Force and Angle Sensor Design for Bipedal Robot Foot

Present by Harsha Karunanayaka

Project Description

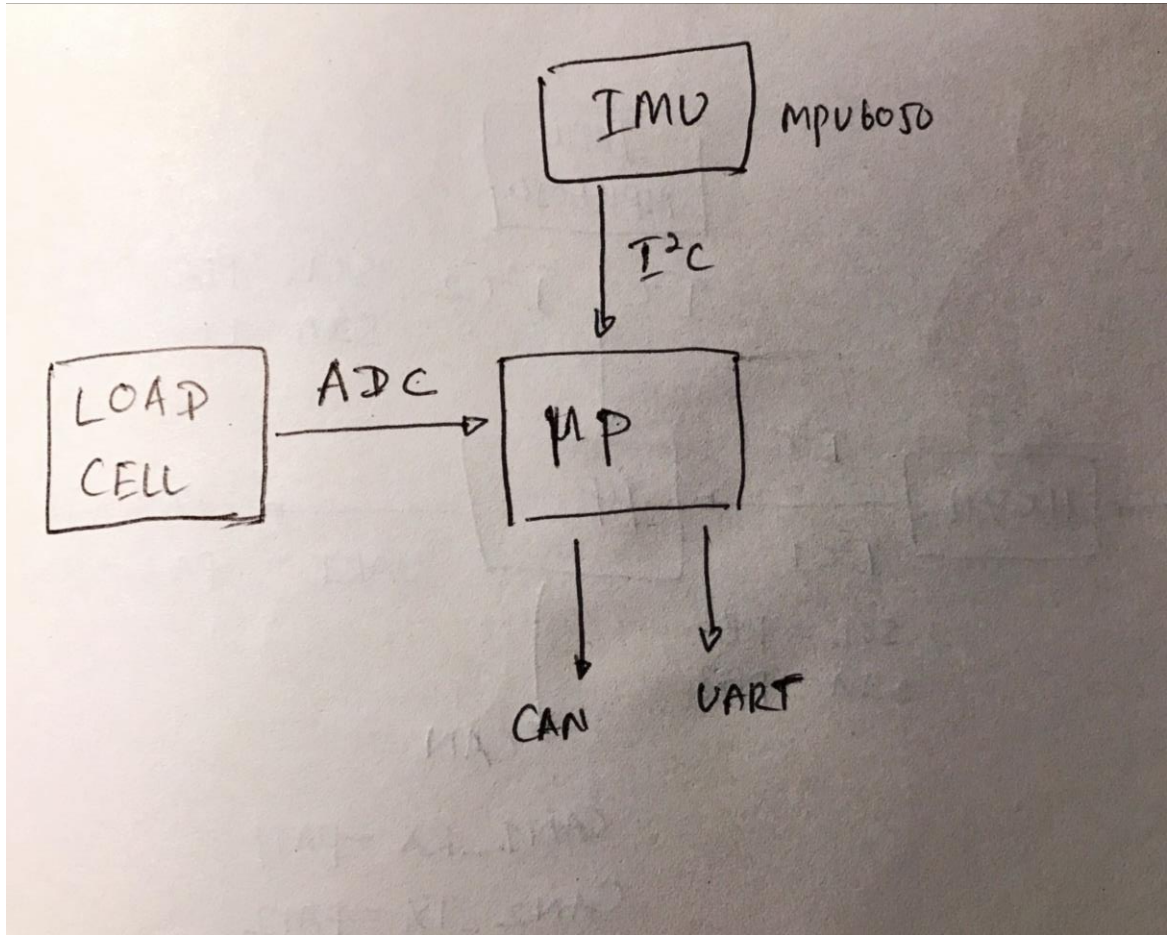
Current Issues in Force Sensing

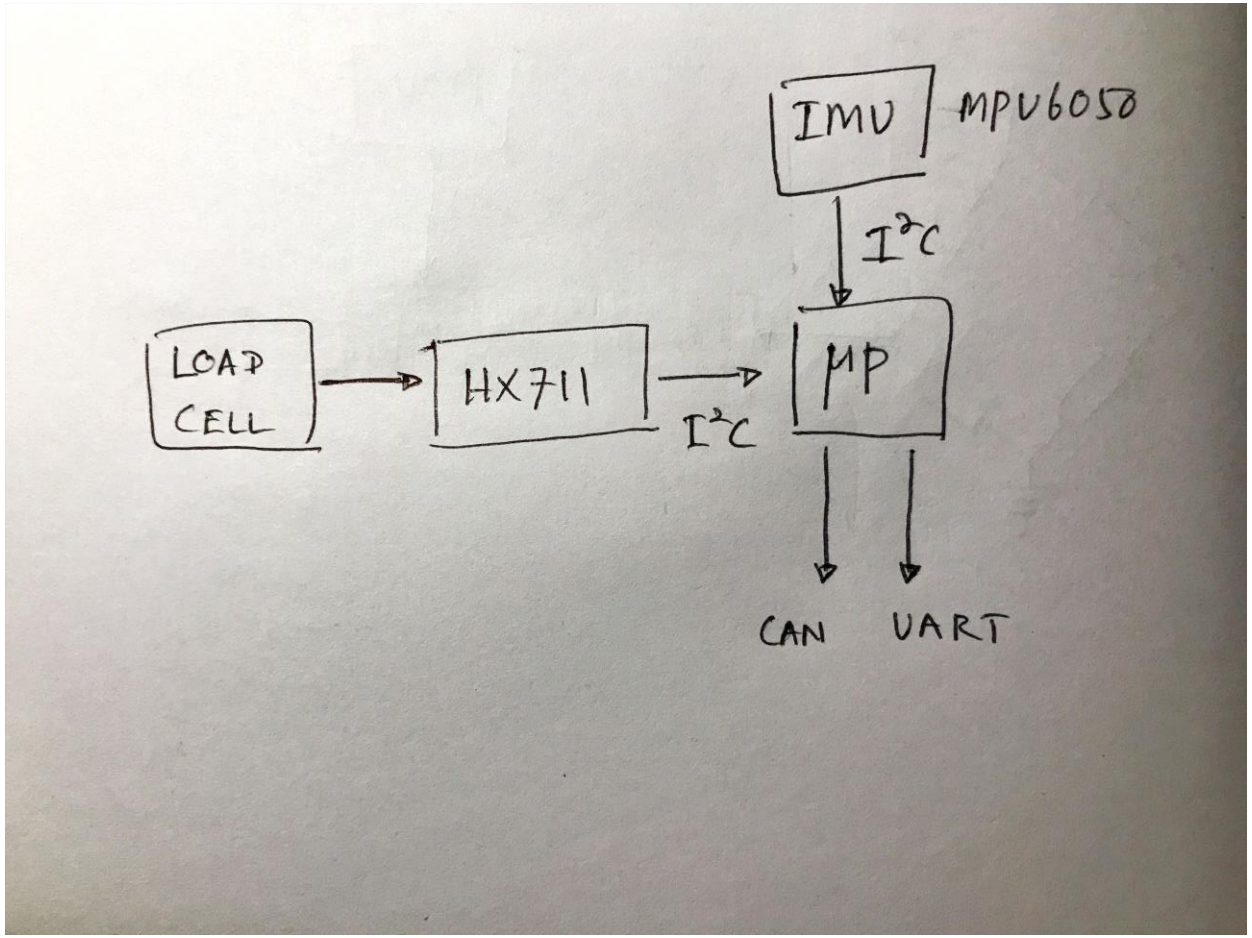
- Low resolution with ADC.
- Analog signals are prone to noise when subjected to electrical and magnetic