Senior Design Project Description

Company Name	*Internal Motorsports Dept.*	Date Submitted	*April 5, 2018*
Project Title	*Engine Simulator and ECU tester* **(UNCC_ECU)**	Planned Semester	*Fall 2018*

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical (motorsports)	2	Electrical	1
Computer		Systems	
Other ( )			

The student mix could be 4 motorsports/0 EE/0 CPE should the motorsports students have sufficient electrical aptitudes.

Project Overview:

There is a lack of affordable, easy to use hardware for ECU testing. The deliverable for this project is an ECU testing tool using low cost hardware that emulates the outputs of an engine and can read the corresponding ecu outputs. This tool is effectively a Hardware in the loop engine simulator.

Local motorsports teams currently do not have the ability to check their ecu hardware in house due to cost and complexity of doing so. This will provide the capability of testing ecu strategies and will be useful for the UNCC formula SAE team for testing reverse engineered stock engine control units and other automotive and non-automotive control systems.

Initial Project Requirements:

The students will develop the embedded hardware and software for interfacing with engine control units. The students will also develop a front end software package to control the real time engine simulator.

Phase 1 – Design/build embedded hardware and be able to generate steady state engine signals
Phase 2 - monitor basic ecu outputs with above hardware with graphical PC or raspberry pi GUI.
Phase 3 – add pass fail and logging capability
Phase 4 - add data playback of race data and logging capability.

Recommended architecture:

Cypress PSOC is recommended for the embedded control system, along with a labview or raspberry pi based HMI. Ethernet is suggested as the communication link between the real time hardware and user interface software.

Expected Deliverables/Results:

Students will deliver a useful ecu testing tool. Goals are to be able to provide this tool design to local NASCAR teams and racing electronics suppliers such as, McLaren Electronics, Motec, Brown and Mille. Also, this tool will be a useful apparatus to support UNCC motorsports research. This project will provide hands on experience into engine control system hardware and software.

Disposition of Deliverables at the End of the Project:

Software and hardware is to support UNCC Formula racing activities.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

Basic understanding of C/C++ programming, embedded systems, Labview or Linux operating systems. System architecture will be guided but can be tailored to student's aptitudes and abilities.