preparing their papers for publication. Final papers in PDF format must be electronically submitted to: https://www.asmeconferences.org/IDETC2011.

Important Dates:

Submission of Abstract	11-02-2011
Submission of Full-Length Paper	18-02-2011
Author Notification of Acceptance	20-05-2011
Submission of Final Paper	30-05-2011

Technical Co-Sponsors:
ASME Division of Design Engineering
IEEE Intelligent Transportation Systems Society
IEEE Control Systems Society

Symposium on Autonomous Systems and Ambient Intelligence

Implementation of autonomous systems is still a tough and challenging topic in mechatronic systems. To improve autonomous capabilities like intelligent navigation and distributed decision, recently, the concept of ambient intelligence has been introduced. The key point herein is to utilize wireless sensors or distributed embedded networks to improve the recognition capabilities of mobile vehicles or robots. Particular topics of interest include, but are not limited to:

- Autonomous Navigation and Control
- Robot Intelligence
- Reinforcement Learning
- Multi-agent Systems
- Teleoperation & Coordination
- Distributed Control Systems
- Indoor Localization
- Wireless Sensor Networks

Symposium on Bio-Mechatronics

The symposium provides a cross-disciplinary platform for presenting the latest developments in biomechatronics and robot assistive technologies for medical and bio-applications. It relates to the design of systems, devices and products for use as assistive tools when interacting with humans and biosystems. Particular topics of interest include, but are not limited to:

- Biomechatronics Design, Biomedical Robotics, Robotics for Medical Surgery
- Rehabilitation Robotics, Robotics for Stroke Patients and Wearable Medical Devices, Assistive Technology for Injured, Elderly and Disabled
- Microelectronics, Health Monitoring Devices, Embedded Signal Processing, Low-power Design
- Bioelectromagnetism, Electrical Bioimpedance, Implantable Electronics
- Biorobotics, Biomaterials, Biosensors & MEMS, Biomechanical Devices
- New Materials, New Sensing and Actuation Technology for Biomechatronic Systems
- Medical Imaging and Visualisation, Simulation and Navigation, Virtual Reality, Intuitive Command and Control Systems, Haptics and Sensor Technologies
- Biomechatronic System Modelling, Simulation of Bio-Systems, System Identification
- Biomechanics Study and Modelling
- Interaction between Devices and Humans, Adaptive Control Methods

Symposium on Cyber-Physical Systems and Cooperative Systems

The combination of physical systems and networks has brought to light a new generation of engineered systems: Cyber-Physical Systems (CPS). CPS is informally defined as: "Computational thinking and integration of computation around the physical dynamic systems form Cyber-Physical Systems (CPS) where sensing, decision, actuation, computation, networking and physical processes are mixed." CPS applications can be found in medical devices and systems, patient monitoring devices, automotive and air traffic control, advanced automotive systems, process control, environmental monitoring, avionics, instrumentation, oil refineries, water usage control, cooperative robotics, manufacturing control, buildings, etc. Particular topics of interest include, but are not limited to:

- Human-centric Cyber Physical Systems
- Enabling embedded components in CPS
- New mission scenarios of CPS
- Cooperative Sensing policy in CPS
- Cooperative Actuation policy in CPS
- Information sharing and agreement in CPS
- Virtualization and virtual organization in CPS
- Complexity measures for CPS
- Random delay effects in CPS
- Communication management in CPS
- Mobility (mobile sensors and actuators) in CPS
- Multi-scale analysis of CPS
- Scale-free network structure of CPS
- Medical Cyber Physical Systems

Symposium on Diagnosis and Monitoring in Mechatronic Systems

The aim of this symposium is to seek new theories and methods, and potential applications and various experiments of monitoring and diagnosis in mechatronic systems. Papers with fault diagnosis emphasized in applications are particularly welcome. Manuscripts are solicited in the following topics but not limited to:

- Survey of recent development of fault diagnosis and monitoring in mechatronic systems
- Modeling and fault diagnosis
- New theories, methods and applications of fault diagnosis
- Fault detection and identification
- Fault-tolerant control, and experimental research on diagnosis and control for mechatronic systems

Symposium on Design & Verification Tools for Embedded Systems

The symposium on Design & Verification Tools for Mechatronic & Embedded Systems is devoted to concepts & tools which assist in the design, implementation and verification process of mechatronic and embedded systems. Topics include, but are not limited to the following:

- System-level design and modelling tools
- Design space exploration tools
- Simulation tools and emulators
- Model checking and equivalence checking tools
- Compilers, assemblers, implementation and synthesis tools
- Power analysis and optimization tools
- Test, debug and diagnosis tools
- Integrated design environments and tool chains
- Hardware/software co-design and co-verification tools
- Surveys, new methodologies and case studies related to design and verification tools for mechatronic & embedded systems

Symposium on Embedded Systems Infrastructure and Theory

Embedded systems are single-purpose computers built into a larger system for the purposes of controlling and monitoring the system, often with real-time computing constraints. They are usually embedded as part of a complete device including hardware and mechanical parts. The design and validation of reliable systems under environmental and economic constraints poses a lot of research challenges. Manuscripts are solicited in the following topics but not limited to:

- Algorithms for Embedded & Mechatronic Systems
- Models of Embedded Computation
- Software Architectures for Embedded Systems
- Design and Validation of Embedded Systems
- Formal Methods & Case Studies
- System-on-Chip and Network-on-Chip Design
- Hardware/Software Co-Design
- Power-aware Design Issues
- Real-time Aspects & Systems
- Operating System & Middleware Support
- Networked Embedded Systems
- Embedded Systems Applications

Symposium on Fractional Derivatives and Their Applications

The Symposium seeks papers solicited in the area of fractional derivatives and their applications. The subjects of the papers may include, but are not limited to:

- mathematical modeling of fractional dynamic systems
- analytical and numerical techniques to solve these equations
- fractional models of viscoelastic damping
- large scale finite element models of fractional systems and associated numerical schemes
- fractional controller design and system identification
- stability analysis of fractional systems
- nonlinear and stochastic fractional dynamic systems
- fractional models and their experimental verifications, and applications of fractional models to engineering systems in general and mechatronic embedded systems in particular

Symposium on Mechatronic Control & Electrical Vehicular Systems

The ever-increasing demand from industry for higher efficiency, speed, accuracy and also higher safety at lower cost presents challenges not only to the product design itself but also the control performance. Nowadays the mechatronic systems are beginning to predominate both in industry and emerging new energy technologies, such as electric vehicles.

The mechatronic control is playing a growing important role in generating simpler and reliable systems with excellent cost performance. The goal of the symposium is to bring together experts on mechatronic control from different areas to present new research results and perspectives on the future of the field.

Manuscripts are solicited in the following topics but not limited to:

- Advanced mechatronic control (software-/hardware-based)
- Analysis, modeling and simulation of mechatronic control system
- Nonlinearity compensation in mechatronics
- Mechatronics in advanced manufacturing
- Mechatronic control in electric vehicles

Symposium on Mechatronic and Embedded Energy Systems

Energy savings and introduction of new forms of alternative energy sources create enormous opportunities for new applications. The discontinuous nature of some sources or the need of conversion to more desirable sources present some challenges for the design and implementation of energy systems. Mechatronic and embedded systems may play a fundamental role in regulating and controlling these unique systems, or processes. Manuscripts are solicited in the following topics but not limited to:

- Design, analysis and modeling of energy systems
- Engine control and optimization processes
- Energy systems software/hardware, theory and implementations
- Wind, solar, hydro and any other alternative form of energy systems
- Energy savings
- Remote stationary, off-road and other mobile applications
- Emerging mechatronic and embedded technology for energy systems

Symposium on Mechatronics and Embedded Systems Applications

The symposium seeks contributions in theories, technologies, methodologies and, particularly, applications for mecahtronic and embedded systems. Particular topics of interest include, but are not limited to:

- Challenges, requirements, models, and constraints associated with various application domains
- Use of mechatronic and embedded technologies in meeting particular system requirements, performance, scalability, reliability, and security
- Assessments of mechatronic and embedded technologies for particular application domains
- Technology transition lessons learned
- Applications in intelligent transportation systems
- Applications in intelligent manufacturing and automation systems
- Applications in underwater, flying and aerospace systems
- Applications in mobile robotics and automotive systems
- Applications in medical systems

Symposium on Mechatronics and Embedded Systems Education

Mechatronics and Embedded systems are both multidisciplinary fields, requiring skills from mechanics, electronics and computer science along with a high degree of application domain knowledge. Demand for mechatronics and embedded systems engineers has motivated a growing interest in the education of specialists in these domain. This fifth symposium on Mechatronics & Embedded-Systems Education aims to bring researchers, educators, and industrial representatives together to assess needs and share design, research, and experiences in embedded systems education. Particular topics of interest include, but are not limited to:

- Innovations in course, curriculum, laboratory development
- Development of teaching tools and innovative teaching strategies
- Integration of emerging technologies into the undergraduate and graduate programs
- Experiences in e-learning and distance learning in the domains of mechatronic & embedded systems