interferences when transmitting data to long distances (1m).

Aims of the project

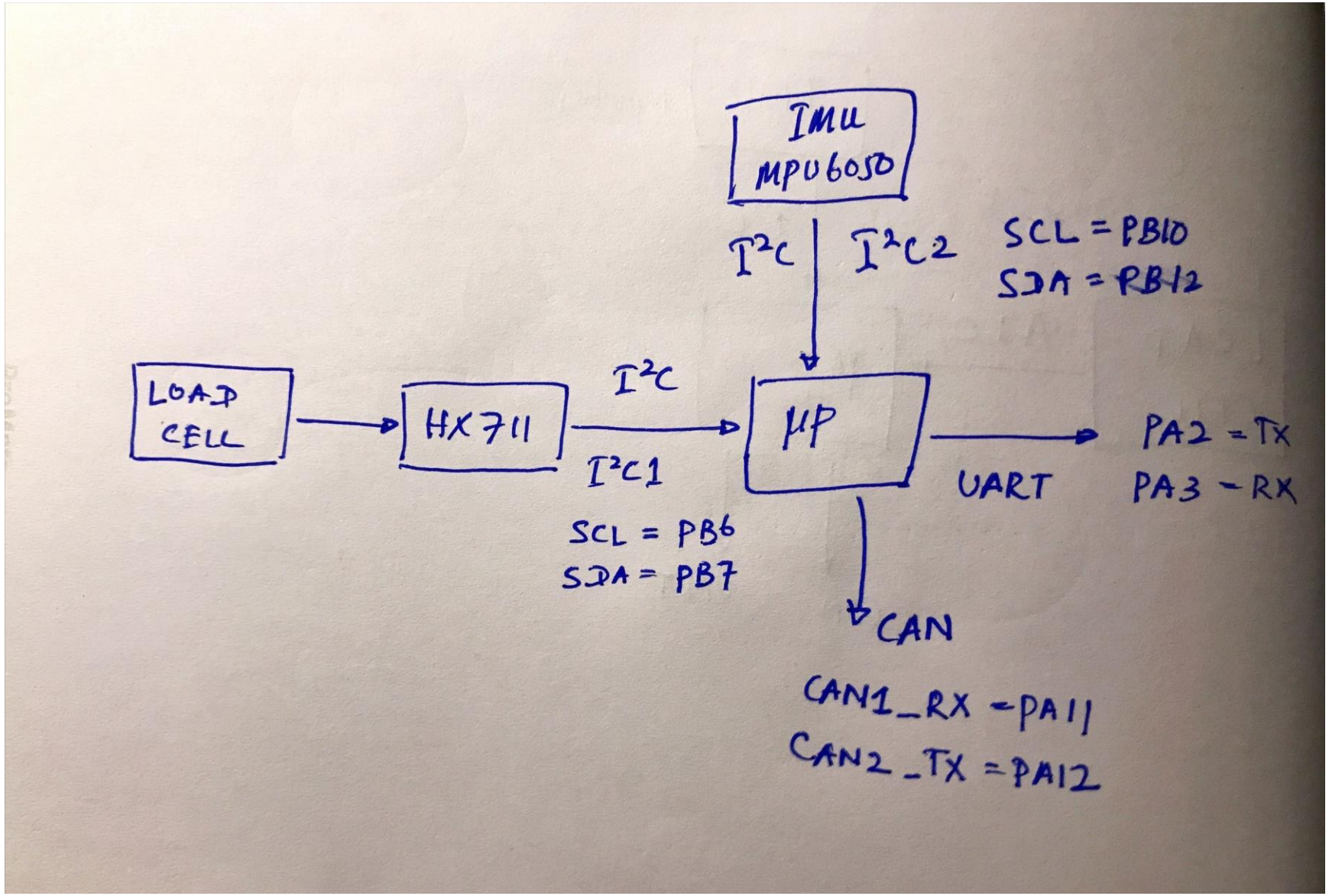
- Convert analog signals to digital with higher resolution.
- Use UART and CAN communication for transmitting the data.
- Transmitting the sensor data at 0.25ms rate to the main microprocessor.

