Abstract

Early failure detection and identification of incipient faults is desirable for online condition assessment, product quality, assurance, and improved operational efficiency of internal combustion engine.

The basis of any reliable diagnostic method is to understand the physical behavior of the machine in healthy case and under faults condition. Soft Computing techniques are increasingly used for condition monitoring and fault diagnosis of the machine.

In this thesis, a fuzzy system is employed to estimate engine parameters, based on monitoring the throttle position and engine speed, to give indication of the faults.

Recursive Least Square Method (RLSM) algorithm is used to perform the engine faults detection and their values. The fuzzy estimator that has been trained for different engine operating conditions, was used to classify the incoming data. The inputs of the fuzzy system are the throttle position and engine speed, and its outputs are the engine parameters values. The fuzzy estimator training data was obtained from the Simulink model with different parameters values to simulate the engine faults at various degree of severity.

The final results of the estimator have been represented by a GUI to look like a monitoring unit that gives early warning of the engine failure.