FAULT DETECTION AND DIAGNOSIS FOR INTERNAL COMBUSTION ENGINES

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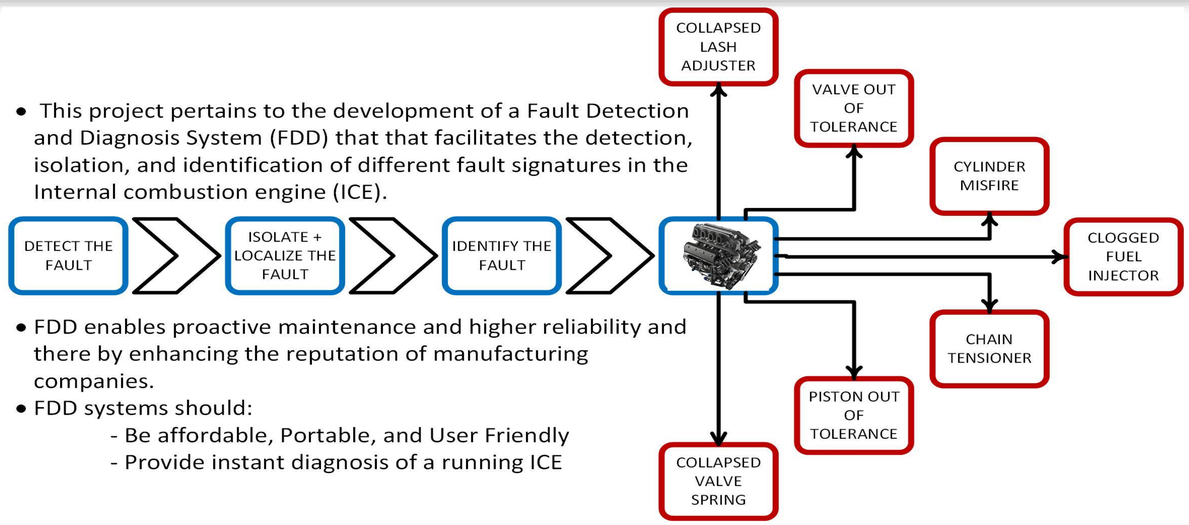
EECOMOBILITY (ORF) & HEVPD&D CREATE

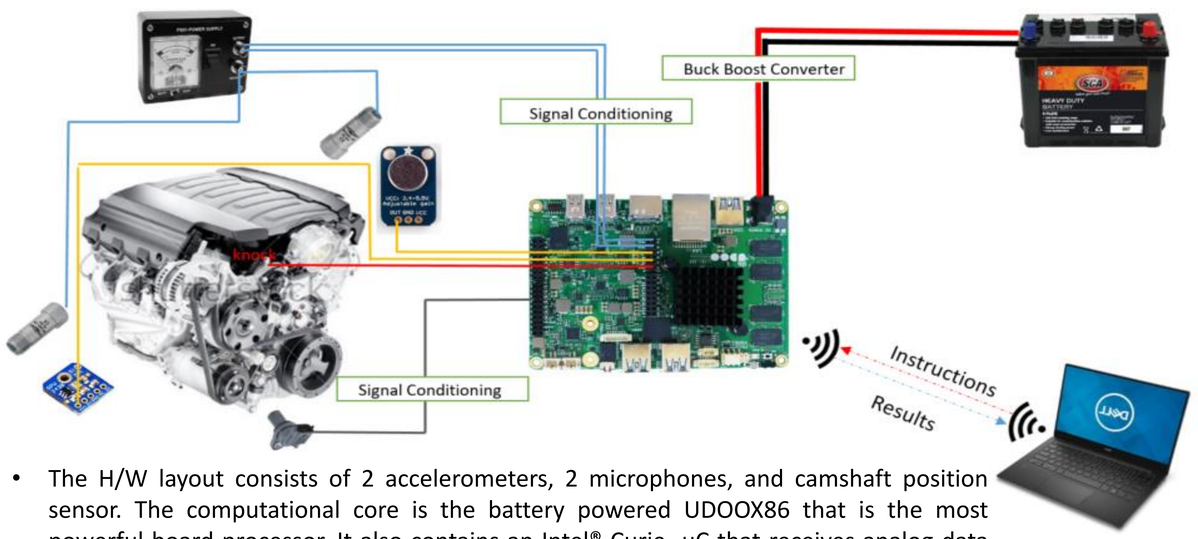
INTRODUCTION

- This project pertains to the development of a Fault Detection and Diagnosis System (FDD) that that facilitates the detection, isolation, and identification of different fault signatures in the Internal combustion engine (ICE).