System Design



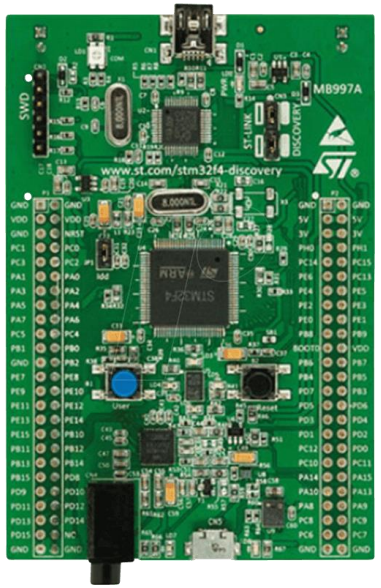


System Design Cont.

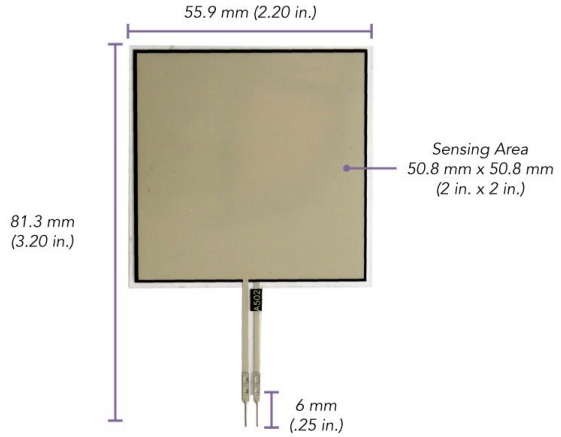


Build Prototype

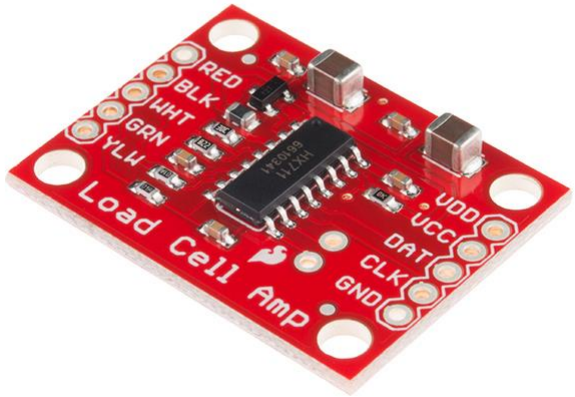
Components Required



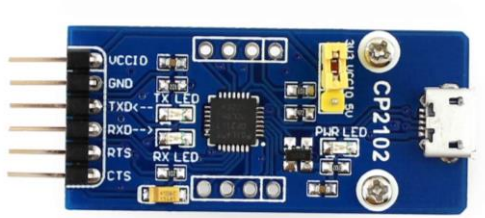
STM32 Discovery board



