

One Axis Drill Project

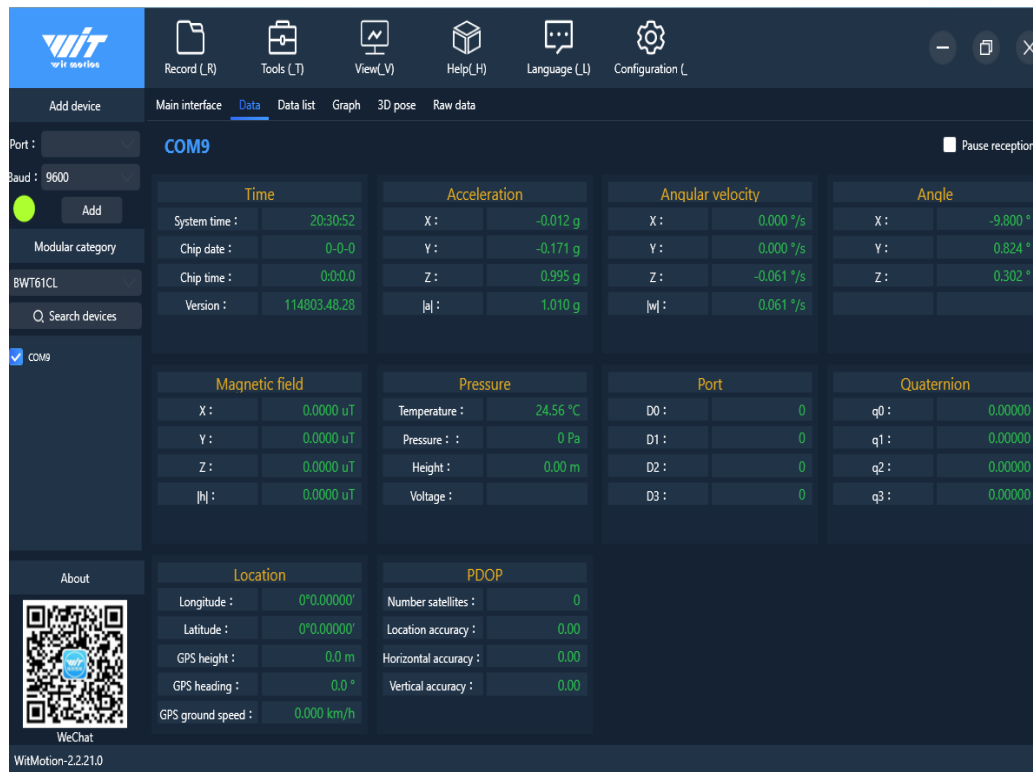
Progress Report 03/06/2023

Goals to be met:

- ✓ Mbaire- Do ANOVA analysis, get PMMA, work on Wit Motion+ RS232+ Arduino
- ✓ Renox- Work on ANOVA analysis, work on load cell+ hx711+ Arduino
- ✓ Katchiets - Power supply simulations in Proteus/ Multism for 5V, 3.3V from 12 supply currently at the setup; to be used in pcb
- ✓ Steve- prepare a circuit diagram of how all components will come together on the PCB; demonstrating ability of Atmega2560 to handle all required components
- ✓ Allan and Morris- finish on mechanical design, incorporating detailed motor designs, Simulink modelling and running DC motor in simscape

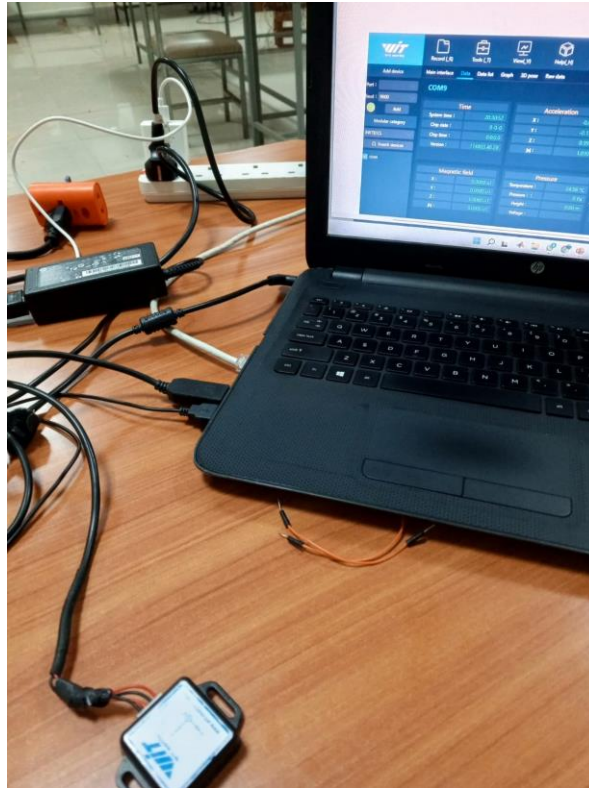
What has been achieved:

