MAE 598 MEDM: Lab # 4

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MAE 598: Topic: Mechatronics Engineering for Design & Manufac (MEDM)

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Question - Bonus Lab HW4

- Get familiar to mechanical components;
- Get familiar to linear motion control;
- Get exposure to building physical prototypes.

Task1: Build a prototype of a linear state using a motor and lead screw.

Task2:Integrate the photoresist to calibrate the moving speed and demo 3 different moving speed of linear stage

Physical Set Up

Circuit Diagram with connections.
Figure 1 & 2

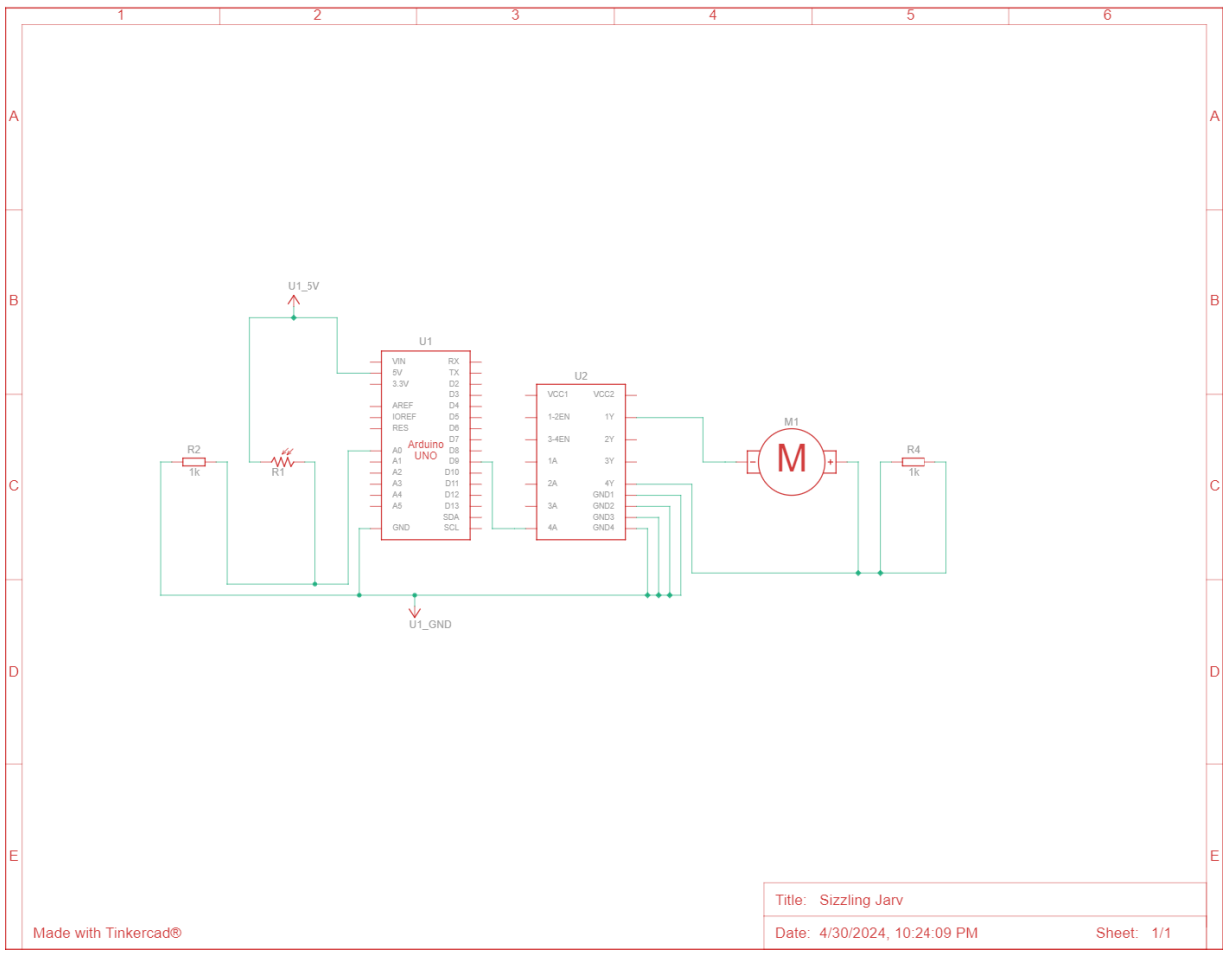


Figure 1