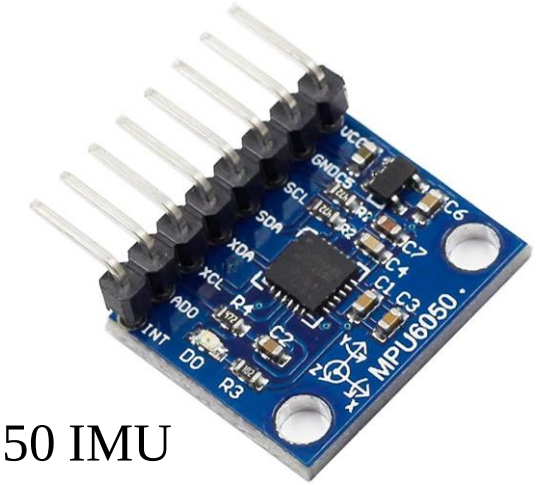
Flexi Force A502 sensor



HX711 Load cell amplifier



UART to USB bridge module

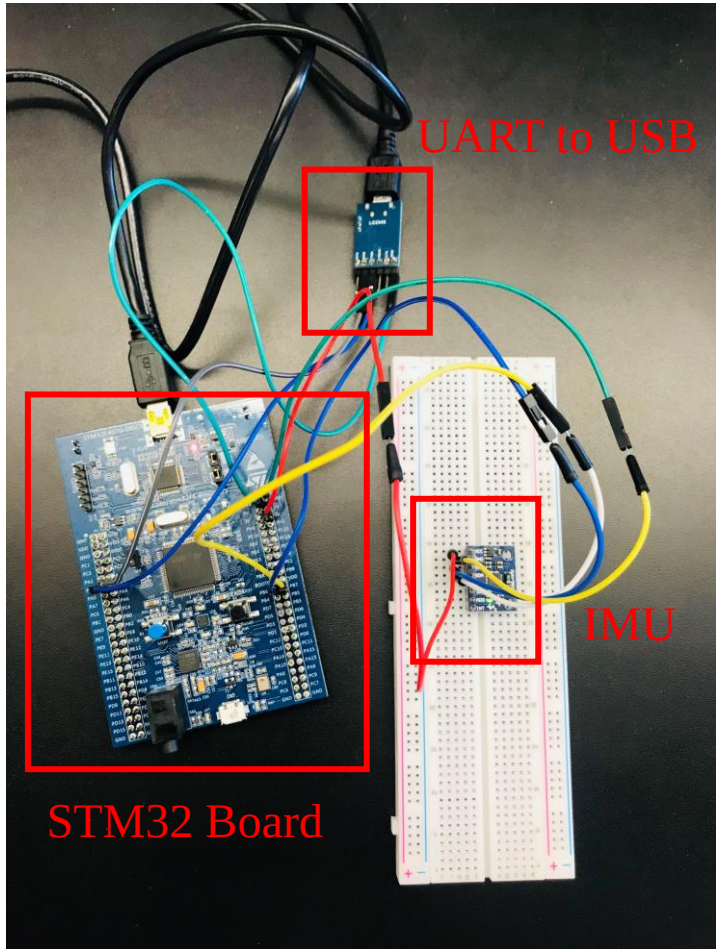


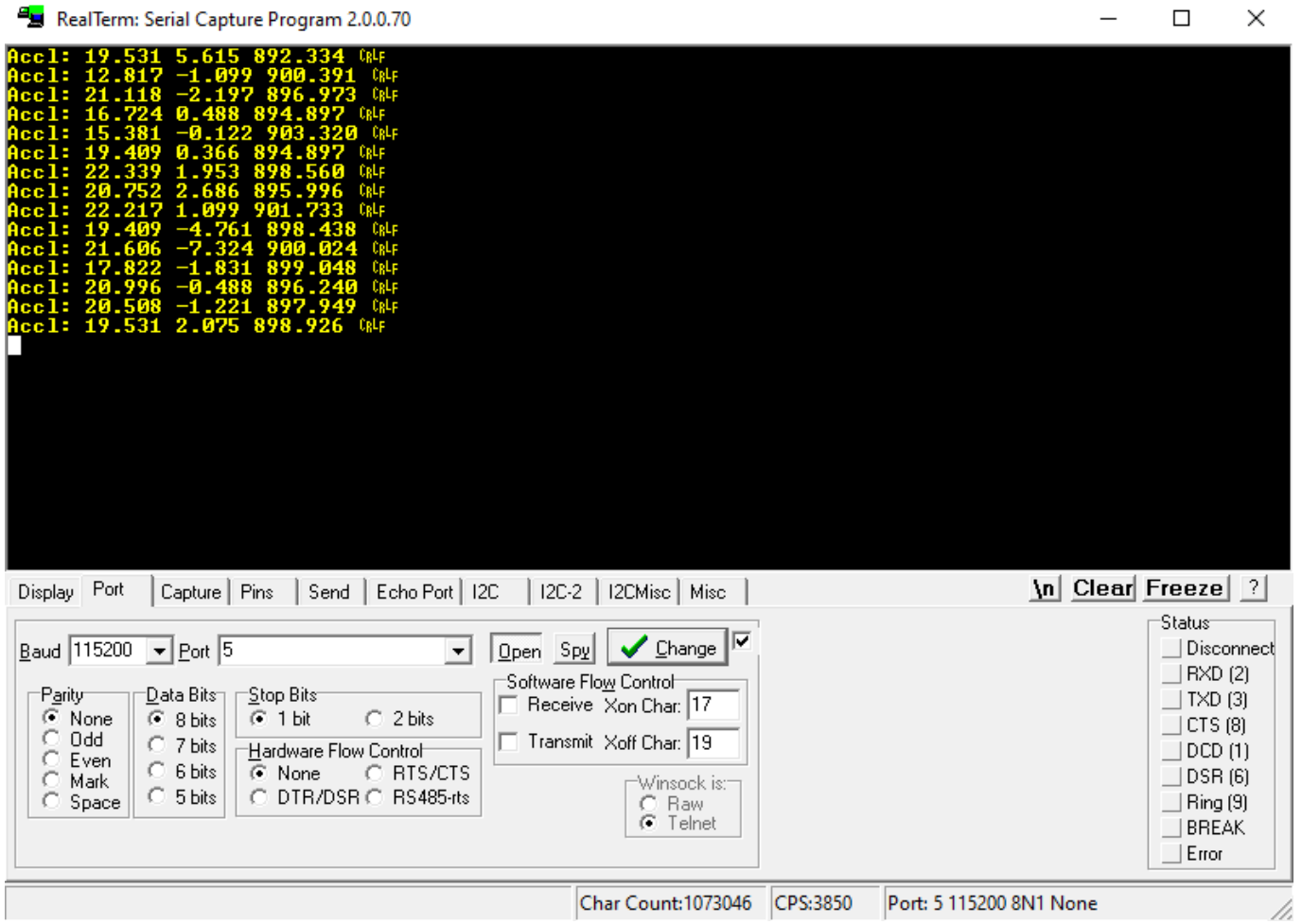
MPU6050 IMU

Resistors

Build Prototype Cont.

