## SUMMARY

The goal of this thesis was to design a data acquisition system for windsurfing board. This project is a part of research for a private company building fins for windsurfing board. The thesis project consists of three main topics: electronic circuit and PCB design, mechanical design and programming.

An electronics design software, Altium Designer is used for designing and creating the necessary connections from sensors to collect data and to save it to the SD card. STM32L151R6 microcontroller is used along with a magnetic rotary position sensor for measuring the angle between board and water. A GPS receiver helps to synchronize measured data with other more precise GPS devices. Accelerometer and gyroscope data is used to monitor the position of the surfboard. All data is stored on the micro SD memory card. The system is powered by a LiPo battery which can be charged using an USB connector, if the voltage drops below critical threshold device will automatically switch itself off.

The device is designed using SolidWorks 3D design software. The appliance is designed in two parts. Seals are used to ensure that the device is waterproof. Housing has a belt loop for mounting. There are two connectors - one for the angle sensor and the other for charging and USB connection. The housing is made of polyamide by 3D printing. A commercially available temporary housing is chosen to simplify prototyping process. In the product development phase the temporary housing is used to be able to update the program and to use debugging tools.

The programming is done in Keil uVision software and the code is written in C programming language and some of the standard libraries are used. The program is divided into a number of sub-functions. And it uses two different sets of functions. The critical (real time) functions are filled every 10 millisecond period, and the rest of the functions are called out every 100 millisecond period.

As a result of thesis project a working prototype was built. After testing the prototype in real life the company will specify the next steps need to be taken in the development of the data acquisition system. There is a need for calibrating software and hardware, which will be engineered later.