

Engine Control Unit Integration and Tuning

Status: Available

Group Members:

Sponsor(s): SF-1

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Project Description

Background

The powerplant in a Formula SAE vehicle has strict regulations in terms of intake design, limiting airflow. As such, a prepackaged engine is not optimized for Formula SAE competition. This is most commonly addressed through management of fuel and ignition timing. This is a common practice akin to the development of an automotive engine.

Project Details

This capstone will focus on integration of an aftermarket Engine Control Unit (ECU) into the existing electrical system of a 600cc Honda engine. This will include identification of required sensors and operating parameters of those already present in the electrical system. With the ECU operational, the engine will be tuned for optimum performance in a Formula SAE competition setting. This project will involve design of a fuel system suited to the output and accessories of the engine, from onboard storage to delivery.

In short, the project will have 2 sections:

Intake Manifold design, including:

- Explore, design and manufacture an intake manifold to optimize the intake air flow within constraints
- Selecting fuel injector/rail location to integrate into intake manifold
- Design and manufacture a throttle body

Engine Control Unit(ECU) tuning, including:

- Electrical wiring for all the onboard electrical components
- Crank/Cam position sensor modification to adapt new control unit
- Diagnose and troubleshooting for starting up engine with new ECU
- Dynamometer testing

Fuel Delivery System design, including:


- Tank design and fabrication
- Fuel line routing

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