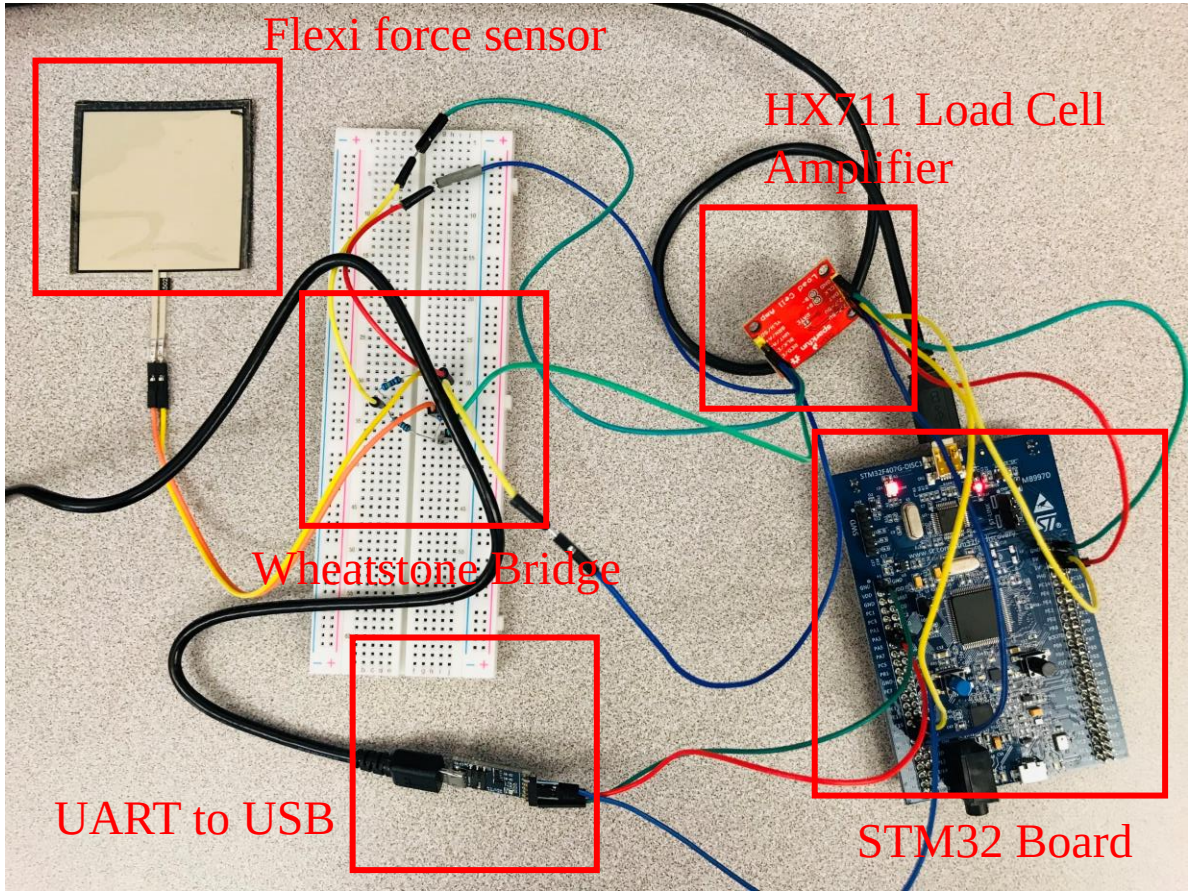
IMU (MPU 6050) Testing

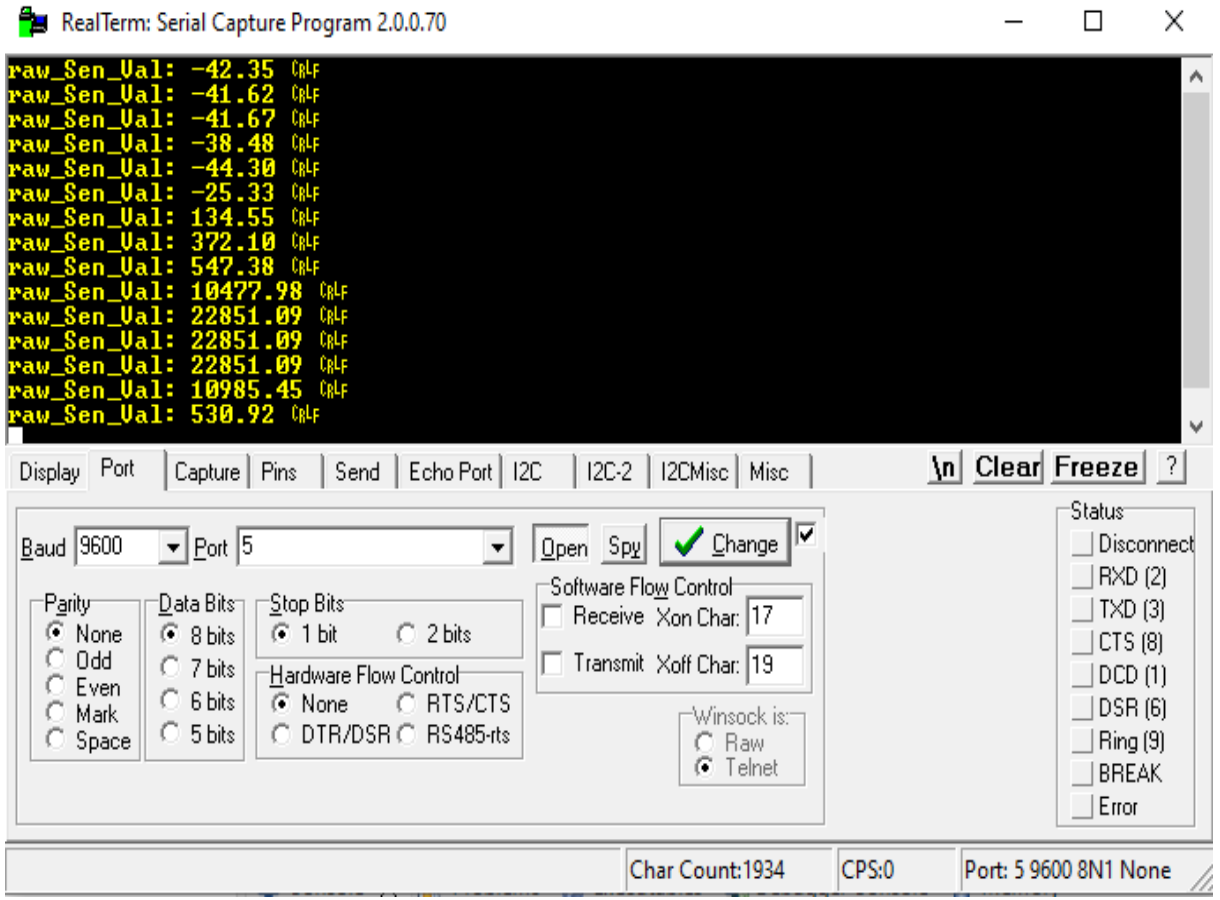




