Testing and Evaluation of Robust Fault Detection and Identification for a Fault-Tolerant AHS

Jason L. Speyer
PATH

• **Objective:** Detect and identify actuator and sensor failures on Buick LeSabre.

• **Approach:** Residual generation: Robust fault detection filter and parity equation. Residual processing: Multiple-hypothesis Shirayev sequential probability test (SPT)

Detection of Brake Actuator Fault

![Detection of Brake Actuator Fault](image)

• **Accomplishments**

  • **Residual generation**
    – Fault detection filters were designed and evaluated in real-time on a Buick LeSabre at Crow’s Landing.
      • Fault detection filters work well over a wide range of car speed (18 m/s and above).
      – Nonlinear parity equation requires an improved engine model.

  • **Residual processing**
    – Multiple-hypothesis Shirayev SPT was designed and evaluated using experimental data.
      • The fault can be announced on the basis of the probabilities of the faults.
      • Faster detection with low probability of false alarms.