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TKN

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Energy Efficient Sensor Networks (EYES)

Introduction

The TKN group is a consortium member in the European research project [EYES](#) on self-organizing and collaborative energy-efficient sensor networks. Wireless sensor networks (WSNs) are large-scale distributed sensing networks that are comprised of many small and cheap nodes equipped with memory, processors, and short-range radios. This combination of sensing and networking opens-up a new horizon of potential applications like smart spaces, environmental monitoring, active structures, etc. The deployment scenarios for these applications call for long operational life of the sensor network during which the limited energy resources of the nodes are not easily replenished. As a consequence, the energy efficiency surfaces as the main design goal for the communication protocol architecture of the nodes.

Main research interests

The main research interests of the EYES research group at the TU Berlin are in the field of collaboration support. Since the sensors and the actuators should form a distributed system, we expect that a good support for such tasks from the network could greatly extend the lifetime and increase the utility. However, such a cross-layer optimization requires intimate knowledge of the whole protocol stack.

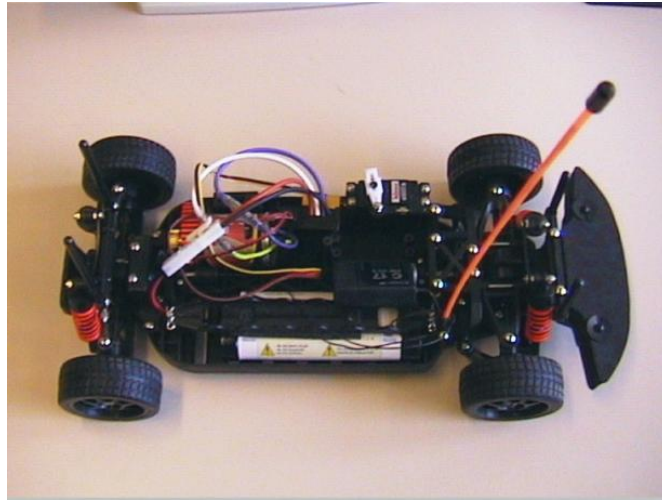
TKN EYES test bed and simulator

To evaluate the networking protocols performance we have chosen the simulation tool [OMNet++](#).

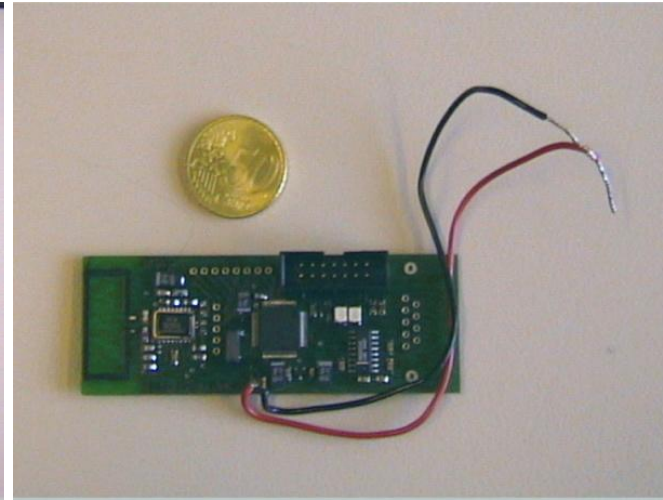
Since the simulation of a wireless networks is hard and not to well understood, we also want to test them in a test bed. The test bed will be used to demonstrate a collaborative task execution between a in-situ

EYES sensor network of low-end nodes and actuators, and small number of mobile nodes.

We plan to use a model car as a base for the mobile node. The motion of the car will be controlled by a PC104+ module. For communication with the EYES network, the mobile node will be equipped with a low-end node, exchanging the information through the serial interface with the PC104+ module.



Mobile node platform (car)



EYES low-end node prototype

Publications:

- [V.Handziski, J. Polastre, J.-H. Hauer, C. Sharp, A. Wolisz, and D. Culler](#), "Flexible Hardware Abstraction for Wireless Sensor Networks", In *Proc. of 2nd European Workshop on Wireless Sensor Networks (EWSN 2005)*, Istanbul, Turkey, February 2005.
([PDF](#))
- [V. Handziski, A. Köpke, H. Karl, C. Frank, and W. Drytkiewicz](#), "Improving the Energy Efficiency of Directed Diffusion Using Passive Clustering", In H. Karl, A. Willig, and A. Wolisz, editors, *Proc. of 1st European Workshop on Wireless Sensor Networks (EWSN)*, Volume

2920 of *LNCS*, Berlin, Germany, January 2004 Springer.

([PDF](#))

- [H. Karl, M. Löbbers, and T. Nieberg](#), "A Data Aggregation Framework for Wireless Sensor Networks", Technical Report TKN-03-016, Telecommunication Networks Group, Technische Universität Berlin, September 2003.

([PDF](#))

- [H. Karl](#), "Quality of service in wireless sensor networks: Mechanisms for a new concept?", ESF Workshop, Zurich, Switzerland, April 2004.

- [H. Karl](#), "Making sensor networks useful: Distributed services --- The EYES project", ESF Workshop, La Spezia, Italy, October 2002.

([PDF](#))

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