



Implementing a test bed for wireless home automation systems

Introduction:

We are considered with Wireless Sensor Networks (WSN), in special, with finding transmission schemes to improve reliability of radio communication. In this work, we consider a home automation system, which consists of sensors (e.g. light switches, temperature sensors, motion detectors, etc.) and actors (e.g. shutter motors, electric switches, etc.). In contrast to most existing commercial solutions, we use simple unidirectional communication, which means that sensors can only transmit and actors can only receive data. This leads to increased power efficiency and reduced costs of the devices, since no complex transceiver circuitry is needed. However, unidirectional communication is highly error-prone due to missing acknowledgment and retransmission mechanisms. Therefore special transmission schemes need to be implemented to improve the reliability of communication in such networks.

Content:

The objective of this work is to develop a testing environment to allow evaluating different transmission schemes in unidirectional systems. The work will include the following tasks:

- Hardware: Developing hardware for the sensor and receiver (actor) nodes as well as implementing a gateway that enables a computer to supervise the system.
- Write firmware for the sensor and receiver nodes that implement different transmission schemes (see *“Designing Reliable Home-Automation Networks based on Unidirectional Nodes”* by Philip Parsch et al., in Proceedings of SIES, 2014).
- Write control software of the test environment: triggering the sensor nodes, detecting data loss, simulating different environment scenarios like noisy urban areas, etc., storing the different test data and plotting the results.

Requirements:

- Knowledge in hardware design and implementation
- Very good programming skills in C/C++; optional: Simulink/Matlab, Qt, etc.
- Self-reliance, ability to work in a team

Contact:

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