# Fault Detection in Quadrotor MAV

Chan Shi Jing, Dwi Pebrianti, Goh Ming Qian

Faculty of Electrical & Electronics Engineering,
University Malaysia Pahang Campus Pekan,
26600 Pekan, Pahang, Malaysia
chanshijing@gmail.com, dwipebrianti@ump.edu.my,
gohmingqian@gmail.com

Luhur Bayuaji

Faculty of Computer Science and Software Engineering,
University Malaysia Pahang, Gambang Campus,
26300 Gambang, Pahang, Malaysia
luhurbayuaji@ump.edu.my

*Abstract*—**Unmanned Aerial Vehicle (UAV) is being used in a wide range of human life. Researcher preferred quadrotor as it can be brought into the first generation of simulator map of an aircraft. It can be developed into larger manned flight. In this regard, extensive research in Fault detection (FD) is necessary, so that it can enhance its safety features. FD is designed to respond and to exclude the wrong information and to quickly perceive and shoulder important regulation. The proposed method for the fault detection in this study uses hybrid technique which combines the Kalman filter and Artificial Neural Network (ANN). Two classes of approaches are analyzed: the system identification approach using ANN and the observer-based approach using Kalman filter. A representative Artificial Neural Network (ANN) model has been designed and used to simulate the system behaviors under various failure conditions. The Kalman filter recognizes data from sensors and indicates the fault of the system in sensor reading. Error prediction is based on the fault magnitude and the time occurrence of fault. The information will then be fed to ANN, which consists of a bank of parameter estimation that generates failure state. The result of the residual signal before filtered and after filtered showed that Kalman-ANN is able to identify multi fault and immediately correct the system to the normal state. The accuracy of the detection is 85 percent. The proposed method is able to detect fault in a short time with delay of 9.23E-05 seconds.**

*Keywords— Kalman filter, Artificial Neural Network, Fault detection, Fault Isolation, Kalman-ANN, Nonlinear Autoregressive Network with Exogenous Inputs*