

Master thesis



Friedrich-Alexander-Universität
Erlangen-Nürnberg

To students at the Technical Faculty

(Mechatronics, Mechanical Engineering, Medical Engineering)

Development of a sensor to measure hydrodynamic pressure on surfboards

Although surfing (Wellenreiten) is widespread around the world, surfboard design is still a trial and error process, since only rudimentary data on the fluid dynamical pressure on surfboards and fins are available.



In this project, a small autonomously working pressure sensor should be developed to measure the hydrodynamic pressure on the surfboard and the fins. The sensor is based on the *Bosch Arduino Nicla Sense ME* technology which is able to work wirelessly and independently from external control hardware during measuring. In this first project, the goal is to include the sensor in a commercial

surfboard fin. Thus, the tasks in this thesis are (1) to develop a method to make the sensor waterproof and to determine the accuracy, resolution and dynamic response of the sensor within water. (2) The sensor has to be integrated in an existing surfboard fin. (3) Finally, a prototype of the fin equipped with the sensor will be mounted at a surfboard and its performance will be evaluated within a water channel and the *Fuchslochwelle (Nürnberger Dauerwelle e.V.)*.

The work will be supervised by **Prof. Dr.-Ing. Michael Döllinger** and **PD. Dr.-Ing. Stefan Kniesburges** in cooperation with **Prof. Michael Zöllner** (Hof University of Applied Sciences).

We search for a dedicated and motivated student with

- Interest in development and application of mechatronic systems
- CAD, scientific programming in the field of sensor and measuring control
- High degree of self-reliance

Tasks:

- Development of method to get the sensor and the processing circuit board waterproof
- Testing the measuring characteristics for waterproof configuration
- Mechanical integration in a surfboard fin with the possibility to recover mounting of the sensor
- Experimental evaluation of the fin-sensor prototype mounted on a surfboard.

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