- Reading data values of wit motion sensor using wit motion software and obtaining plots.

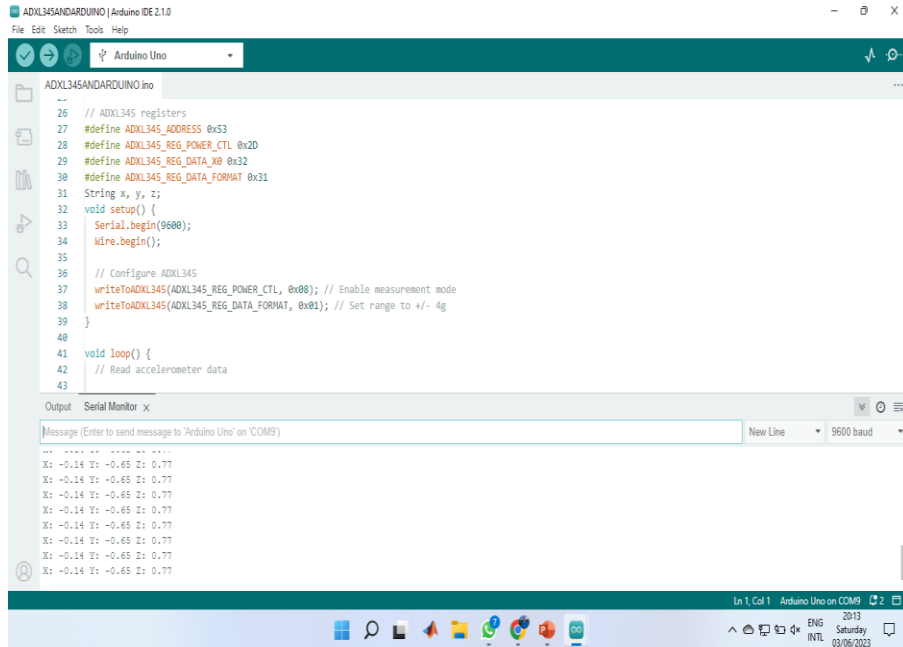


Wit motion continued...

- Working physically



Using ADXL345 accelerometer to read analog values for vibration in X,Y and Z axes



