E-Moto Project

Zach Levenberg

August 11, 2016

Abstract

This paper describes the Behavioral and Performance specifications for the electric motorcycle.

Contents

1 Behavioral Specifications

1.1 Features

1. Keyless Entry
2. LCD touch Screen
3. Analog Turbo Guage (Power in kW)
4. Digital Speedometer
5. Analog Regen
6. Bluetooth Link
7. LED lights
8. Turn Signals
9. Novelty Horn
10. Dual 5v usb 2.0 & c chargers
11. Ram Mount Phone Holder
12. Rack System + Dog Holder
13. Motion Sensor and Alarm system
14. Hand Warmers
15. Seat Warmers - maybe
16. Electronic Fork Lock
17. Electronic Seat Lock

1.2 Behavior

1.2.1 Sleep Mode

1. Sleep mode shall consume no more than 20mA
2. Bike shall transition from sleep when the ignition button is pressed or a BLE signal is received.
3. Bike shall wake from sleep and transition into Panic Mode if motion-sensor is triggered.

1.2.2 Locked Mode

1. The keyless entry system shall be accessible by password on the resistive touch screen or the blue-tooth app.
2. The password shall be user configurable via the app or touch screen.
3. The touch screen shall feature a wake up screen and then prompt the user for a password.
4. More than 5 incorrect PW attemps will disable BLE connectivity until PW is entered correctly and it is reactivated from within the system. More than 10 PW attemps and the system will default to a 20 character default PW.

1.2.3 Safe Mode

1. Upon entry the user can access battery health, trip data, BLE connectivity, and user settings.
2. Ignition hold will place the bike into Running Mode

1.2.4 Running Mode

1. The bike shall run according to user input including throttle, brake, and any command via touch screen or ignition switch.
2. The bike shall not run if the kickstand is down, and an alert will displauy on screen.
3. While running, ingnition switch presses shall scroll though the LCD menu screen.
4. Safe mode may only be re-entered while stopped by pressing and holding the ignition button.

2 Performance

2.1 Electronics

2.1.1 High Voltage Battery

1. The battery shall be a 90V system.
2. The battery shall be a 100Ahr system.
3. The battery shall be comprised of 3.6V 2000mAhr NMC 18650 cells
4. The battery shall be an array of 50 cells in parallel and 25 in series.
5. The battery shall be capable of discharging 600 Amps for a 1 minute burst.

2.1.2 DCDC Converter

1. DCDC converter shall provide at least 10 Amps at 13.7 Volts
2. DCDC converter shall be on a switched circuit controlled by the MCU
3. DCDC converter shall be switched on only when 12V battery falls below 12v for more than 1 minute.

2.1.3 12V Battery

1. The system shall be powered by a 12V Lead Acid battery.
2. The battery shall have a nominal voltage of 13.7 Volts.
3. The battery shall be at least 10Ahrs.
4. The battery shall power all electronics excluding the Motor and Motor Controller
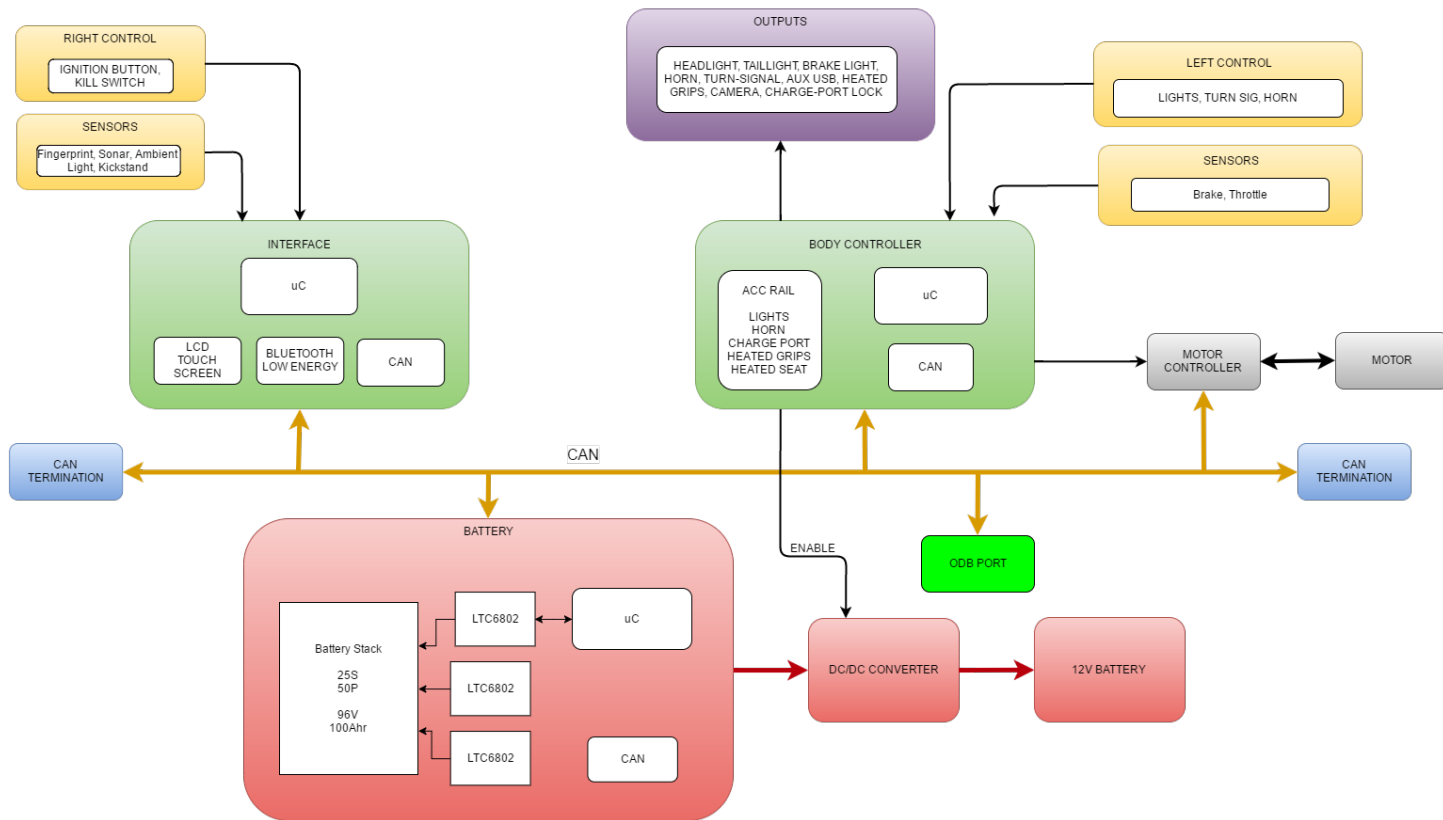
2.1.4 Motor

1. Motor shall be capable of 50kW bursts
2. Motor shall be capable of 20kW continuous (May want to increase this)
3. Motor shall be 3phase Brushless DC

2.1.5 Motor Controller

1. The Controller shall be a True Sine Wave controller
2. Must be capable of delivering 600 Amps at 90V
3. Must feature regererative braking

3 System Architecture

E-Moto System Architecture

t

3.1 Some other shit

4 SomeShit

4.1 Some other shit

4.2 Some other shit

5 SomeShit

5.1 Some other shit

5.2 Some other shit

6 SomeShit

6.1 Some other shit

6.2 Some other shit