# Sensor Data Filter

This component is responsible for filtering the sensor data and computing the current orientation of the XCopter in euler angles. Because those calculations require a deep mathematical understanding, the sensor data filter was extracted from a third party piece of software (REF [1], [2]) and configured so it can be used in the XCopter flight controller. The implementation and mathematical details of this component are intentionally not discussed and only the interface to the filter is described because in this project it is considered as a black box.

The only important thing inside this black box are the parameters for the accelerometer calibration. A tutorial of how the calibration is done, can be read in chapter REF **“Calibration of accelerometer”.**

To get access to the functionality of the sensor data filter, the module provides the function ‘filterSensorData (...)’. This function takes three parameters:

* A pointer ‘int16\_t\* avgSensorData’ on the array of the averaged sensor data from the sensor data manager. This is considered as an input parameter.
* A pointer ‘float\* filteredSensorData’ on the array where the result (filtered data) is saved to. This is considered as an output parameter.
* A number ‘uint32\_t averagedDataDelatT’, that holds the time delta between one set of averaged data and the next set of averaged data in milliseconds. This is considered as an input parameter.

In the main task the function gets called, whenever new averaged sensor data is available. For more details of the program flow please see chapter REF **“Program flow of the flight controller”.**

## Literaturverzeichnis

[1] \ XCopter\code\SimpleFlightController\filterungHerrSteiper\ Duocopter\_PAP\_Report.pdf

[2] \XCopter\code\SimpleFlightController\filterungHerrSteiper\FreeIMU\_raw\_extendef\_6\_ethernet\_udp\_3\_test\ FreeIMU\_raw\_extendef\_6\_ethernet\_udp\_3\_test.ino