

## **Multi-Sensor Fusion for robust Altitude estimation of a low-Cost UAV in challenging GNSS environments**

The objective of this paper is to determine the altitude of a flying microdrone using several embedded low-cost sensors: a GPS, a baro-altimeter, an ultra-sounds (US) and an Inertial Measurements Unit (IMU). The GPS is not available indoor and the accelerometer measurements drifts over time. Therefore, we propose a robust fusion method to correct the estimated altitude using other complementary sensors. The fusion approach is started by a pre-processing step of all measurements to mitigate outliers in GPS, barometer and US data, and pre-filter the INS output. Each couple of sensors are integrated using a complementary Kalman Filter with analysis of reliability, then a robust fusion method is applied to combine these subsystems in a master estimator. We learn the design measurements weights adaptively from data using Fuzzy logic instead of using fixed constants as usually set in the literature.