

## **Diploma/Master Thesis:**

# **Real-time adaptive outlier detection for multiple sensors in flight parameter estimator**

The connectivity of heterogeneous smart objects enables them to communicate with each other and with users of the Internet of things (IoT). A prominent role in the IoT will be played by small unmanned aerial vehicles (UAV). These UAV require a highly accurate and reliable onboard estimation of the flying parameters such as position, orientation and speed given the constraints on sensors inaccuracies and available processing power. Furthermore, robustness to temporary sensor failures during the flight is one other important challenge. This thesis aims to study robust, real-time outlier detection in multi-sensor fusion extended Kalman filtering. The estimator employs measurements from the MEMS based inertial measurement unit (IMU) as well as GPS and pressure sensors for inertial navigation systems in small UAV and lightweight manned glider planes.

Your role will involve the following tasks:

- Literature study on outlier detection and Kalman filter theory
- Study of flight parameter estimation based on Kalman filtering
- Design and development of offline-tuned outlier detection for various sensors
- Design and development of adaptive outlier detection
- Integration of outlier detection algorithms into the flight parameter estimator
- Evaluation of outlier detection algorithms based on recorded flight measurements

Requirements:

- Good knowledge in estimation and detection theory
- Programming skills in Matlab

Possible start

- From October 2019

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