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New tools for developing dependable Wireless sensor networks

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Wireless sensor networks (WSNs) can be deployed in many application domains, like monitoring parameters of infrastructure facilities, for example, bridges, buildings or drinking water pipes, but they may also be used for control functions in distributed systems. The advantage is their flexibility for deployment due to the possibility of being battery-powered and their wireless communication capability. However, because WSNs are typically deployed in harsh environments, they are prone to node and link failures. Therefore, in order to operate a wireless sensor network in a dependable way, fault tolerance techniques are typically incorporated to guarantee long lifetime and correct handling of node and link failures. Moreover, the design of dependable WSNs also requires the validation of the software running on the nodes to avoid network failures due to software bugs. In particular, this also requires the validation of the behavior of the designed fault tolerance techniques to make sure that they provide the desired behavior in case of occurring faults. Of course, this includes not only the simulation of the integrated techniques but also a test of the implementation in a fully functional test setup, because a simulation alone cannot accurately reflect all aspects of a real system. Therefore, the proposed presentation gives some real life examples, where failures were discovered in the deployed system that could not be discovered by a previous simulation and test. Based on these examples, requirements for the tool chain for the development and test of dependable WSNs are drawn. The focus here is on methods and tools for the test of the implementation on real hardware, i.e., on distributed hardware nodes. Some of these tools, which are currently under development within the frame of a project, will be introduced in more detail and an outlook is given on the targeted test and development platform for dependable WSNs that fulfill the specified requirements.

Biography

Mario Schölzel received a diploma degree in Computer Science in 2001 at Brandenburg University of Technology (BTU) in Cottbus. From 2001 to 2006, he was working in the compiler construction group at BTU and received his Doctoral degree in 2006. In 2007, he was working in the computer engineering group at BTU in the field of fault tolerant computing. In 2014, he completed his habilitation thesis at BTU Cottbus-Senftenberg. Since 2014, he is a Professor at University of Potsdam and the leader of a junior scientists group at IHP in Frankfurt (Oder).

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