Project Work

« Experimentation and Evaluation Support for Acoustic Underwater Communication »

Motivation
Acoustic underwater communication is a prerequisite to realize swarms of autonomous underwater vehicles (AUVs). Due to the heavy impact of the environment and because tests in small-sized water tanks do not provide meaningful results, real-world experiments are inevitable. Unfortunately, they tend to be complicated, tedious, and leave the scientist to the elements. To alleviate this problem, an automated and wireless tool for experimentation and evaluation support is needed. It will enable the user to place acoustic underwater communication devices in remote (up to 100 m), hard-to-access places and control them via a laptop through a wireless (radio) connection such as Wi-Fi or IEEE 802.15.4. In addition, such a tool will perform standard evaluations in the field and hence allow early access to measurement and experiment results.

Work Description
The goal of this project work is to design and implement a tool to support in-the-field experimentation and evaluation of acoustic underwater communication for experiments. It is particularly tailored to support the acoustic modem developed at the Institute smartPORT.

The completion of the project work involves several steps. First, a suitable wireless communication technique has to be identified, possibly by comparing different solutions. Next, a simple relay device—e.g., a wireless sensor node—is programmed to “translate” between wireless radio communication and the acoustic modem (which will be connected through a serial interface). The main task of the project work is then to design and implement a GUI that controls the acoustic modem remotely, enables experiments in manual and batch mode, and provides methods for standard, in-situ evaluations (e.g., plots of packet reception rates). Finally, software testing and a use case study conclude the work.

Prerequisites
The following skills are expected for a successful thesis completion:
- Practical experience with programming (e.g., C/C++, Python)
- Experience with wireless communication (sensor networks, Wi-Fi)
- High degree of autonomous working and self-motivation

Knowledge of serial communication and Linux systems is beneficial.

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