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Ble - anywhere

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Smartphones have reached the status of small computers. Most of them also contain a large number of sensors and communication interfaces. However, all of the older smartphone models (and some of the newer models) do not integrate the new Bluetooth 4.0 standard, which was passed in the year 2009 by the Bluetooth Special Interest Group (SIG) and allows low power communication with sensors.

As a part of a Bachelor thesis for the Institute of Embedded Systems (InES) at the Zurich University of Applied Sciences (ZHAW), an adapter for smartphones, which allows to set up a Bluetooth low energy (also known as Bluetooth Smart) connection in order to communicate with sensors in its sourrounding, was developed. The communication between the smartphone and the adapter runs via an audio jack in order to keep it as universal as possible. Despite the great diversity of smartphone manufacturers, the operating system Android has established itself on the market over the last few years. Contrary to the iPhone, there is no audio interface solution available for this kind of devices. Consequently, an audio adapter allowing a Ble connection for Android devices has been developed in this project.

The Smartphone can receive data from and send data to the adapter and vice versa. This makes it possible to request sensor data over the adapter and to process and display it on a smartphone. To achieve these goals, a hardware solution has been developed and the software for a microcontroller and an Android application was implemented. The main features of this thesis lie mainly in the energy management as well as in the communication interface between the smartphone and Ble-board. Contrary to other works in this direction, the energy management makes the use of phones possible that deliver small audio voltages. This basically makes the design applicable to all Android devices. Although all the project objectives have been achieved, there is still potential for optimization. Especially as far as the energy needs of the adapter and the communication data rate between phone and adapter are concerned.

The smartphone communicates via the audio jack with the developed print. This establishes a wireless connection via Bluetooth smart with the evaluation board.