PDR Presentation

Team Dyno(mite)

Acceptance Test Plan

- Sensors
  - 5 main metrics - Torque, speed, input voltage, output current, and system temperature
  - Will be tested by comparing results to manufacturers parameters
- Test Stand
  - Mostly physical design, including standards and safety measures
- Interfaces
  - Interfaces with every system
  - Testable assuming the respective system in complete
- Power Supply
  - Switchable sources with insulated connectors
- Safety
  - Safety loop fallback
  - Emergency stop button

ATP - Sensors

- Torque
  - Will be logged from the dynamometer
  - The basis for generating a torque curve
- Speed
  - Can be found in the motor encoder or controller frequency
  - Sources will be compared for redundancy
- Motor Current
  - Function of the motor controller for all three phases
- Controller Input Voltage
  - Function of the motor controller
  - Can be used to find the input current
- System Temperature
  - Measured at various points, including inside the controller

ATP - Test Stand

- Includes physical design considerations
  - checked by redundant inspection:
- Cable management
  - Based on the standards of GPR005
- MCS cooling system
  - Must operate, but not necessarily well
- Physical design safety
  - Shielded connector covers
  - cable insulation

ATP - Interfaces

- Assumes that the other half of the interface is complete
- VSCADA
  - Data regarding the sensor systems must be delivered accurately
  - Verified by comparing to the locally logged data
- GLV Power
  - Sensor systems
  - VSCADA interface system
- TSV Load Controller
  - Alternative power source
- Safety Loop
  - The GLV safety loop must be able to shut the motor down

