Issue on Optimisation of Wireless Sensor Networks

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Call for Submission This editorial introduces the second issue of the *Embedded Selforganising Systems (ESS)* journal with the focus on embedded, wireless sensor networks and upcoming, innovative application scenarios.

For this journal, we also choose a modern kind of electronic publication, which provides a flexible way to discuss latest research results. The advantages of such an e-journal are multifarious. In comparison to traditional paper journals we replace the classic review and creation process with a new *Sliding Issue* model. Each issue starts with an initial editorial and a official call for papers. The submitted articles will be reviewed and, if accepted, published as soon as the final version is received by the committee. Based on this process, each sliding issue can be filled successive until the maximum number of article is reached. During this period, all accepted papers can already be read by other researchers while other papers are still in the reviewing process. Accordingly, the time to publish shrinks to an minimum. In Addition, multiple issues with different focus can co-exist at the same time, which provides completely new possibilities to react on latest research topics. The journal allows also the integration of discussions and other reactions on published articles in the same journal issue.

Finally, we are looking for fresh ideas and novel scientific works. We also intend to create a promising platform for creative and constructive discussions.

Wireless Sensor Networks

Actual projects within the research field of mobile Ad Hoc networks focus more and more on the monitoring of all kinds of systems using wireless sensor network topologies. Each node represents an independent measurement unit with application specific sensor devices and strongly restricted hardware resources. The collected data will be transmitted to a central data sink over a decentralised multi-hop network interconnection. Due to the limited energy resources of each node, the primary objective for all kinds of wireless sensor networks scenarios is the optimisation of the node lifetime. During the last decade, several research approaches focus on this key problem. One basic idea is to reduce the transmission power of the wireless network interface to reduce the power consumption during the communication. Other techniques deal with an intelligent topology layout. Here, several approaches try to prolong the sensor node lifetime by minimising the number of active links in the network.

But most of these techniques manipulate the lower levels of the protocol stack and focuses on the PHY, MAC or network layer. But on higher levels of abstraction high optimisation potential can be identified as well. High level solutions will focus on the application layer. At this layer, detailed information regarding to application relevant timings, data complexity or scheduling aspects are available. This information can be used by optimisation methods for synchronisation of the overall sensor network in relation to the measurement timings of each node as well as for optimisation of energy consumption of each node and the overall network. For determination of reached optimisations new metrics are needed. A metric measures the quantity of the optimisatin criteria, e.g. time differences or energy consumption. Optimisation methods need to determine the metric values for each node and provide algortihms for detecting and enroling changes in the wireless sensor network. All methods should be concentrated on wireless sensor networks due to the necessity of a reduction of the energy consumption in the area. Regarding to the optimisation of the measurement quality, techniques for the local data aggregation and data fusion effect significant improvements.

Further topics of intrest, with respect to wireless sensor networks are sensor node reconfiguration approaches, online and on-demand scheduling mechanisms, monitoring scenarios, priorisation of bandwidth limited channels, reduction of transfered data sets as well as inteligent, energy optimitsed routing algorithms. Papers in this issue are intended to present concepts and casestudies in the decribed context.

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