The screenshot shows the Arduino IDE interface with the file 'ADXL345ANDARDUINO.ino' open. The code defines the ADXL345 registers and configures the accelerometer to read data from the I2C bus. The Serial Monitor displays the output of the program, showing the X, Y, and Z axis values for vibration.

```
// ADXL345 registers
#define ADXL345_ADDRESS 0x53
#define ADXL345_REG_POWER_CTL 0x2D
#define ADXL345_REG_DATA_X0 0x32
#define ADXL345_REG_DATA_FORMAT 0x31

String x, y, z;

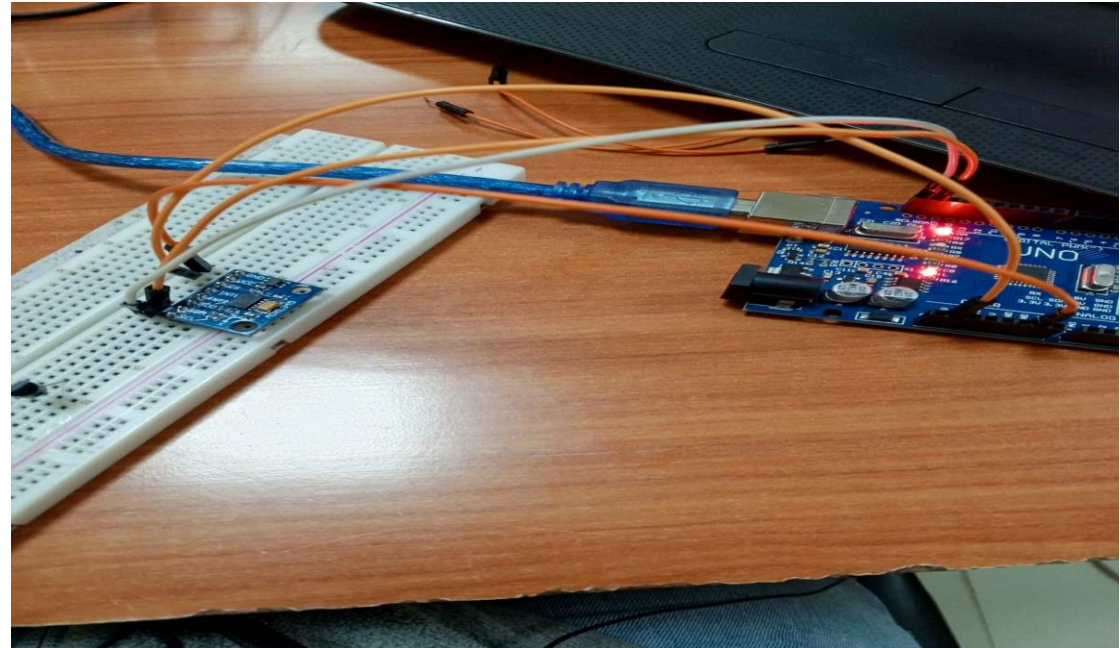
void setup() {
  Serial.begin(9600);
  Wire.begin();

  // Configure ADXL345
  writeToADXL345(ADXL345_REG_POWER_CTL, 0x08); // Enable measurement mode
  writeToADXL345(ADXL345_REG_DATA_FORMAT, 0x01); // Set range to +/- 4g
}

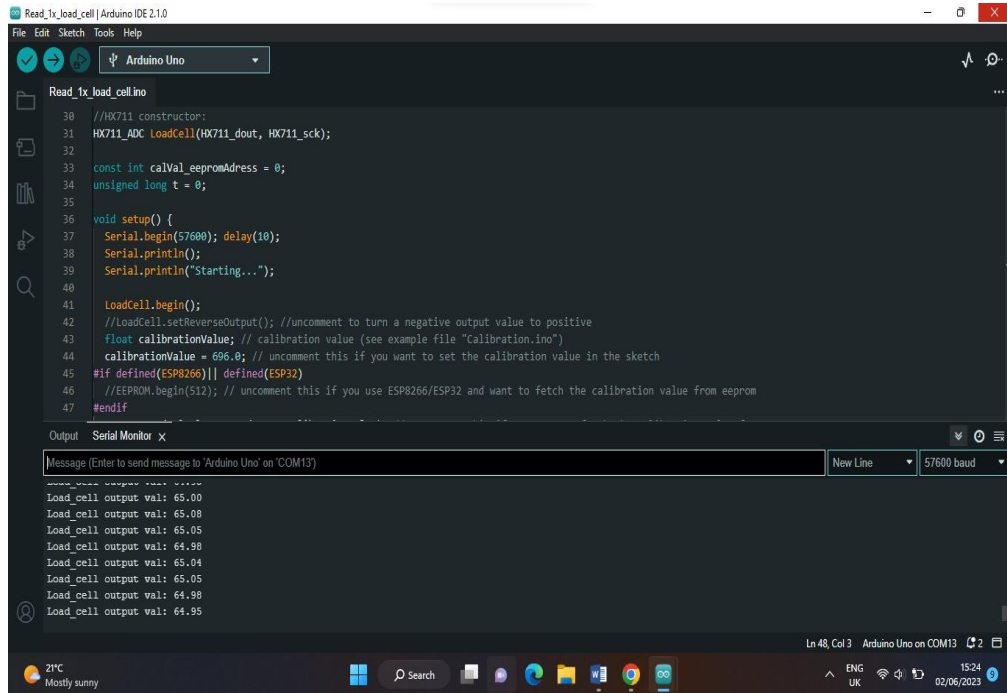
void loop() {
  // Read accelerometer data
}
```