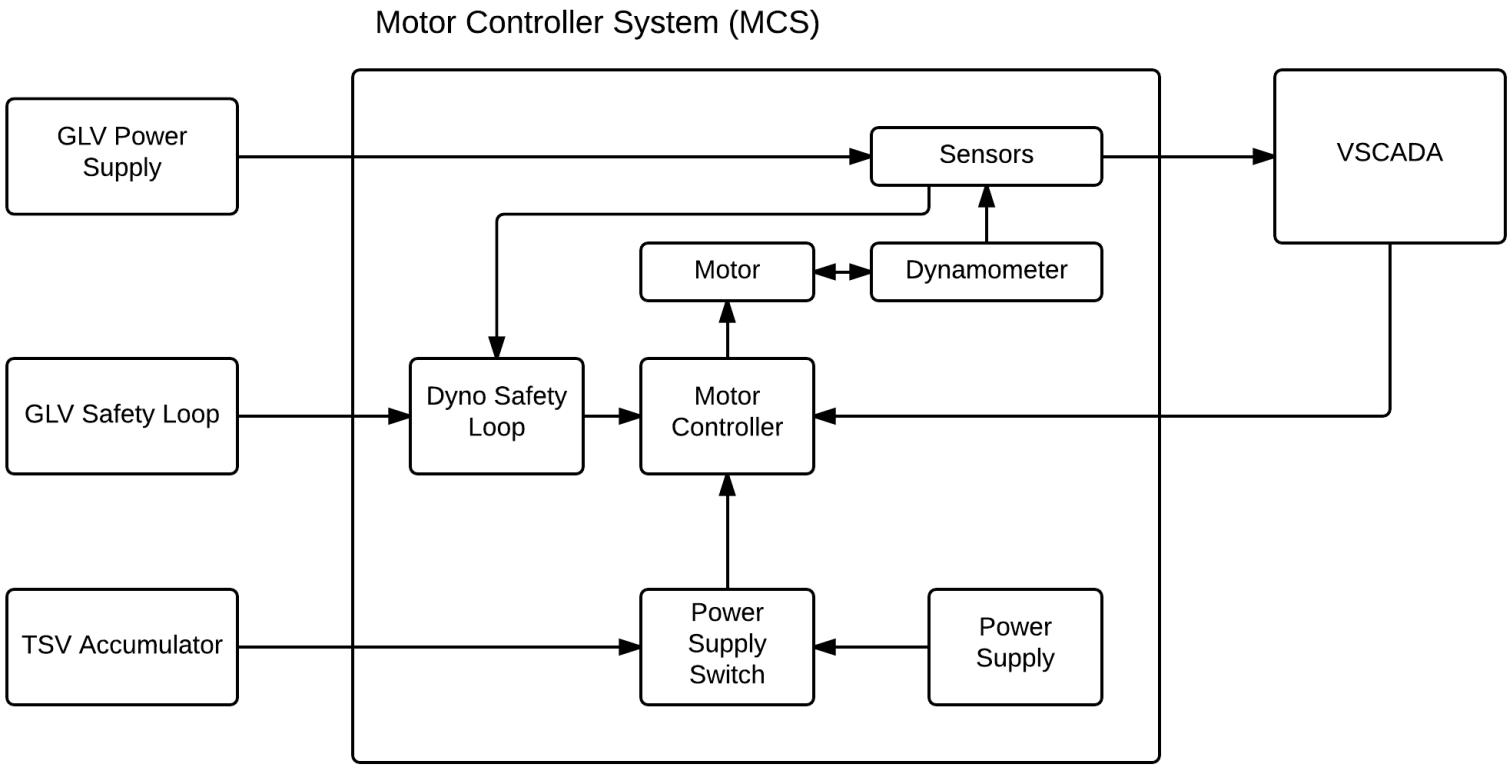
ATP - Power Supply

- The power supply must allow the motor to spin
  - Current draw figures will be collected
- Power supply switching
  - The power supply must be swappable without contacting uninsulated wiring

ATP - Safety

- Operational safety concerns should stop the motor
  - Ground Fault
  - Overtemperature
  - Overspin
  - Overtorque
- Emergency stop must be hardwired into the test stand
  - Disconnects the power supply from the motor controller

Subsystem Hierarchy



Requirements Matrix - Formula Hybrid Competition Rules

- List of all relevant rules and requirements that are set forth by the Formula Hybrid Competition
  - Motor Parameters
  - Motor Controllers
  - Sensors
  - Safety Concerns

Requirements Matrix - VSCADA

- Discusses the interactions between the Dyno system and the VSCADA team
  - Sensor integration
  - Motor Controller

Requirements Matrix - Motor, Controller, and Dynamometer Test Stand

- All requirements set forth in the Statement of Work in section R005 about the motor system
  - Equipment Necessary
  - Motor Parameters
  - Independent Safety Loop
  - Sensor Integration
  - Power Supply

Requirements Matrix - Safety Loop / TSV Load Controller

- Proper cables and cabling practices shall be used to ensure safety when the motor is operational and to power the system from the load controller

System State Analysis

- VSCADA will have primary state machine
- In general, the motor control system will have two main states
  - On
  - Off

System State Analysis - “On” State

- The system enters the “On” state when the driver turns the car on and the car is ready to drive
- Forward or reverse acceleration is possible in this state

System State Analysis - “Off” State

- Idle state
- Triggered by the driver turning the car off
- Can also be triggered by certain safety conditions
  - Overtemp
  - Overspin
  - Overtorque
  - Ground Fault
  - Emergency Stop Button

Cost Analysis

Cabling - assuming 0 gauge wire			
Item	Quantity	Price	Total
0 AWG (gage) wire - 50ft	1	$75.00	$75.00
Wire connector package	1	$50.00	$50.00
Temp sensor - DS18S20+CT-ND	5	$4.95	$24.75
Strain gage sensor - 1033-1004-ND	1	$60.00	$60.00
optical encoder - 102-1923-ND	1	$20.00	$20.00
A2D converter	5	$4.00	$20.00
		Total:	$249.75

Risk Assessment

- Biggest risk - team member(s) falling behind schedule.
- Late delivery of dynamometer manual
- Late delivery of remaining sensors purchased with dynamometer
  - Strain gauge, optical encoder, special data cable for feedback information regarding valve in motor to control oil flow rate.
- Late deliverables from TSV group regarding battery pack - could impact accuracy of models.
- Late deliverables from GLV regarding safety loop could cause delays in integrating our safety loop with theirs to make a comprehensive system.

Work Breakdown Schedule

- Weekly Milestones
- Student Tasks
- Measurable and specific

Week 2			
	Group	Finish PDR and Present	
	Steve	Hierarchical Subsystem breakdown and semester task breakdown	
	Alex	Complete ATP	
	John	Risk Assessment and Cost Analysis	
	Brendan	Requirement Analysis	
	Nate	System State Diagram	