

Team Formula EV

EXPO 2013

Battery Energy Storage and Management System

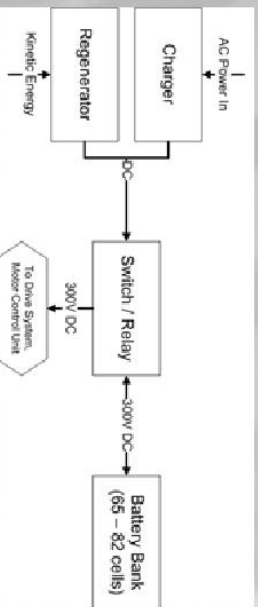
Problem Definition

This project is the first part of a multi-year effort to construct an all-electric powertrain for use in an electric vehicle to compete in a future SAE Formula Electric vehicle competition.

Team Formula EV is focused on designing a lightweight battery system, an appropriate battery management system, and an interface connecting the batteries with the regenerative braking system designed by Jaz Veach.

General Requirements

- Provide up to 85kW of power at 300V
- Supply power to operate the vehicle at a moderate velocity (35 km/h) for up to 40 minutes
- Recharge batteries during operation using energy harvested from regenerative brakes



Team Members: Blazen Ingram, Antonio Telleria, Chihan Wang

Advisor: Dr. Herb Hess

Mentor: Jaz Veach



Selected Batteries

Hayin Lithium Polymer Batteries

- # of Cells: 65 - 82 @3.7V
- Capacity: 6000mAh/cell
- Max continuous discharge: 390A
- Max burst discharge: 780 A
- Specific energy: 541.3 kJ/kg
- Mass: 9.2 - 11.6kg for 65 - 82 cells



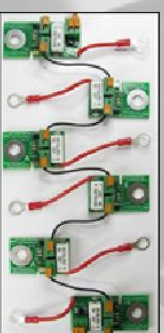
Monitoring System

Emus Battery Management System (BMS)

- Consists of cell modules linked to a central control unit
- Monitors cell voltage, temperature, and state of charge
- Can monitor up to 255 individual cells
- Supports cell balancing during charging
- Controllable via USB, RS-232, and CAN
- Can transmit monitoring data via Bluetooth to a smartphone



Control Unit



Cell Modules

Future Work

- Test the batteries and monitoring system
- Set up a flywheel test platform to model overall vehicle performance
- Specify and design the interface between the batteries and the regenerator
- Acquire a charger compliant with level 1, 2, and 3 charging standards for electric vehicles
- Construct the full battery system

Testing Platform

Flywheel test platform

- Powered by a Lynch PMDC motor and Kelly motor controller



Flywheel Platform with Lynch Motor

Mentor: Jaz Veach