- FDD enables proactive maintenance and higher reliability and there by enhancing the reputation of manufacturing companies.
- FDD systems should:
  - Be affordable, Portable, and User Friendly
  - Provide instant diagnosis of a running ICE

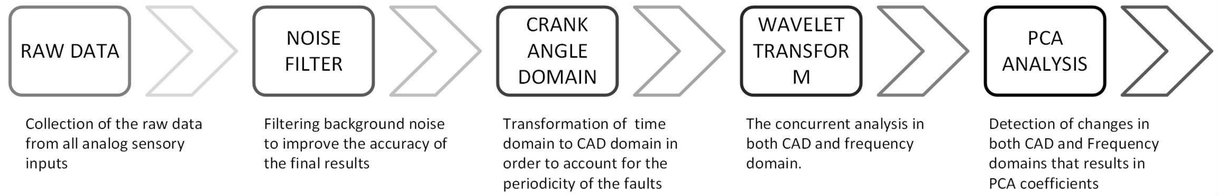
THE SENSORY SYSTEM (Hardware)



- The H/W layout consists of 2 accelerometers, 2 microphones, and camshaft position sensor. The computational core is the battery powered UDOOX86 that is the most powerful board processor. It also contains an Intel® Curie uC that receives analog data and a powerful 2.56 GHz Quad-Core uP that carries out the required signal processing

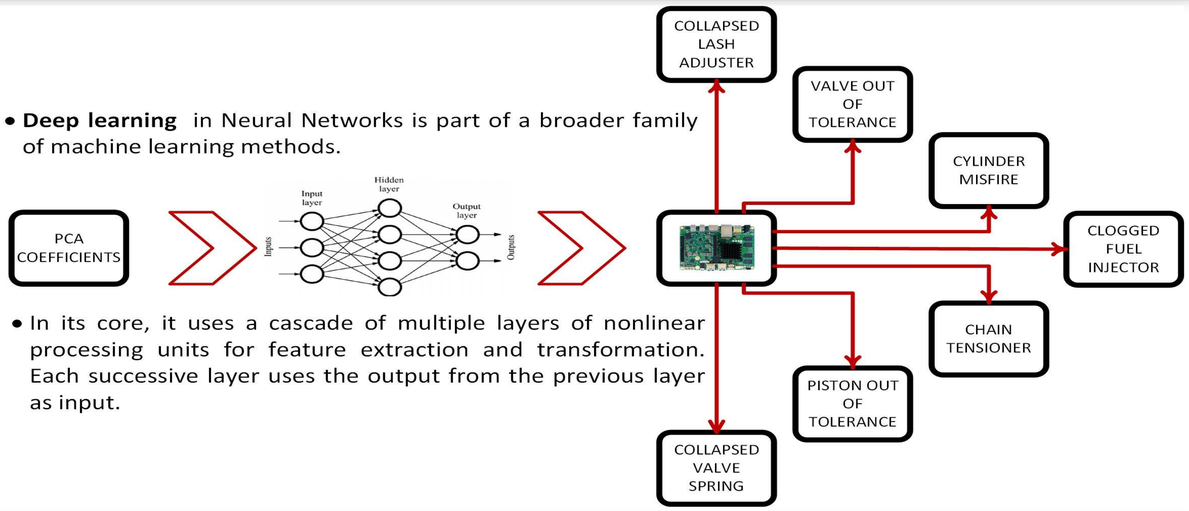
CAD DOMAIN IEMSPCA (Software)

The system uses the Industrial Extended Multi-Scale Principle Components Analysis (IEMSPCA) Algorithm that analyses signals in both time and frequency domains to detect any deviations from baseline measurements. If there is a deviation, The software generates faults signatures used to diagnose the fault type.



DEEP LEARNING AI (Software)

- **Deep learning** in Neural Networks is part of a broader family of machine learning methods.



- In its core, it uses a cascade of multiple layers of nonlinear processing units for feature extraction and transformation. Each successive layer uses the output from the previous layer as input.

RESULTS

- Small, light, and modular Sensory System
- Cloud based API to maximize the learning throughput from many cars
- Expandability over both Hybrid and Electric car models

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