

Semester Thesis:

Outsourcing Scheduling

a Key to efficient Wireless Protocol Implementation and Testing

Motivation and Informal Description:

The Low-power Wireless Bus (LWB) [1] is a state-of-the-art protocol that provides robust and energy efficient data dissemination through arbitrary multi-hop wireless sensor networks, while running on ultra-low power radio-embedded board, like the TI CC430 (the red board from Fig. 1).

In LWB, the wireless multi-hop communication is globally time-triggered and occurs in rounds, segmented into slots. A slot is allocated to one node, which can then send data. The network manager is responsible for computing the schedule for the next rounds (i.e., the slot allocation). In practice, the scheduling task is performed locally by one of the nodes. But because of the limited computational capability of low-power nodes, the actual implementation of elegant scheduling policies is a long and tedious task, while not bearing any research interest in itself.

The goal of this semester thesis is to avoid that boring part! The idea is to setup an external scheduler, running on e.g. a PC, which would be connected to an existing LWB network and play the role of network manager. The message exchange between the external scheduler and the LWB is facilitated by the recently developed BOLT processor interconnect [2], as illustrated on Fig. 1.

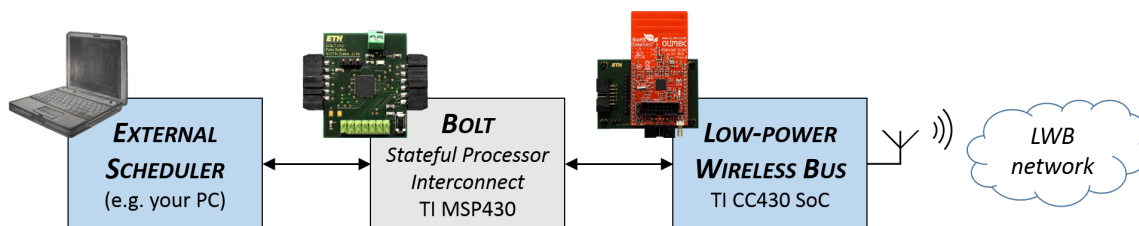


Figure 1: Proposed system architecture of the outsourced scheduler

Your Project: In practice, your tasks are to

- Set up the external scheduler architecture and adapt the LWB protocol to use externally computed schedules in the network. Extensive test on Flocklab [3], our internal testbed featuring a CC430 network running LWB, will validate the proposed architecture.
- Leverage the external scheduler architecture to implement and test a state-of-the-art distributed wireless protocol for Cyber-Physical System developed in our group [under publication].
- If time permits and motivation is high, original scheduling approaches can be investigated and easily tested using the external scheduler architecture.

Requirements: Standard programming skills and interest in physical testing. Basic knowledge on wireless communication protocols and scheduling theory are a plus.

Interested? Please have a look at <http://www.tec.ethz.ch/research.html> and contact us for more details!

References:

- [1] Low-Power Wireless Bus, F. Ferrari, et al., SenSys 2012.
 [2] Bolt: A Stateful Processor Interconnect, F. Sutton, et al., SenSys 2015.
 [3] Flocklab: www.flocklab.ethz.ch/

Contact:

Romain Jacob, ETZ G75
romain.jacob@tik.ee.ethz.ch