Build Prototype Cont.

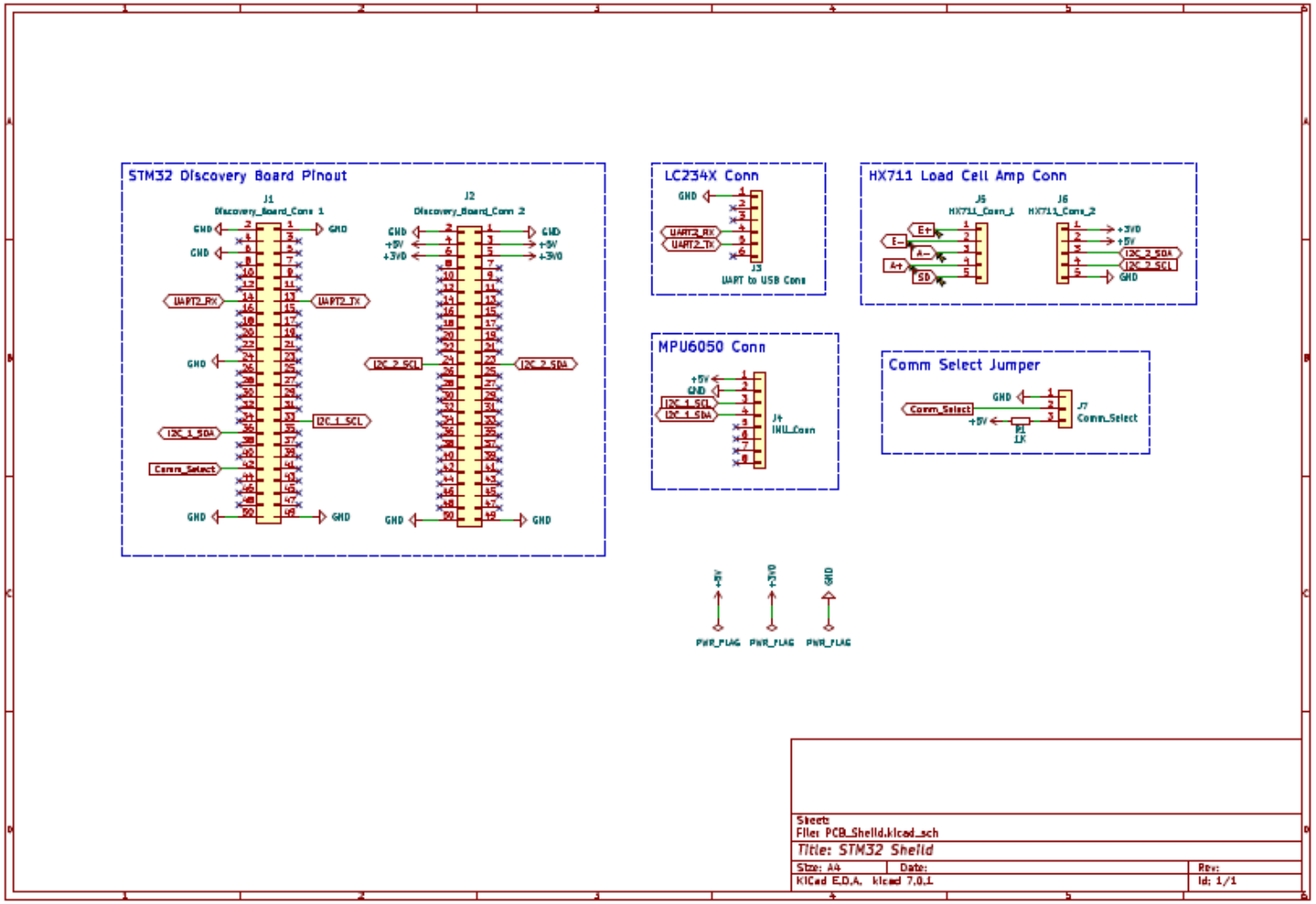
Force Sensor Testing with HX711 Load Cell Amplifier