Symposium on Robotics & Mobile Machines

The symposium provides a platform for presenting the latest developments in robotics and mobile machines. In particular, it relates to the design and application of such devices. Topics of interest include, but are not limited to:

- Novel robots
- Robots with legs and metamorphic structures
- Reconfigurable robots
- Biomedical devices
- Man-machine interface and applications
- Underwater robots and swimming robots
- Space robots
- Path planning and navigation
- Mobile robots and applications

Symposium on Sensors & Actuators

The symposium provides a cross-disciplinary platform for presenting the latest innovations on sensor and actuator technologies for mechatronic and embedded systems. Particular topics of interest include, but are not limited to:

- Force Sensors, Multi-axis Force & Torque Sensors
- Smart Material Sensors and Actuators
- MEMS Application for Sensors and Actuators
- Biomimetic Sensor and Actuator Design
- Robotic Applications of Sensors and Actuators
- Optical Sensors
- Acoustic Sensors
- Tactile Sensors
- RF Sensors
- Self-sensing Actuator
- Encoder Applications
- Sensor Fusion

Symposium on Sensor Networks & Networked Embedded Systems

Technology is taking us to a world where numerous networked devices interact with the physical world in multiple ways and at multiple scales. This symposium seeks theoretical and experimental research papers in the areas of sensor networks and networked embedded systems. The symposium covers, but not limited to, following topics:

- Network architecture and protocols
- Software platforms and development tools
- Self-organization, scalability, and synchronization
- Routing and data dissemination
- Quality of service
- Energy conservation and management
- Data processing, storage and management
- Mobile ad hoc networks
- Bio-inspired sensor networks
- Vehicle control networks
- Sensor network applications

Symposium on Small Unmanned Aerial Vehicle Techn. & Applications

In recent years, new developments in MEMS sensors, embedded systems, wireless technologies as well as cognitive sciences and artificial intelligence made it possible to use small and affordable unmanned aerial vehicles (UAVs) in both military and civilian applications. While the UAV market so far has been mainly driven by military and security applications, this new generation of UAVs also has the potential to generate a broader range of civilian applications like in- and out-door surveillance, disaster management, agriculture, remote sensing etc. However, there are still many unsolved problems in the area of small UAVs like the design of vehicles with a higher degree of intelligence and autonomy, the integration in the airspace, sense and avoidance technologies or the coordination of teams of small UAVs, to mention only a few. This symposium aims at presenting latest results in small UAV research and application. Manuscripts are solicited in the following topics but not limited to:

- Fixed-wing small UAV technologies
- Small UAV as flying sensors and applications
- State estimation and fault diagnosis for small UAVs
- Multi-UAV cooperative navigation and control
- Small UAV software architectures
- Rotary-wing small UAV technologies
- Low cost IMU and autopilot development
- Vision-based navigation for small UAVs
- Low cost UAV platforms
- Resilient flight controls
- Small UAV software architectures
- Resilient flight controls
- Fault-tolerant control
- Airworthiness
- Student UAV/UAS competitions

Symposium on Virtual Prototyping in Mechatronics

As intelligent mechatronic systems are becoming more prevalent in numerous application fields, the development process requires high efficiency, increased functionalities, reduced costs and optimized performance. Virtual Prototyping allows reducing consuming physical prototypes as well as improving system control before manufacturing. The simulation environment requires the cooperation among design team members introducing a distributed and collaborative paradigm for the design and development of complex systems in mechatronics. Virtual Reality (VR), Mixed Reality (MR) and Augmented Reality (AR) are human-computer interfaces improving the interaction between the user and the prototype to achieve a better understanding and cognition of mechatronic systems working conditions. Virtual Prototyping (VP) uses such technologies for product design and simulation. In this context manuscripts are solicited in the following topics but not limited to:

- VP-based design methods for intelligent mechatronics products
- Immersive modeling systems for mechatronics
- Advanced VP toolkits based on mechatronics solutions
- VP and Hardware-in-the-Loop testing and simulation
- Application of VR/MR/AR in mechatronics design and development
- Multimodal and multisensory interaction: advanced haptics, tactile, visual and audio displays
- Multi-user virtual environments
- Internet-based platforms based on AR/MR for mechatronics
- Tools and methods for multi-disciplinary and cooperative design in mechatronics
- Advanced applications of VP tools in mechatronics
- VP technology for manufacturing plants simulation
- Early testing and verification of mechatronics products
- Human-computer studies and validation of interaction