Interface Control Document

ECE 492 - Spring 2015

Abstract

This document dictates the interfaces between each aspect of the LFEV design project for the 2015 spring semester.

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Summary

There are four separate subprojects involved in the completion of the LFEV project. Each of these projects will be worked on independently and simultaneously, and therefore have a variety of standardized interfaces that must be created to ensure they will work together when complete.

VSCADA - Dynamometer

The VSCADA system is responsible for recording all data from the dynamometer sensors. This interface largely details the protocols used by the VSCADA software to access the dynamometer sensors hardware.

VSCADA - GLV

The GLV system maintains all hardware connections for the VSCADA software, and the interface dictates where all hardware connections are made to the VSCADA processor pins. The VSCADA system also communicates directly with the GLV system to control several GLV hardware functions.

VSCADA - TSV

The VSCADA - TSV interface is primarily a data transfer system. This will be communicated through galvanically isolated ethernet with a data protocol that has yet to be defined.

Dynamometer - GLV

The GLV system provides power for the dynamometer system, and interfaces the vehicle wide safety loop with the dynamometer safety loop. The specifications for these connections are defined by the interface.

Dynamometer - TSV

The TSV load controller provides power for the dynamometer motor controller. The specifications of this connection, including the load characteristics of the motor controller, are defined by the interface.

TSV - GLV

The GLV and the tractive system voltage are interfaced only to activate and deactivate the voltage to the load controller.

VSCADA - Dynamometer

The VSCADA system must be able to receive sensor data from the dynamometer system to simulate a fully operational system. In order for this to happen, the following data transmission protocols must be implemented:

VSCADA - GLV

The VSCADA system must be able to receive sensor data from the GLV system to safetly monitor the state of the load controller, GLV power source and the safety curcuit. The VSCADA is also interface to the GLV system via relays to: control the safety loop, monitor the safety loop, and control the load to the motor.

VSCADA - TSV

The TSV system must be able to send sensor data about the packs to the VSCADA system. This includes cell temperature, voltage, current, and charge readings. Some of these readings will be used by VSCADA for safety protocols, while others are simply for driver use. Temperature and voltage are used to by the safety system to shut down the system if they reach dangerous levels while charge simply gives the amount of power remaining in the packs. This data will be conveyed to VSCADA through galvanically isolated ethernet with a protocol that has not be determined yet.

Dynamometer - GLV

The dynamometer system contains several sensors and other electronics that must run on power independent of the motor controller main power. The GLV system will provide this power. The GLV safety loop must also integrate with the dynamometer safety loop to allow the vehicle to shut down in case of an emergency.

Power Supply

The GLV system must provide power to the dynamometer system to operate its various sensors. The minimum requirement for this interface will consist of two wires providing 24 Volts and GLV ground, with a maximum constant current of a specific current. The peak current draw of the dynamometer system will be a specific current.

Vehicle Wide Safety Loop

The dynamometer system shall have an input that allows the GLV safety loop to deactivate the vehicle motor. This input will consist of a single wire with a voltage relative to the GLV ground. In the case that the voltage of the wire is reduced to a minimum threshold voltage above GLV ground, the dynamometer shutdown sequence will begin.

Dynamometer - TSV

The dynamometer motor controller runs on power supplied by the TSV load controller. Therefore, the TSV load controller must be designed to provide the amount of power used by the motor controller, as shown in dynamometer testing.

Motor Power

The TSV system will contain a load controller capable of delivering motor amperage consumption at TSV load controller voltage, with a peak current of motor peak current.

GLV - TSV

The only interface between the GLV system and the TSV packs is the safety loop, which controls the activation of the tractive system. The safety loop must be connected to each of the 4 packs (order does not matter) and must terminate with a short across the 1st and 4th pins of the safety loop.