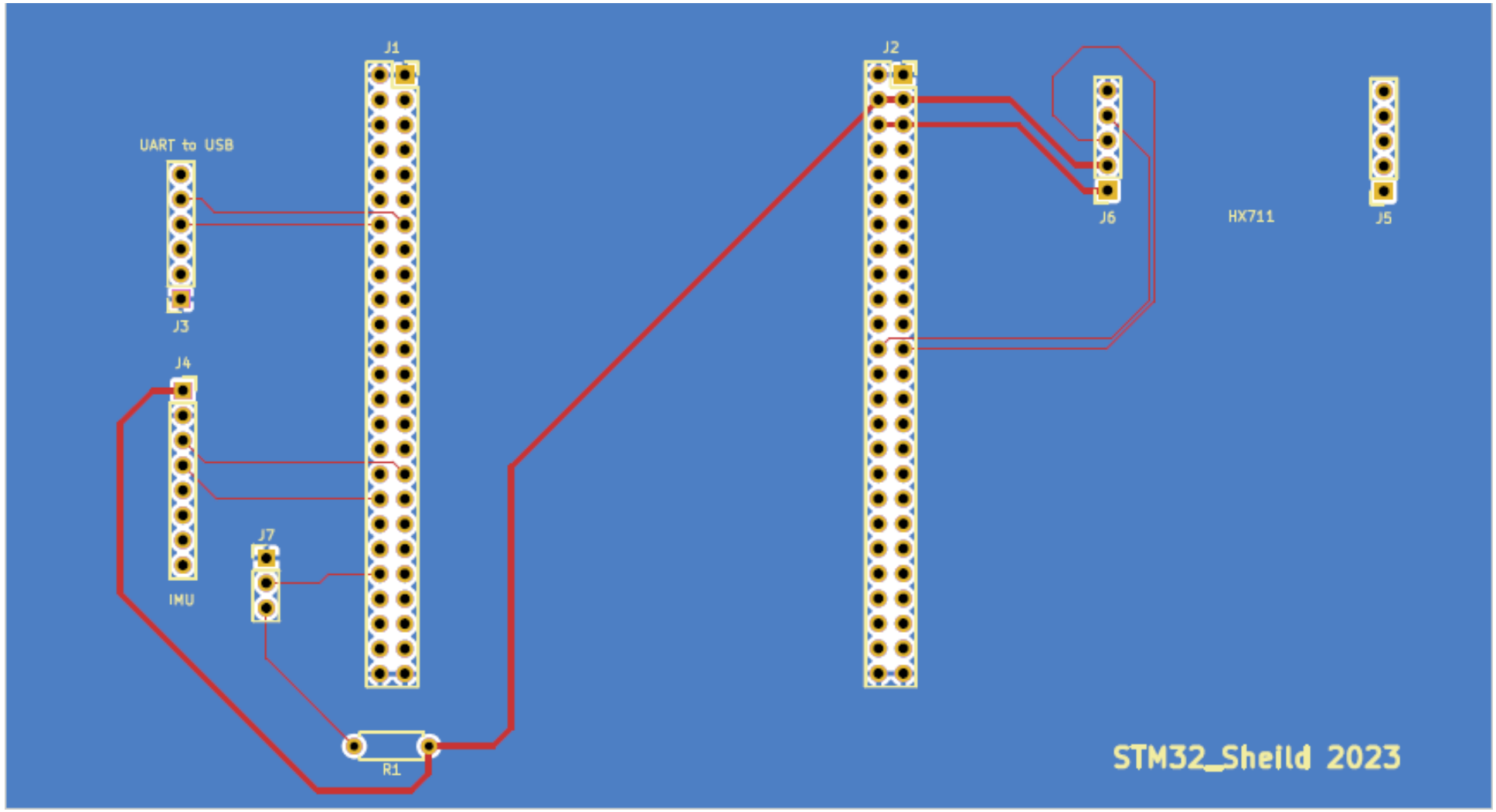
PCB Design

Schematic

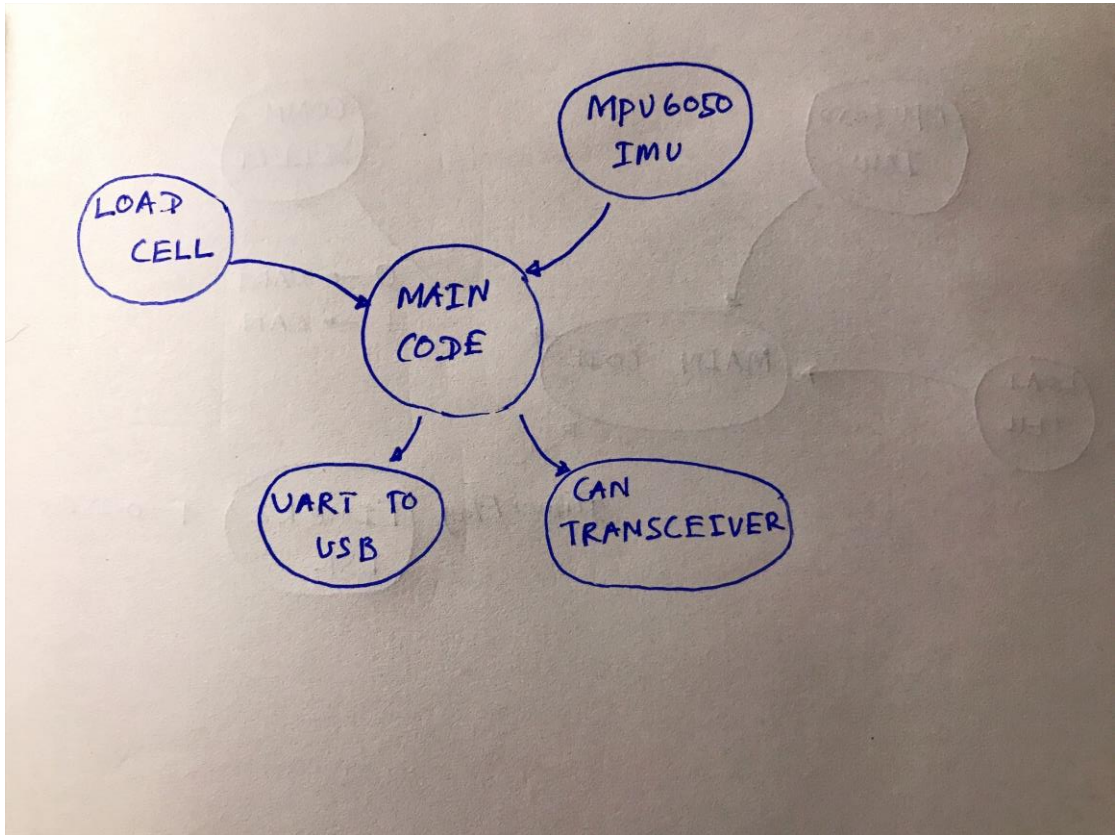


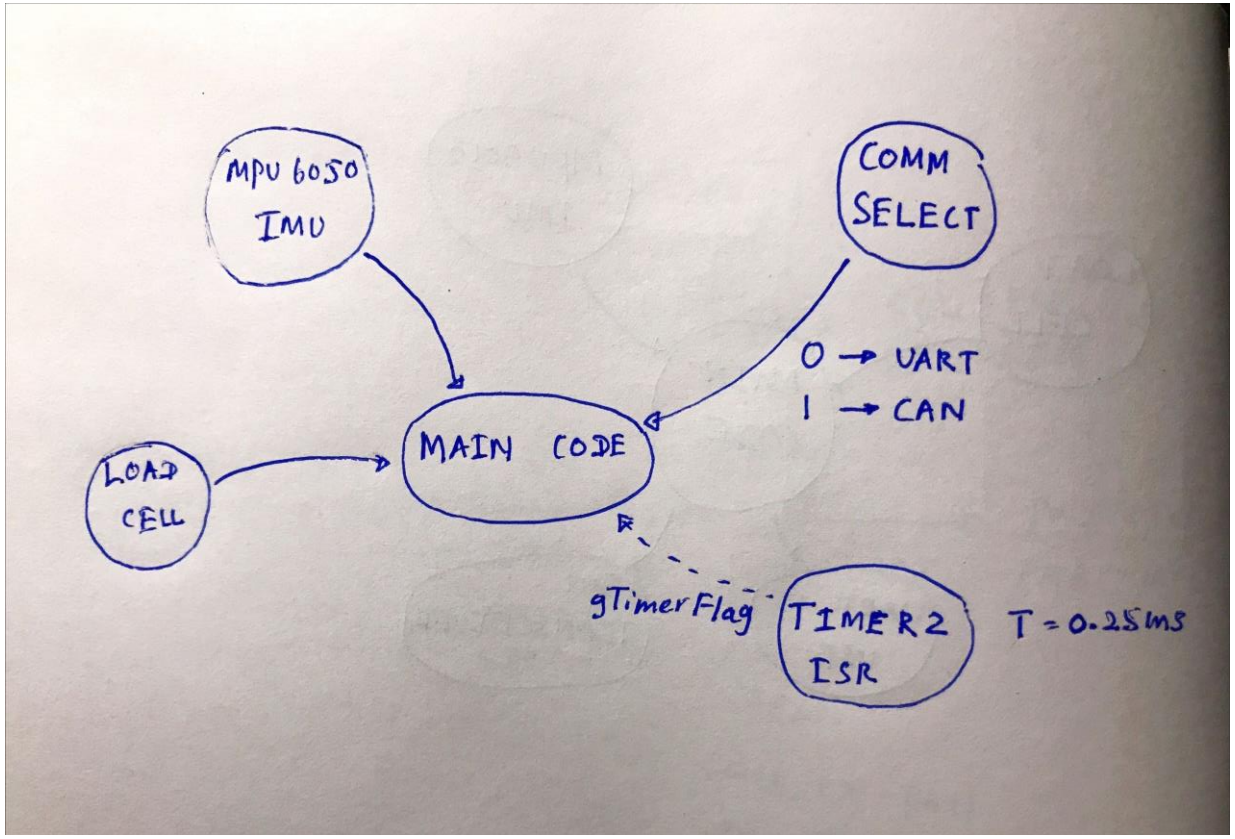
PCB Design Cont.

PCB Layout



Software Development





Future Development

- Library that is available for HX711 for STM32 is not giving desired results. It does not use HAL_I2C functions. Thus, a new library needs to be developed.
- Transmitting data with 0.25ms rate is challenging. When using the “sprint” function to read the serial data that rate can not be achieved.
- Individual components were tested separately. But, testing both of them together is required.
- CAN communication was not used to transmit the data.

THANK YOU