Serial Monitor Output:

```
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
X: -0.14 Y: -0.65 Z: 0.77
```



work on load cell+ hx711+ Arduino and calibrate sensor to measure force values

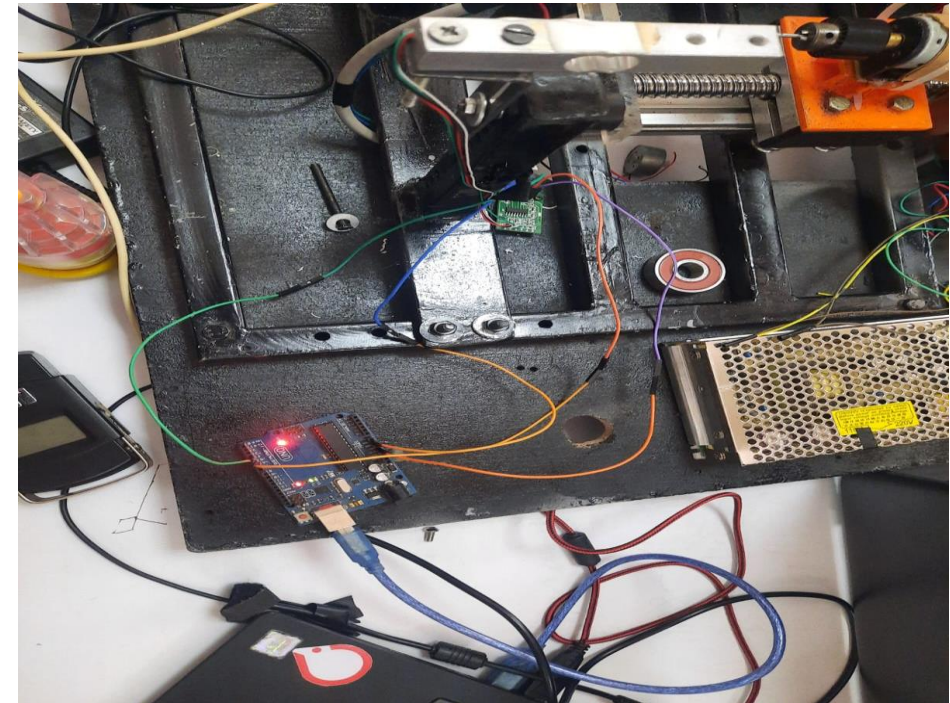


The screenshot shows the Arduino IDE interface with the sketch 'Read_tx_load_cell.ino' open. The code includes comments for the HX711 constructor, calibration value, and setup. The Serial Monitor displays the output of the sketch, showing the load cell output value for each of the 10 measurements.

