ELECTRIC CAR ACCELERATION SUB-SYSTEM

ECE 303 – 061: ECE LABORATORY – FALL 2018

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OBJECTIVE

- Test-bed for the pedal-to-wheel system of an electric car

- Component calibration and analysis

- Measurement equipment procedures and automation

- Integration of several sub-systems

MAIN FUNCTIONALITY

- Use of (2) Arduino Mega microcontroller boards
  - main controller
  - data acquisition system
- Load cell and signal amplifier to emulate acceleration pedal
- Main controller to read in data and output PWM signal to wheel
- H-bridge to drive wheel motor and optical counter to measure RPM
- Serial communication between main controller and DAQ for sharing data
- Storing load cell calibration factor and maximum RPM in Arduino EEPROM

MAIN FUNCTIONALITY (CONTINUED)

- Data acquisition system to read RPM and send to GUI for display

- Maintain various sensors for maintaining normal operation of the system

- Initiate emergency shutdown protocols to turn off motor using a relay

- Send all sensor data to GUI to control visual indicators

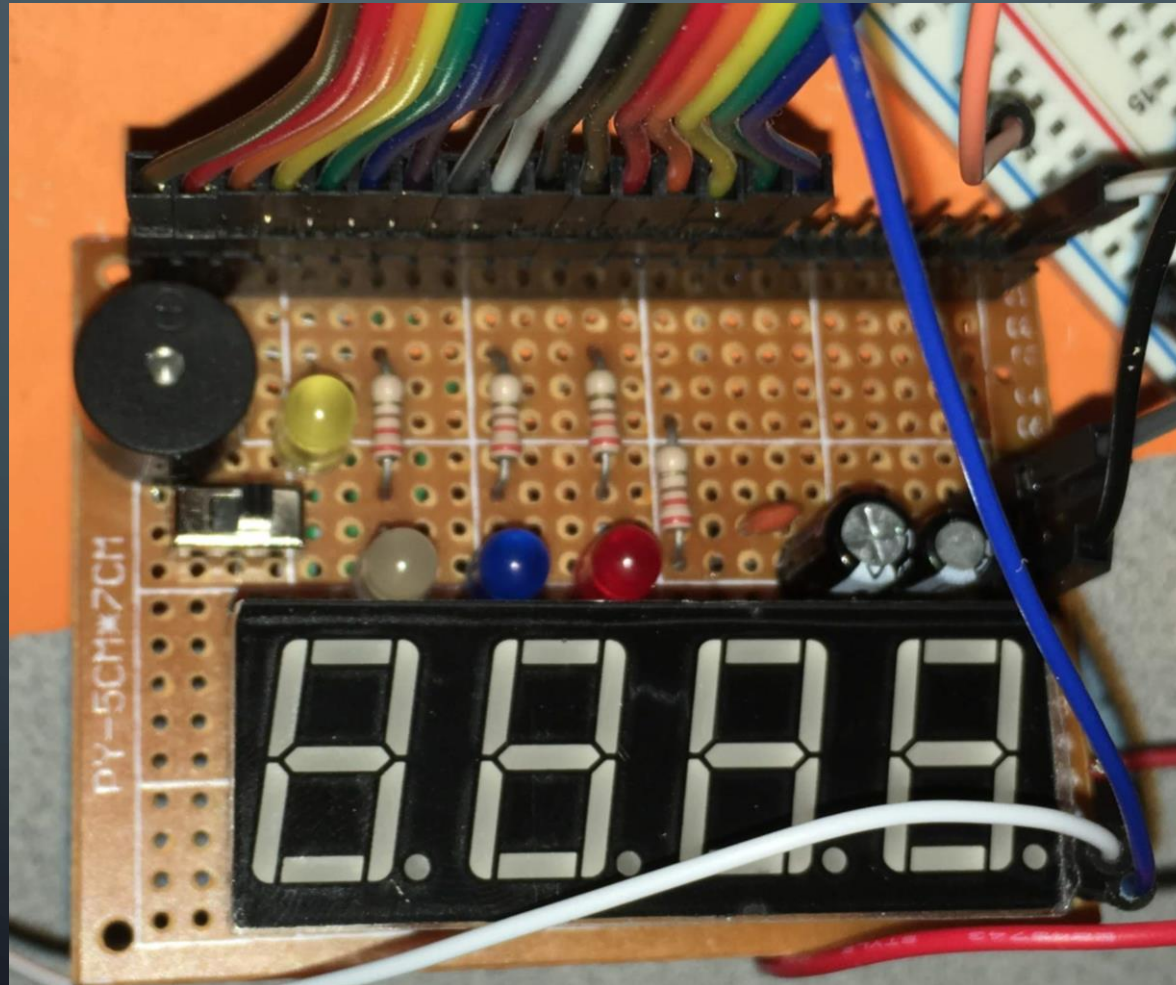- Transfer start-stop instructions from GUI to main controller