Name	Quantity	Component
U1	1	Arduino Uno R3
U2	1	H-bridge Motor Driver
R1	1	Photoresistor
R2 R4	2	1 kΩ Resistor
M1	1	DC Motor

Figure 2

Circuit Schematic Diagram

Circuit Schematic Diagram

Figure 3

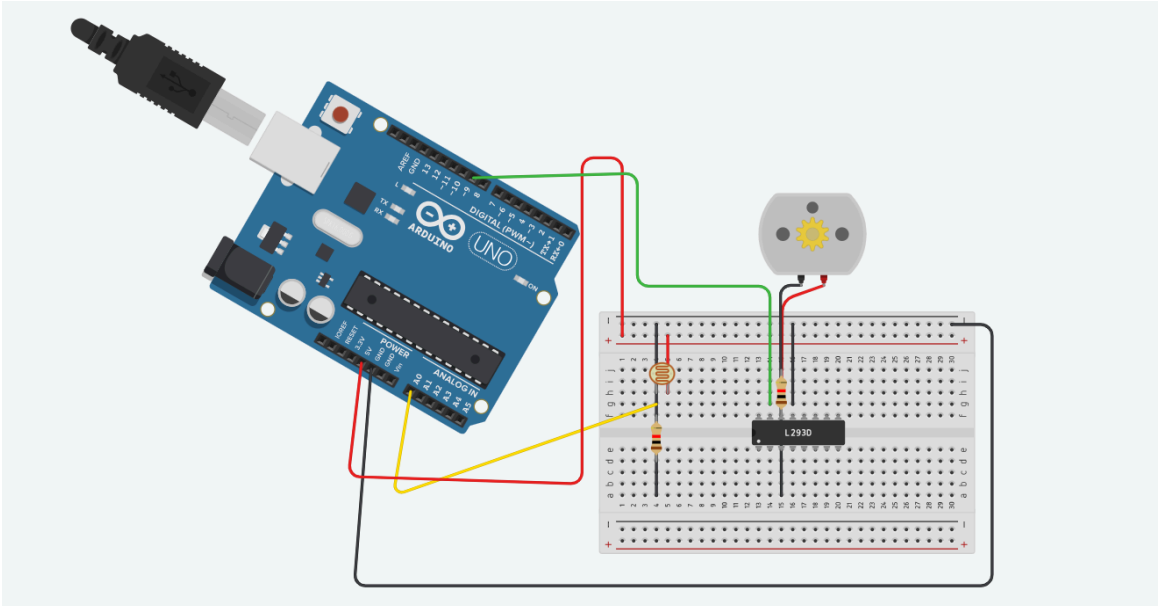
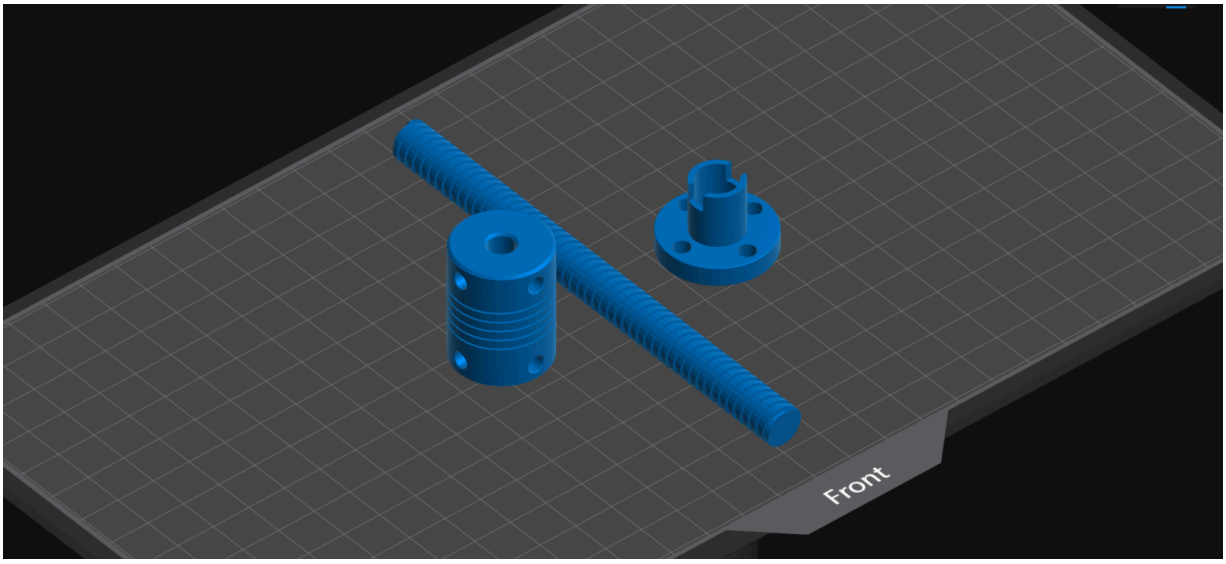
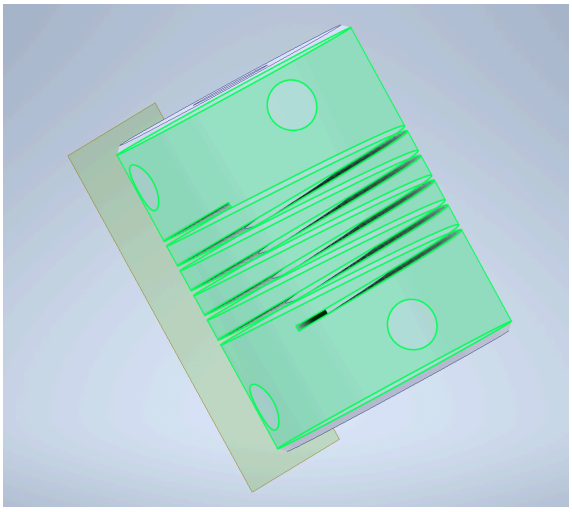