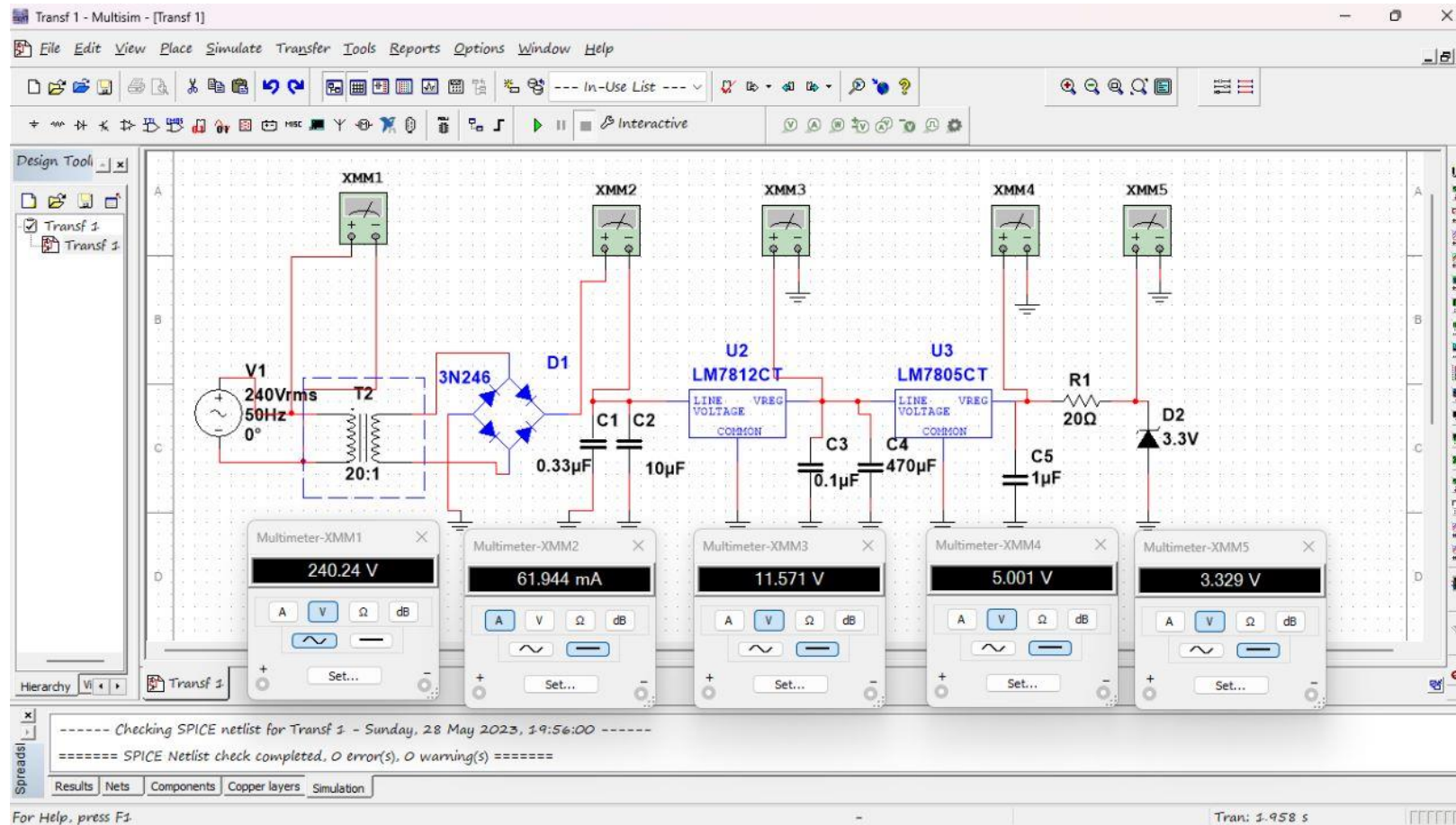
```
Read_tx_load_cell.ino
30 //HX711 constructor:
31 HX711_ADC LoadCell(HX711_dout, HX711_sck);
32
33 const int calVal_eepromAddress = 0;
34 unsigned long t = 0;
35
36 void setup() {
37   Serial.begin(57600); delay(10);
38   Serial.println();
39   Serial.println("Starting...");
40
41   LoadCell.begin();
42   //LoadCell.setReverseOutput(); //uncomment to turn a negative output value to positive
43   float calibrationValue; // calibration value (see example file "calibration.ino")
44   calibrationValue = 696.0; // uncomment this if you want to set the calibration value in the sketch
45   #if defined(ESP8266) || defined(ESP32)
46   //EEPROM.begin(512); // uncomment this if you use ESP8266/ESP32 and want to fetch the calibration value from eeprom
47   #endif
48 }
49
50 void loop() {
51   float val = LoadCell.getWeight();
52   Serial.println(val);
53   delay(1000);
54 }
```

Serial Monitor Output:

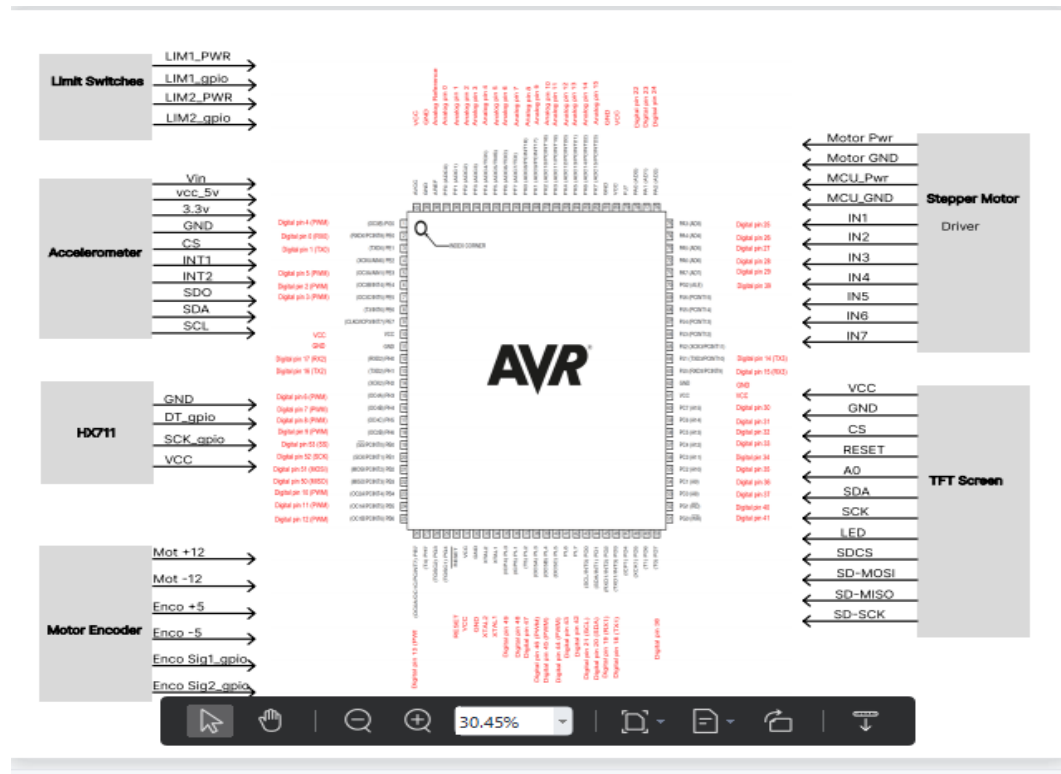
```
Load_cell output val: 65.00
Load_cell output val: 65.08
Load_cell output val: 65.05
Load_cell output val: 64.98
Load_cell output val: 65.04
Load_cell output val: 65.05
Load_cell output val: 64.98
Load_cell output val: 64.95
```



