**Lehrstuhl für Eingebettete Systeme**
Prof. Dr.-Ing. Ch. Haubelt

Specialization Module / MA Project / Bachelor Thesis

# Evaluation of Sensor Data Synchronization Effects for Signal Correlation

**Description:**

The importance of wireless body area sensor networks has been growing in the past decades as it is one of the key enabler for various ubiquitous and pervasive computing applications. One of the issues in wireless body area sensor networks is non-synchronized sampling of sensor data between individual sensor nodes. Furthermore, varying transmission delays of low energy wireless standards, e.g., Bluetooth Low Energy (BTLE) further hardens the problem of transforming sample timestamps into a common time reference. Using arrival timestamps of wirelessly received data packages on a data aggregating device could be a possible approach, but remains affected by variable transmission delays.

In this work, a linear regression based synchronization approach shall be tested towards its capabilities to estimate and correct jitter in timestamps of arrival of inertial sensor data. The impact of the thereby possibly suppressed timestamp jitter should be compared and evaluated by using the signal correlation between two wireless sensors undergoing the same motion trajectory.

The following tasks should be done within the scope of this work:

- Usage of two wireless sensor nodes and an android application for receiving sensor data over BTLE

- Implementation of an online linear regression based timestamp synchronization algorithm

- Implementation of an online re-sampling filter as a prerequisite for signal correlation calculation

- Implementation of an online signal correlation algorithm as evaluation metric

- Experimental comparison of signal correlation between two wireless sensors undergoing the same motion trajectory with and without the synchronization method

- Evaluation of the approach and documentation of the acquired results

*Requirements:*

- Practice in Java and Android programming

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