Figure #: 3

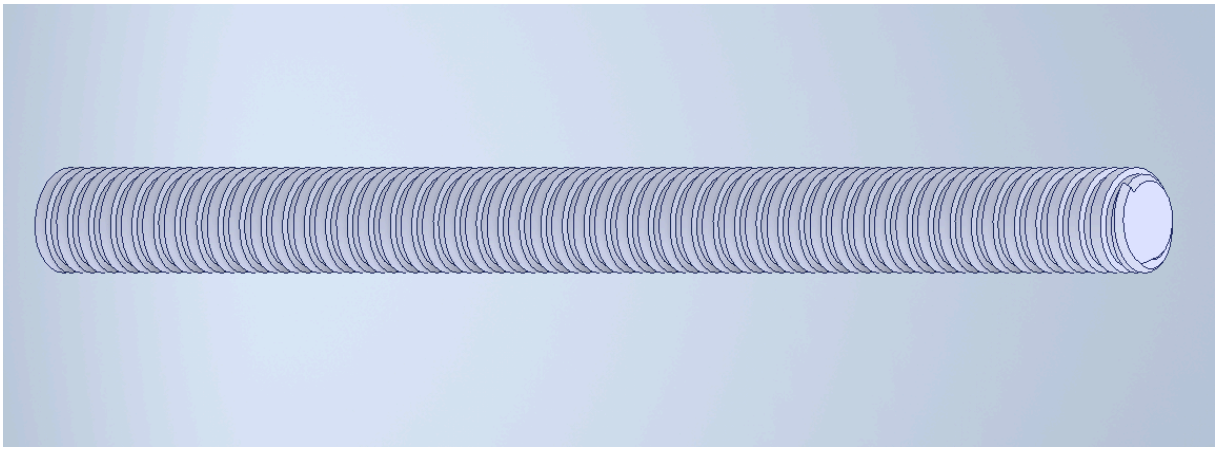
Lead Screw Mechanism
Figure 4



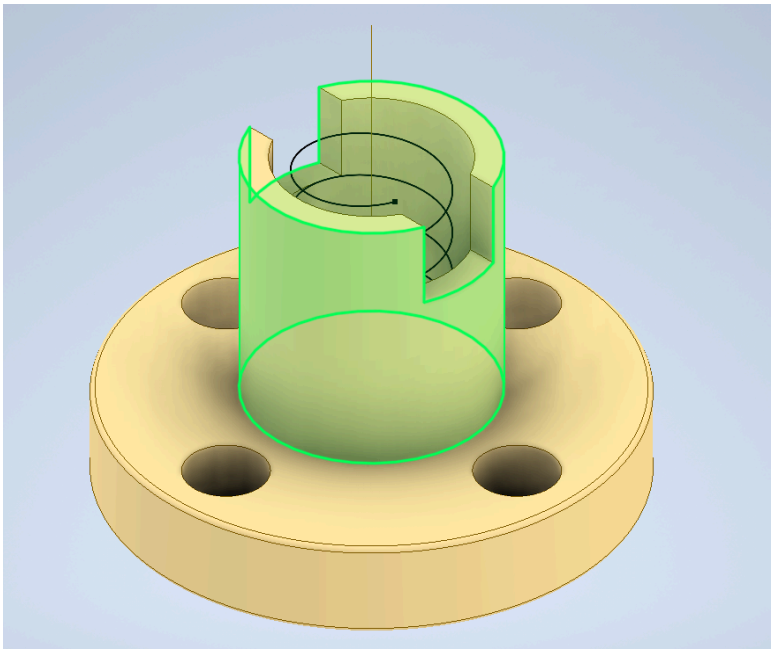
Coupler
Figure 5

- 

Lead Screw
Figure 6



Circle Screw
Figure 7



3D printing simulation (Chitubox)

TinkerCAD was used to model this circuit.
The photorest was connected to the breadboard and input A0 and one 1000 Ohms resistor was utilized to protect the photoresist. A five volt power supply is used to run the system.
We utilize a regular motor for the lead screw mechanism as using a stepper motor with a lead screw would short the arduino kit provided to us.

Code(s)

```
const int motorPin = 9; // Connect the motor control pin to digital pin 9
const int photoresistorPin = A0; // Connect the photoresistor to analog pin A0

void setup() {
  pinMode(motorPin, OUTPUT);
  // Initialize serial communication for debugging
  Serial.begin(9600);
}

void loop() {
  // Read the value of the photoresistor
  int photoresistorValue = analogRead(photoresistorPin);

  // Map the photoresistor value to motor speed (adjust the range as needed)
  int motorSpeed = map(photoresistorValue, 0, 1023, 0, 255);

  // Set the motor speed
  analogWrite(motorPin, motorSpeed);

  // Debugging output
  Serial.print("Photoresistor Value: ");
  Serial.println(photoresistorValue);
  Serial.print("Motor Speed: ");
  Serial.println(motorSpeed);

  // Add some delay to prevent flickering
  delay(100);
}
```

Note - In case of spacing issues the txt file has been attached here - txt