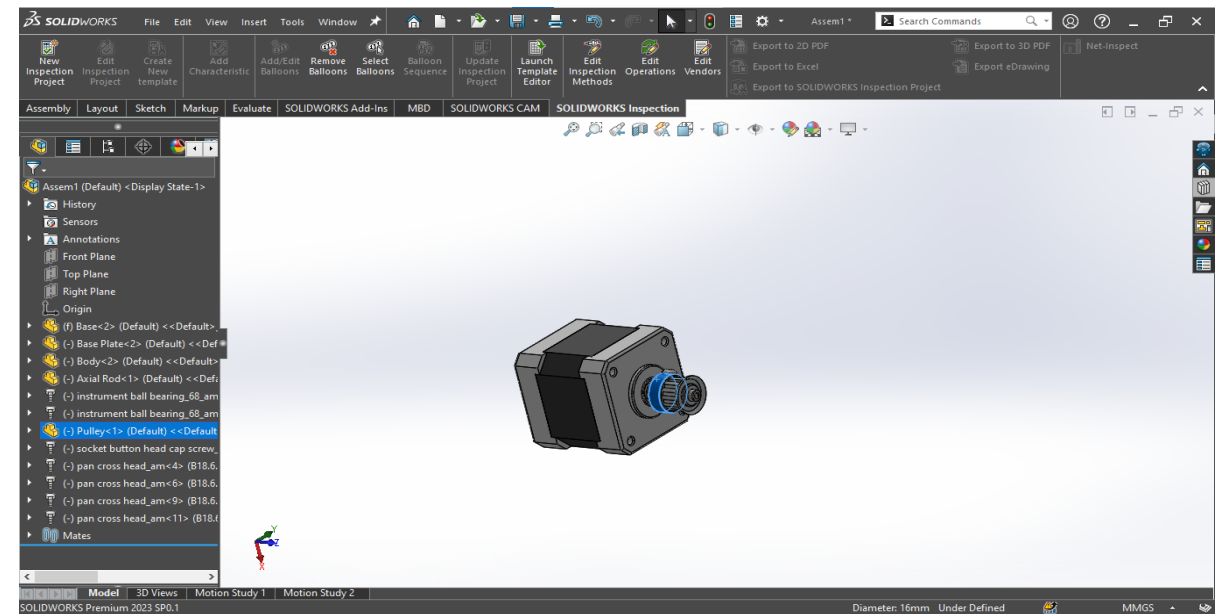
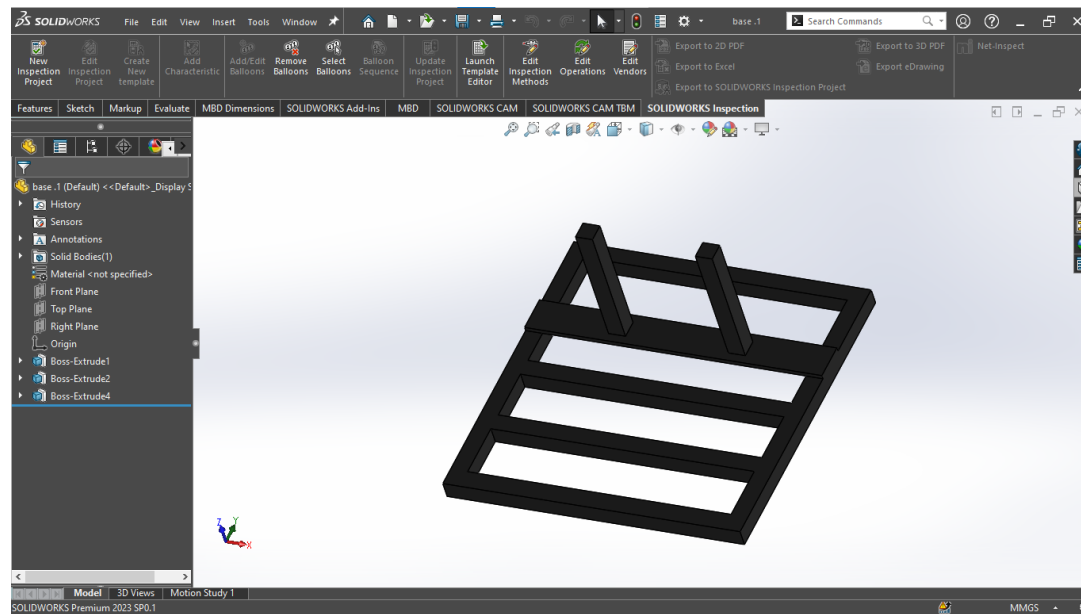
Power supply simulations in Proteus/ Multism for 5V, 3.3V from 12 supply currently at the setup; to be used in pcb