USER INTERFACE

- Design GUI using MATLAB App Designer

- Maintain serial communication with data acquisition system

- Dynamic display of motor RPM, battery percentage, and distance travelled

- System start-stop and additional functionality
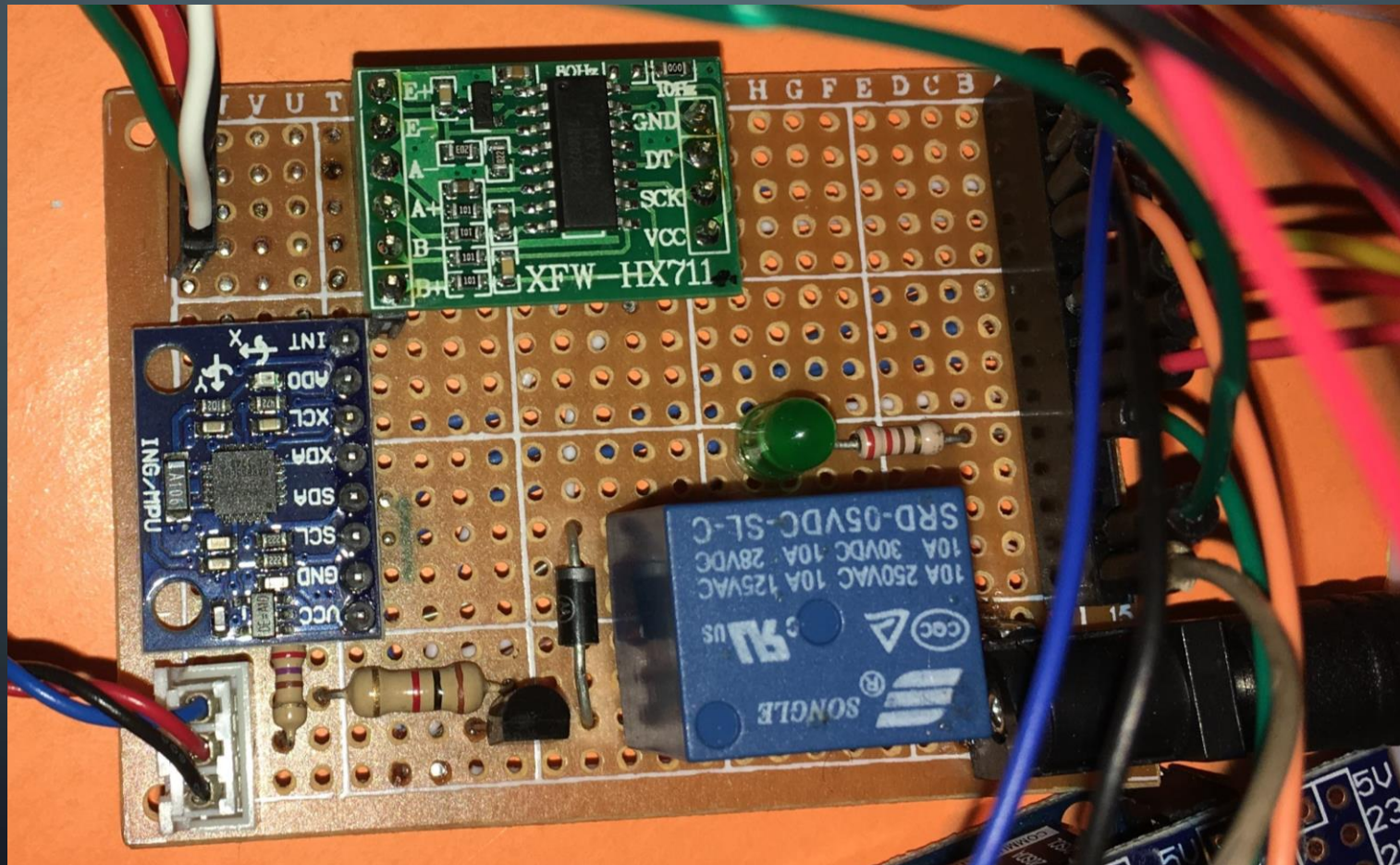
ADDITIONAL COMPONENTS

- 4-digit 7-segment display for dynamic display of motor RPM

- Secondary data display integrated with data acquisition system

- GY-521 accelerometer for detecting excessive vibration and tilt

- Additional emergency shutdown system integrated with main controller

CUSTOM DAQ CIRCUIT BOARD

CUSTOM MAIN CONTROLLER CIRCUIT BOARD

DEMO

- Part 1: https://youtu.be/XoUiI-7gRtg

- Part 2: https://youtu.be/6TS6ROIBclw