Sensor Network Laboratory Project: Event-based Data Acquisition

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1 Preparation

The preparation to the application project is different from the previously conducted preparation. While previously you have obtained detailed instructions on the functionality to be implemented, in this exercise the implementation is up to you. Although you have more time than in the fundamental exercises, the time you have in order to implement your application is limited. Thus, preparation and specification of your implementation is vital. Start to plan your implementation prior to the first lab session.

2 Exercise Goal

The exercise goal is a event-based data acquisition system. In this project, the student should show that

- a basic understanding of wireless sensor network principles was obtained

- he/she is able to use the Waspmote platform to implement a small-scale application

- basic functionality of the Waspmote modules was understood

- different functions of the Waspmotes can be combined into an application

3 Application Requirements

While the design and implementation of the application is in the hand of each student group, there are some basic requirements each project has to fulfill. The following application levels lead step-wise to the final system implementation. The amount of levels included in the project implementation will contribute to the grading of the project work.

3.1 Level 1: Light Data Acquisition

Level 1 describes the minimum requirement for passing the laboratory project. In this level, you should implement a small network with one transmitter and one receiver (both Waspmotes). The transmitter should send sensor data of a light sensor via the XBee

module in a periodic manner. The received data should be visualized on the PC as a lux level.

3.2 Level 2: Event Detection

Instead of transmitting the light level periodically, a change in light condition should be detected (e.g., light on or off). Communication should only occur when a event change was detected.

(Note: the chosen method of detecting the event can have an influence on the grading.)

3.3 Level 3: Second Transmitter

Add a second transmitter to the network. Whenever node 1 (the light sensing node) detects an event, it transmits the light value to node 2 instead of the receiver. Node 2, then forwards the light level, as well as its own temperature (external or RTC temperature), to the receiver. You may assume that the address of the receiver is known to node 2 in advance.

3.4 Level 4: Average Temperature

Finally, the average temperature during the event period should be transmitted. When node 1 informs node 2 about the start of the event, node 2 starts measuring temperature values periodically. When the event period is over (i.e., second message from node 1), node 2 transmits the average temperature and the approximate length of the event duration to the receiver.

4 Project Tips

- Plan what/how to do prior to your implementation.

- Do not try to implement everything at once.

5 Examination

The examination of the project will be based on the levels covered, the methods used to address the levels, the demonstration of the results and the project report.

5.1 Demonstration

Each project group is required to demonstrate and explain their implementation in order to pass the laboratory part of the course. Demonstration can occur at any time during the lab periods or on separate occasions, but latest on the **23rd of March**.

5.2 Report

In addition to the demonstration of the project implementation, each group will hand in a report describing their project implementation. The report should contain a short introduction, as well as a detailed description of the project implementation. The description of the implementation should make clear, which levels have been addressed, how these levels have been addressed and motivate the implementation choices.

The report has to be submitted in PDF format and include the group number and student names. Deadline for submission of the report is the **23rd of March**. There will be an assignment inbox on the course website.

5.3 Sourcecode

Together with your report, you need to submit your full sourcecode of your project. Submit one .pde file per node of your final application implementation using the inbox on the course website. You may compress the source files to a single archive.

Make sure the sourcecode is well structured and understandable for a reader not part of your project group (i.e., include comments to make the code more readable).