Micro Urban Electric Vehicle

Phase III

Final Proposal

12/04/12

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Project Summary:

This project is entering its third phase for the 2012 - 2013 school year. It will be focusing on implementing a regenerative braking subsystem to increase the vehicle's range and energy efficiency. Most of the research will be on regenerative braking as well as the power electronics needed to capture energy efficiently. The braking system will be constructed on a test bench after extensive simulations have been performed. If time permits, the ultimate goal will be to install this system on the Micro Urban Electric Vehicle.

Project Description:

- PSIM will be used to design and simulate the power electronics.
- Power electronics will be built based on PSIM designs and connected to a voltage source to verify proper operation.
- Use an additional DC motor to drive the go-cart motor and use power electronics to recover the kinetic energy during braking simulations.
- Use a controlled voltage on the additional motor to simulate various braking profiles applied to the go-cart motor.
- Model regenerative braking subsystem in Simulink.
- Perform multiple simulations to verify the design.
- Investigate the possibility of using a variable speed drive to recover energy at lower speeds.
- Integrate completed design with the Miniature Urban Electric Vehicle (MUEV).

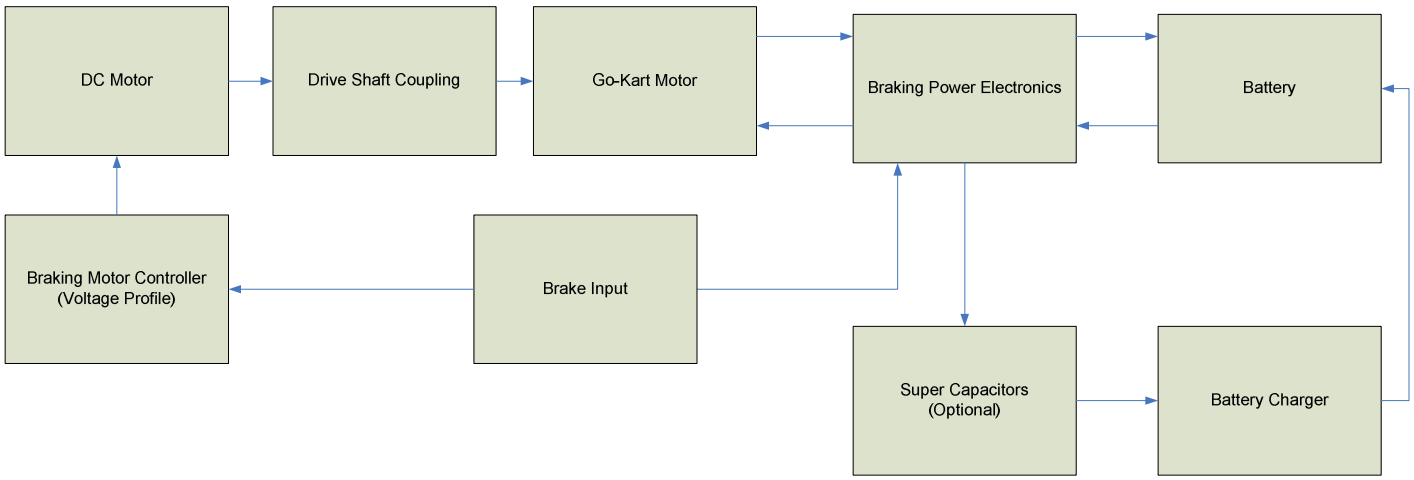

Figure 1: Complete System Block Diagram

Functional Requirements:

- Brake pedal shall apply regenerative braking up to approximately 75% displacement.
- Brake pedal shall apply hydraulic and regenerative braking above 75% pedal displacement.
- Power electronics shall optimize the recovery of the available kinetic energy.
- Batteries and possibly super capacitors shall store all energy recovered by the power electronics.

Equipment List:

Vehicle Platform

- Make: Vector Go Kart
- Model #: 4170
- Brakes: 7.5" hydraulic disc with parking brake
- Tires (Front): 16"x6"x8"
- Tires (Rear): 16"x7"x8"
- Dimensions: 72"L x 46"W x 49"H
- Wheel Base : 47.5"
- Seat to pedals: 33" to 37"
- Curb weight: 310lbs
- Max. Rider weight: 300lbs

Batteries (3)

- Product ID: Interstate SLA1161
- Type: Sealed lead acid
- Voltage: 12V
- Capacity: 44 Ah

Controller

- Type: Alltrax DCX-600

Braking Simulation Motor

- Type: Yet to be determined.

Voltage Profile Controller

- Yet to be determined.

Schedule:

Date		Nate Golick	Kevin Jaris
Week 1	1/29/2013	Aquire additional motor	Simulate power electronics
Week 2	2/5/2013	Design pedal displacement system	Contruct power electronics
Week 3	2/12/2013	Create Simulink model of motor	Create voltage profile
Week 4	2/19/2013	Test power electronics with additional motor	
Week 5	2/26/2013	Test power electronics with additional motor	
Week 6	3/5/2013	Remove go kart motor from MUEV	Create Simulink model of regenerative braking
Week 7	3/12/2013	Mount both motors onto test platform	
Week 8	3/26/2013	Test regenerative braking system	
Week 9	4/2/2013	Test regenerative braking system	
Week 10	4/9/2013	Test regenerative braking system	
Week 11	4/16/2013	Mount regenerative braking system to MUEV	
Week 12	4/23/2013	Test regenerative braking system on MUEV	
Week 13	4/30/2013	Test regenerative braking system on MUEV	
Week 14	5/7/2013	Finalize report and presentation	
Week 15	5/14/2013	Presentation	