

## Health Monitoring and Failure Detection of Electronic and Structural Components in Small Unmanned Aerial Vehicles

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**Abstract :** Fully autonomous small Unmanned Aerial Vehicles (UAVs) are increasingly being used in many commercial applications. Although a lot of research has been done to develop safe, reliable and durable UAVs, accidents due to electronic and structural failures are not uncommon and pose a huge safety risk to the UAV operators and the public. Hence there is a strong need for an automated health monitoring system for UAVs with a view to minimizing mission failures thereby increasing safety. This paper describes our approach to monitoring the electronic and structural components in a small UAV without the need for additional sensors to do the monitoring. Our system monitors data from four sources; sensors, navigation algorithms, control inputs from the operator and flight controller outputs. It then does statistical analysis on the data and applies a rule based engine to detect failures. This information can then be fed back into the UAV and a decision to continue or abort the mission can be taken automatically by the UAV and independent of the operator. Our system has been verified using data obtained from real flights over the past year from UAVs of various sizes that have been designed and deployed by us for various applications.

**Keywords :** fault detection, health monitoring, unmanned aerial vehicles, vibration analysis

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