

Michigan State University
College of Engineering; Dept. of Electrical and Computer Eng.
ECE 480 Capstone Design Course Project Charter

Sponsoring Company/ Organization: Delphi

Project Title: Development of a Low-Cost Engine Watchdog Controller

Contact Information:

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Background Information:

Business Case:

Delphi performs advanced powertrain testing on expensive, one of a kind engine hardware which needs to be protected. To do so, a watchdog control system has been put in place to shut down testing in a controlled way to preserve the hardware if any safety concerns are detected. While this system has proven valuable, the overall system cost is prohibitively high, limiting the number of applications. Development of a low cost replacement will reduce the cost of future vehicle builds while maintaining the ability to protect the valuable development engine hardware.

Project Intellectual Property Considerations:

An SAE paper (2014-01-1172) describing the watchdog system and software has already been published; therefore, there are no IP concerns. The students will be free to present all of their work publicly.

Opportunity Statement:

The student team will be tasked with development of a complete controller within the project budget. Success in this task will make it possible for Delphi to build/acquire several more of these controllers in the future and install them on various test platforms. This not only provides the opportunity to reduce cost of new builds but also reduce potential for hardware damage by rolling the technology out to more test platforms than would otherwise have been possible.

Deliverables:

At the end of the semester, the design team will deliver a working controller complete with an enclosure and ready to be mounted in a vehicle. The controller should be flashed with the control algorithms provided by Delphi. Any hardware I/O interface software needed to adapt the Delphi algorithms to the new controller will also need to be provided. Finally, the team will provide schematics and the parts list needed to build additional identical devices.

Goals:

The final goal of the project will be to perform a demonstration of the new controller where it mimics the function of the current watchdog controller in use at Delphi.

Scope:

- In scope:
 - Evaluation of various potential solutions
 - Design/build of module (circuit board etc.) and packaging
 - Adaption of new design to existing wiring harness
 - Software changes required to interface with the new design
 - Replicate functionality of existing watchdog controller
 - Functional Verification
- Out of scope
 - New algorithms/software/functions
 - Definition of verification requirements

Constraints:

- Must support Simulink development environment
- A re-flash/debug environment must be available
- 9-16 Volt operating range
- 5 kB of non-volatile memory
- 2 CAN channels
- ~16 inputs
- ~12 outputs
- Interface to existing I/O connector (may use adapter harness)

Project Team: (Completed once semester begins)

Name	Responsibility

Faculty Advisor: (Assigned by ECE Dept . based on project requirements)
