

Programming Abstractions and Languages for Wireless Sensor Networks: Fundamental Concepts and State of the Art

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By providing an interface between digital and physical world, *Wireless Sensor Networks* (WSNs) are currently regarded as a key technology towards the vision of an “*Internet of Things*”. Nevertheless, market research firms and research road-maps still regard WSN programming as a major hampering factor. The current practice largely revolves around low-level programming frameworks, usually right atop the operating system. However, such an approach is not sustainable in the long term, and is certainly not applicable when WSNs become part of a larger computing infrastructure, such as the Internet of Things.

Researchers are addressing this issue with several higher-level programming solutions, which greatly differ in the way they let developers describe the system behavior. However, a well-established characterization of available approaches is missing. It is thus difficult for researchers and students to orient themselves in the field, and for end-users to identify the solutions most appropriate to their needs.



In this half-day tutorial, we begin with a characterization of WSN applications to identify the fundamental requirements at stake. Next, we describe a taxonomy of WSN programming solutions providing a foundation to classify, compare, and evaluate the various approaches. We intertwine the description of representative examples with live demonstrations of the technology being discussed. The tutorial is aimed at fresh students looking for interesting problems, researchers willing to gain deeper insights into WSN programming, and practitioners in search of a systematic overview on the topic. In particular, our

tutorial will enable the PLDI community to be exposed to challenging problems of potential huge impact in the future, and thus to find plenty of “food for thought” for both short- and long-term research plans.

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