

Call for Papers

IEEE TRANSACTIONS ON AUTOMATIC CONTROL

Special Issue on

Wireless Sensor and Actuator Networks

Wireless Sensor Networks (WSNs), in their various shapes and forms, have greatly facilitated and enhanced the automated, remote, and intelligent monitoring of a large variety of physical systems. These networks consist of a large number of typically small devices, each incorporating sensing, processing, and wireless communications capabilities. Their use has penetrated a plethora of application domains from industrial and building automation, to environmental, wildlife, and health monitoring.

The control and systems community has played an important role in the maturing of WSNs addressing issues related to their fundamental limits and designing strategies to optimize and control their operation so as to improve performance. Performance encompasses a variety of metrics that may vary with the application but in all cases includes the network's energy use which determines its usable lifetime. As WSN nodes are powered by small batteries, energy conservation has become a very important concern. Equally importantly, the existence of WSNs has provided a major application context to theoretical contributions of the control community including cooperative and distributed control, event-based monitoring, discrete-event systems, and consensus algorithms.

What is emerging as the next step in the WSN evolution is their use not only in monitoring but also in controlling a physical system. To that end, some of the WSN nodes have to be augmented by integrating actuators. Actuators can be simple devices programmed to take immediate, one-shot, action in response to sensory input, or they can be more sophisticated entities (like robots) that interact with their environment in more complex ways. The resulting augmented version of WSNs is commonly referred to as Wireless Sensor and Actuator Networks (WSANs). WSANs are therefore heterogeneous networks that comprise of networked sensor and actuator nodes that communicate among each other using wireless links to perform distributed sensing and actuation tasks.

WSANs can be used to close loops over the network in a variety of applications, such as, environmental control, event detection and suppression, home automation, manufacturing, microclimate control, surveillance etc. The control community has recently made important contributions in understanding control over communication channels but this work has, for the most part, abstracted the communication medium. A new challenge is to consider a WSAN as the communications channel over which we seek to close control loops.

The topics relevant to this special issue include but are not limited to:

- ✧ Autonomous sensor networks
- ✧ Co-design of communication protocols and control strategies
- ✧ Architectural, modeling and simulation of WSANs
- ✧ Autonomic and self-organizing coordination and communication
- ✧ Sensor-actuator and actuator-actuator coordination
- ✧ Distributed control in sensor-actuator networks
- ✧ Biologically inspired communication in WSANs
- ✧ Applications and prototypes.

Submission Details:

All papers submitted to the special issue will be subject to peer review in accordance with the established practices of the IEEE Transactions on Automatic Control. Papers that do not fall within the scope of the special issue will be returned to the authors without review, to enable them to submit them as regular papers through the normal channels.

Authors are invited to submit their manuscripts to either one of the guest editors. The manuscript format should follow the guidelines posted at the website: <http://css.paperplaza.net/journals/tac/>. Hardcopy submissions will not be accepted.

Important dates:

Paper submission: DEADLINE: February 1, 2010;

Acceptance: August 2010;

Tentative Publication: May 2011.

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