

IoT for Large-Scale Horticulture

The main focus of this bachelor thesis was the development of a sensor/actuator IoT system for data acquisition in horticulture experiments at ZHAW Wädenswil. By integrating a large number of sensors, the system will collect three-dimensional climate data for various horticulture experiments.

To make this possible, a system was developed in which climate data from different sources are stored centrally. This platform also provides visualization and export of the desired data. Furthermore, sensor modules in the form of a sensor rod were designed. Each of these sensor rods measures temperature and humidity at three different vertically distributed points. In addition, the modules also measure soil moisture and CO₂ values. All measured values are recorded in a one-minute time interval and then sent to the server. The data points are assigned to a position and time on the basis of their metadata.

The system was tested in a greenhouse at the ZHAW Wädenswil. Nine sensor rods were used for data acquisition and an actuator module for irrigation control.

Based on the data collected in the test experiment, the benefits of a system with a high spatial resolution for horticulture experiments could be demonstrated. Furthermore, statements about the measuring resolution, measuring intervals and the optimal spatial distribution of the sensors could be made.



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Heatmaps of three dimensional
temperature data



Setup of the test experiment at
ZHAW Wädenswil