

## Design and Development of Prognostics for In-Vehicle Health Management



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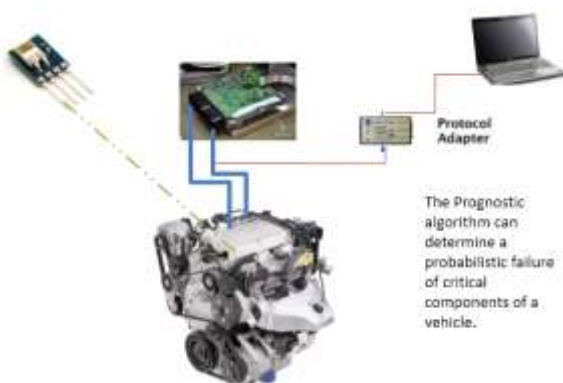
**Keywords:** Prognostics, Diagnostics, Sensors, Life Prediction

**Abstract:**

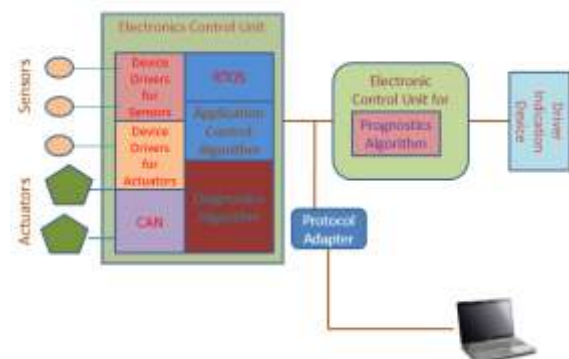
In most of the automotive systems, failure detection happened after error generation and further check engine lamp will be activated. Since this failure information cannot be accessed without a scan tool, commercial vehicle customers are not confident on this system because these vehicles need company operator to diagnose, who took hours to arrive at vehicle and thus their profits get surfaced. Also these CRDe systems are not repairable for roadside mechanic. The theme of project is to notify advanced failure notification to driver or owner if system behaves abnormal, accordingly he can take further action of repair/replacement much prior to failure.

The growing dependence on electronics and complex vehicle architecture demands for dynamically-controlled safety systems, who should identify the component before failure. Development of prognostic logic for the identified vehicular subsystem was done. In simulation, an engine related parameters like Fuel quantity, level, its quality, Temperature and pressure of manifold is checked as these are numerical values. Any degradation of their output was identified by comparison of the same with their design allowable data values. Further, as per degradation the remaining life can be mapped. For the same, modeling of developed prognostic logic was done and integrated with model of vehicular subsystem. Validation of developed prognostic logic by generating suitable test cases was done.

Algorithm of individual systems like fuel level, quality & temperature is simulated in MATLAB with their diagnostic & prognostics algorithm. Their output is verified with the expected output. The system has been developed by integration of these into one system. The system has prognostic as well as diagnostic algorithms with override mechanism for selection. The outcome is, if prognostic is provided then the need of diagnostic will automatically get eliminated. Further, there is vast scope of integration of more no of sensors & making system more accurate.



**Interface of electronic controller with engine**



**Block diagram of separate ECU for prognostics**