

Energieautarker Windmonitor mit Bluetooth Low Energy

The wind measurement at sailing regattas is often done by hand. With the wind measuring device developed in the context of this bachelor thesis, a course of wind direction and wind speed over a period of time can be created automatically. This creates a more accurate overview of the wind conditions and enables to place the buoys more precisely. To avoid having to recharge the device manually, an energy autarkic solution was also developed. The energy is generated by solar cells and temporarily stored in a battery. After longer periods of non-use, a USB charging socket is also available for quick recharging. The measured values are displayed in a specially developed Android app on a smartphone. In addition to the display of the current measured values, the course of the wind speed and wind direction can also be displayed and exported as a CSV file. The smartphone can also be used to read out the GPS position and speed data. With these values it is possible to calculate the true wind. Because the GPS of the smartphone is used for this purpose, the power consumption of the measuring device can be significantly reduced.

The communication between the device and the smartphone runs via Bluetooth Low Energy in advertising mode. This technology allows an energy-efficient, unidirectional data transmission.

In the course of the bachelor thesis the wind direction sensor as well as the wind speed sensor were developed. These sensors use different encoders and an IMU to record the various values measured. The entire electronics for processing the sensor signals is split over four circuit boards, which are installed in a specially designed housing. In addition, all components are designed for use in rough weather conditions, so that water splashes or light rain do not damage the electronics. For the prototype only a few components are made of metal. Many of the self-designed parts are printed from PLA 3D printer.

The bachelor thesis was completed with the commissioning of the wind monitor. Although there is still room for improvement in the first prototype, it was shown that the wind monitor is able to measure and record wind conditions automatically and energy autarkic.

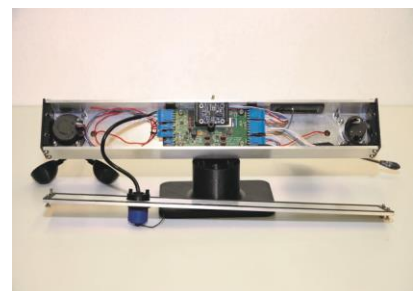


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Prototype of the Windmonitor



Inner view of the Windmonitor