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ORIENTATION OF AIRCRAFT USING EXTENDED KALMAN FILTER

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ABSTRACT

This work describes the designing of AHR System with TGIC (Two Step Geometrical Intuitive Correction) algorithm using Kalman Filter to provide a proper orientation. A multi sensor IMU is required because a single type sensor cannot provide accurate attitude estimation. The acce1erometer is sensitive to vibrations. A gyroscope is susceptible to low-frequency drift and wideband measurement noise, resulting in accumulation of bias, and the magnetometer readings get distorted due to the ferrous materials (magnetic material). Therefore, it is passed through a correction algorithm to reduce these distortions. TGIC with Kalman Filter helps in reducing these distortions. AHRS application includes Drones (UAVs), navigation tracking etc. Kalman filter is an estimation algorithm. It's a method of calculating the future state of a system based on the prior state. We are using a quaternion based Extended Kalman filter, where the quaternion with the gyro bias represents the state vector. Including the bias that is in the state vector gives ability to track the bias and model the drift in Kalman filter to reduce error.

KEYWORDS: *Attitude, Extended Kalman Filter, TGIC, Navigation Tracking*

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