19. MOBILE SENSING NETWORKS

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INFRASTRUCTURE OF THE WIRELESS SENSOR NETWORKS LABORATORY

USRP sw radios, Xbow Mica development kits, TI CC2420 development kits, Amber AMB8423 wireless target boards, sensors

ACTIVITIES

One of the central issues in the development **Wireless Sensor Networks** (WSNs) is to devise new protocols under the constraint of limited resources (e.g. energy, size, available bandwidth, computational power…etc.). The most important characteristics of WSN are as follows:

- since the sensors are installed over a large area, a direct link between the information source and destination does not exist, hence the communication protocols to be developed have to support reliable multi-hop operation;
- sensor nodes needs only a low data rate (LR) communications link where some latency time is tolerated;
- channel conditions including both the propagation conditions and inner and outer radio interference (coexistent wireless system) are varying continuously;
- ultra low power consumption: using the same AAA battery, one node should operate for at least a few years, since regular maintenance (including battery changing) would make the system impractical.

As opposed to traditional networking protocols, these limitations pose new challenges to algorithmic protocol design. A great deal of researches has been pursued into developing novel communication protocols and distributed signal processing algorithm.

In our earlier research, we have developed several novel routing and MAC protocols which significantly increased the lifespan of the WSN under constraint of reliable packet reception at the BS (e.g. correct packet arrival at the BS is guaranteed by a given probability). These protocols were adapted and implemented in our test network.

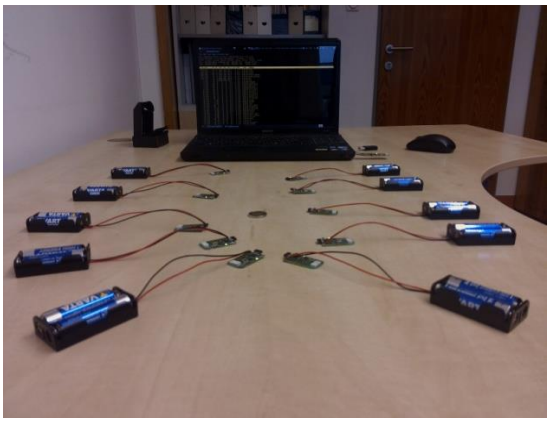

Fig. 1 The AMB8423 development kit

Our WSN group has a seven-year experience in research and development. The corresponding projects, education activities are as follows:

- *Development and Implementation of Wireless Indoor Climate Monitoring System* (completed project with EnerG Kft. sponsored by Hungarian Scientific Research Fund)
- *Signal processing and wireless device design and prototyping for analog sensors* (currently running project for Research Institute for Technical Physics and Materials Science (MFA) of the Hungarian Academy of Sciences)
- In the recent years we have published book chapters, journal papers and conference papers in the field.
- In this area 4 PhD were awarded and 2 PhD students are just before the thesis defense and more than 15 BSc and MSc students were working on the field.
- Recently we have developed a WSN based survivor detection system which is going to be implemented in AMB8423 wireless boards.