

Weekly Reports

Project in Embedded Control

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During the first week we discussed the different project proposals and decided to work on the *tremor* project. The goal of this project is to develop a system which quantifies tremor of patients suffering from diseases like Parkinson. The system should be able to track the movement of the hand which performs a predefined movement like "*pick up a phone from the table and move it to the ear*". The motion consists of a fast part — the tremor — which overlays the movement from the table to the ear.

The movement tracking is done by using sensors which are normally available on smartphones today. This includes gyroscopes (which measures the angular velocity of the device around its axes), accelerometers (which measure the acceleration applied to the device) and magnetometers. We watched a video about sensor fusion¹ which gives a short introduction in how these sensors work and how they can be used. It also discusses briefly the difficulties regarding position tracking².

We plan to gather sensor data using a specialized chip, the BNO-055 from Bosch. It includes sensors and sensor fusion in a single package. A microcontroller of the STM32F103 family is used to read out the sensor data. The data is then processed either on the chip itself or it is transferred to another device using Bluetooth. Currently we are setting up the environment and the communication between the BNO-055 and the microcontroller.

In order to plan further we would like to discuss how the tremor can be quantified. Is it enough to analyze acceleration data or will it be necessary to track the position of the device. A conference paper we read³ used only the acceleration data which might be sufficient.

¹See the Google-Tech-Talk at <https://www.youtube.com/watch?v=C7JQ7Rpwn2k>

²See minutes 23–29.

³https://www.researchgate.net/publication/266080900_A_Smartphone_Application_for_Parkinson_Tremor_Detection