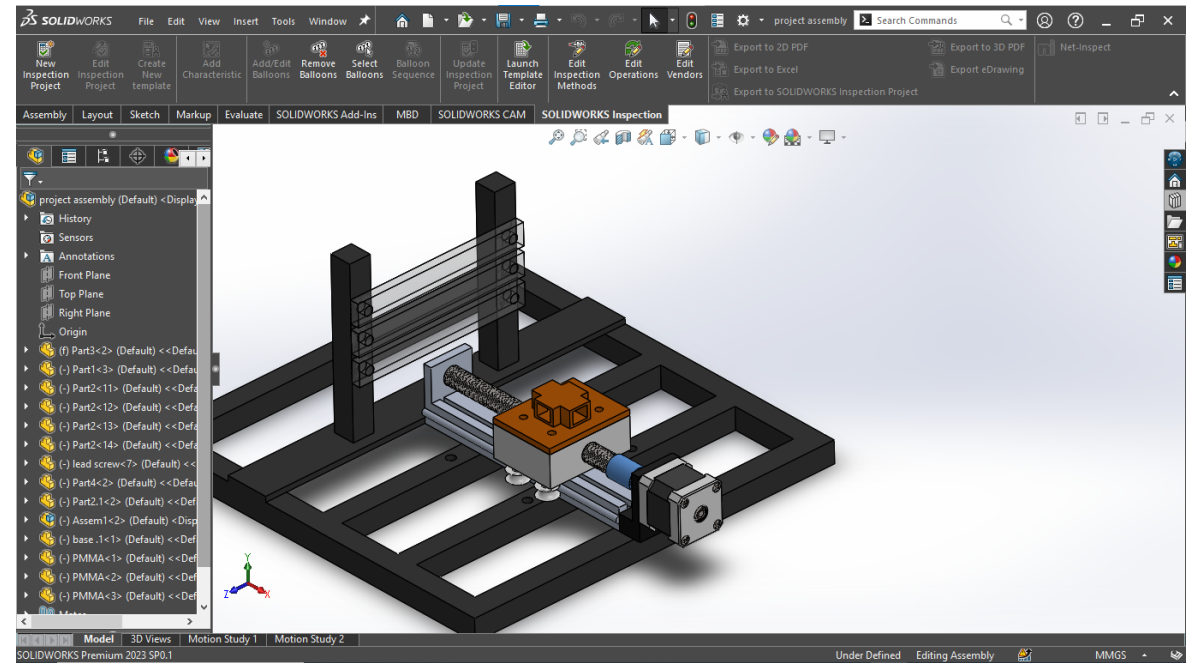
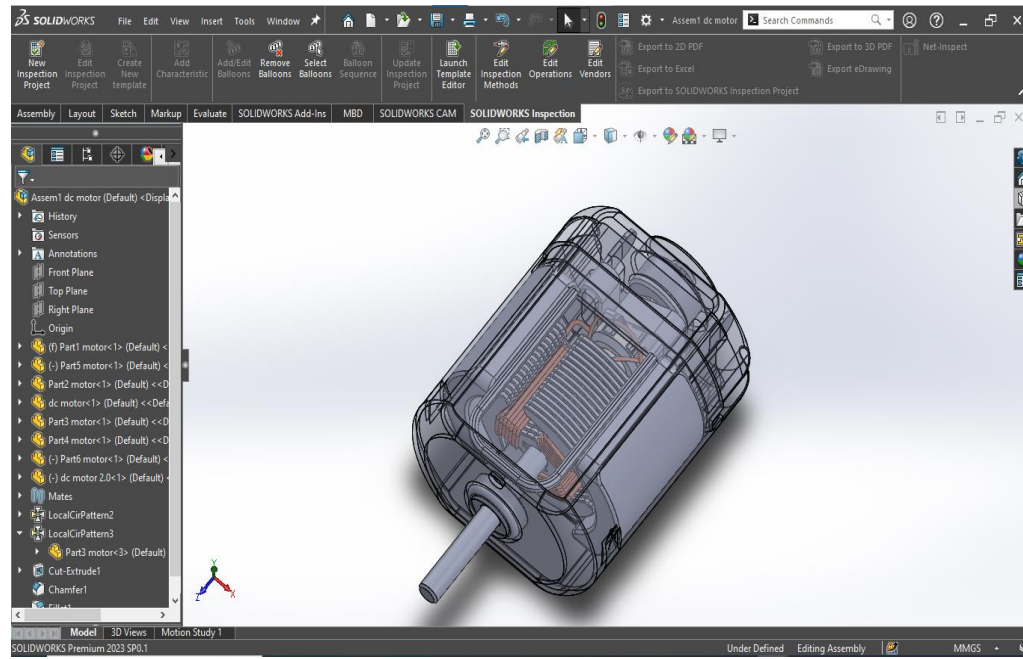
prepare a circuit diagram of how all components will come together on the PCB; demonstrating ability of Atmega2560 to handle all required components



finish on mechanical design, incorporating detailed motor designs, Simulink modelling and running DC motor in simscape



Mechanical assembly continued...



What has not been achieved yet:

- ANOVA analysis- we have not been able to run the dc motor to provide rotary feed and stepper motor to provide linear feed simultaneously for drilling process. Currently working on it.
- Simulink modelling of DC motor and addition of drill bit- in progress
- Work on Wit Motion+ RS232+ Arduino- the wit motion sensor module cannot be configured to directly communicate with Arduino thus opted to use ADXL345 accelerometer for data collection and wit motion for data visualization.

Goals of coming week:

- Get the DC motor and stepper motor to run concurrently for drilling process and ANOVA analysis
- Finish on Simulink modelling of DC motor and DC motor assembly and full project mechanical simulation
- Research on encoder interfacing with Arduino
- More to be discussed in Monday's meeting.