

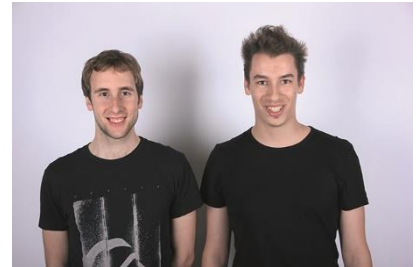
Selfpowered microcontroller system for real-time monitoring of industrial facilities

Sensors, which operate without external power supply, are of big interest to the industry. In combination with wireless transmission techniques, these sensors are installed once and then function without any maintenance up to their lifespan. If such a sensor system is placed somewhere, its lifetime is theoretically unlimited.

In this bachelor-thesis a demonstrator is produced, which implements a microcontroller system with radio connection. As a possible use case, the application is intended to monitor the state of one or more machines in industrial production. The built-in sensors are used to detect potential complications at an early stage. If there is a complication, an alarm is triggered. The demonstrator includes a microcontroller with sensors and an Android application for convenient remote control.

The demonstrator is self-sufficient, which means that the energy is harvested by the device itself. If too little energy is gained, the controller handles this well and without loss of data. The data measured by the sensors is stored in a ring buffer. In order to store as many data as possible, old records should be checked, compressed or deleted, depending on relevance. In order to prevent data leakage even in the event of power failure, the data is written to a persistent memory medium such as Flash storage. The microcontroller is configurable with a wireless connection. The device settings and the sensors can be configured. Bluetooth Low Energy is used as the wireless connection. The measured data can be downloaded to an Android phone with the wireless link with Bluetooth Low Energy.

On the Android device the data is stored in a database. The data is presented in a suitable manner and can be viewed both in a table and as a graph. To detect possible malfunctions of the overseen devices, rules can be defined on the Android device. These rules are then downloaded to the microcontroller. These rules define limit for sensors values, which must not be exceeded. If a violation occurs, an alarm is triggered, which can be received by nearby devices. The android application receives the alarm and passes it on to the user.



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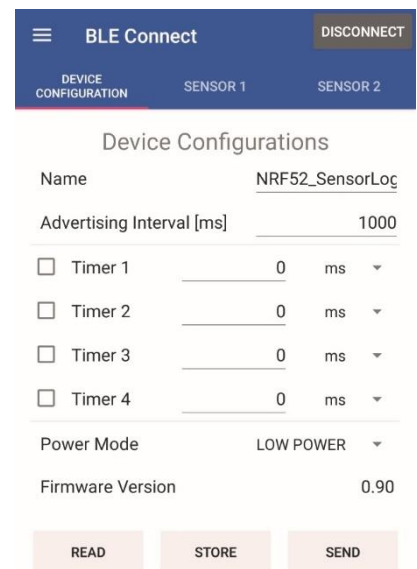


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