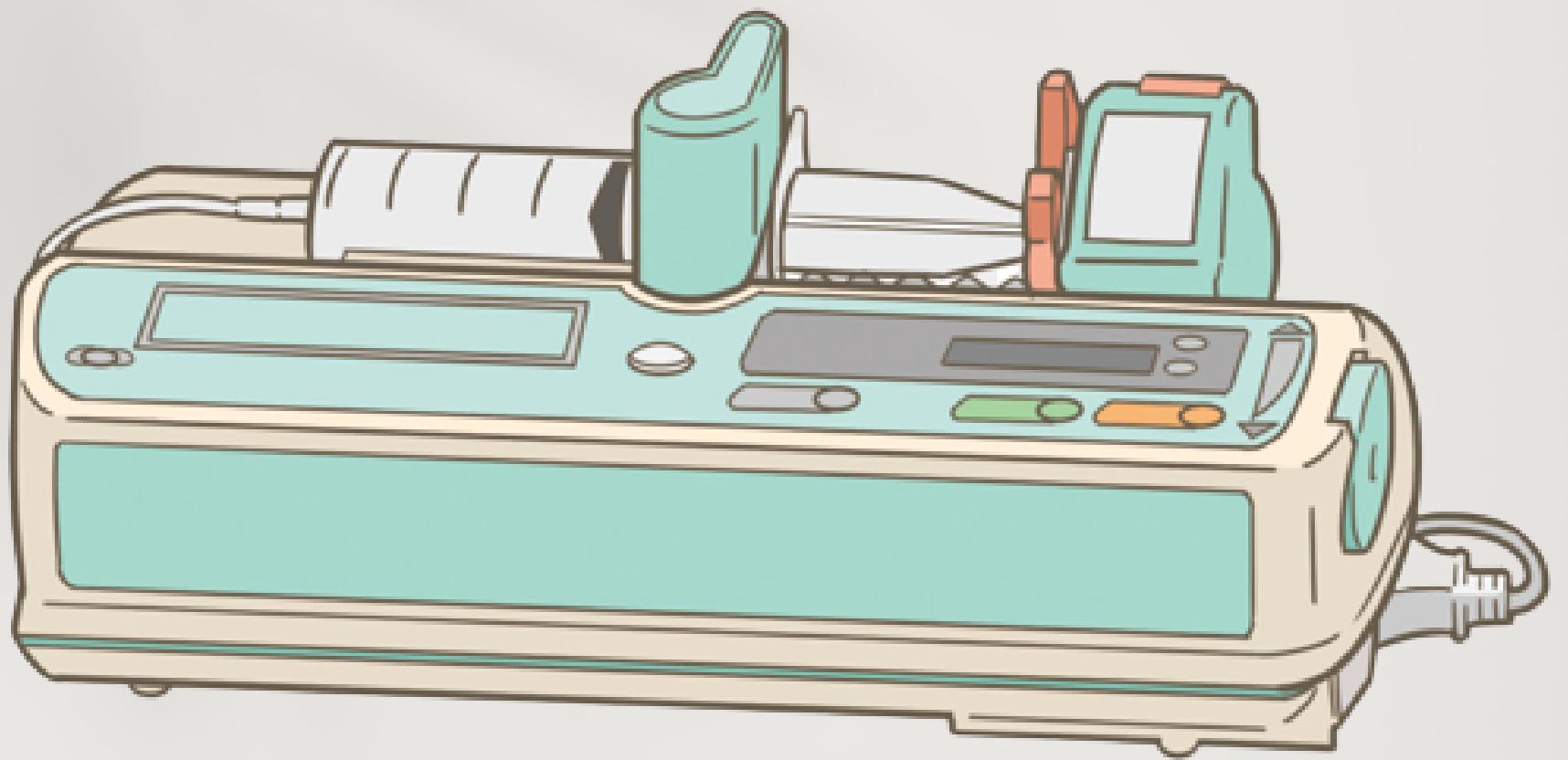


IOT SYRINGE PUMP



@Nicky 12006013
FINAL EXAM

ASPECTS TO COVER

SENSOR &
MEASUREMENT

SIGNAL & SYSTEM

BIOMEDICAL
DEVICE NETWORK

- Utilizing sensors for the beneficial of the device, measuring the displacement of the syringe pusher.

- Making a good system based on mathematical model, code, and logic which allow the device to have various features, also utilizing the value of a signal as triggers for certain act of system.

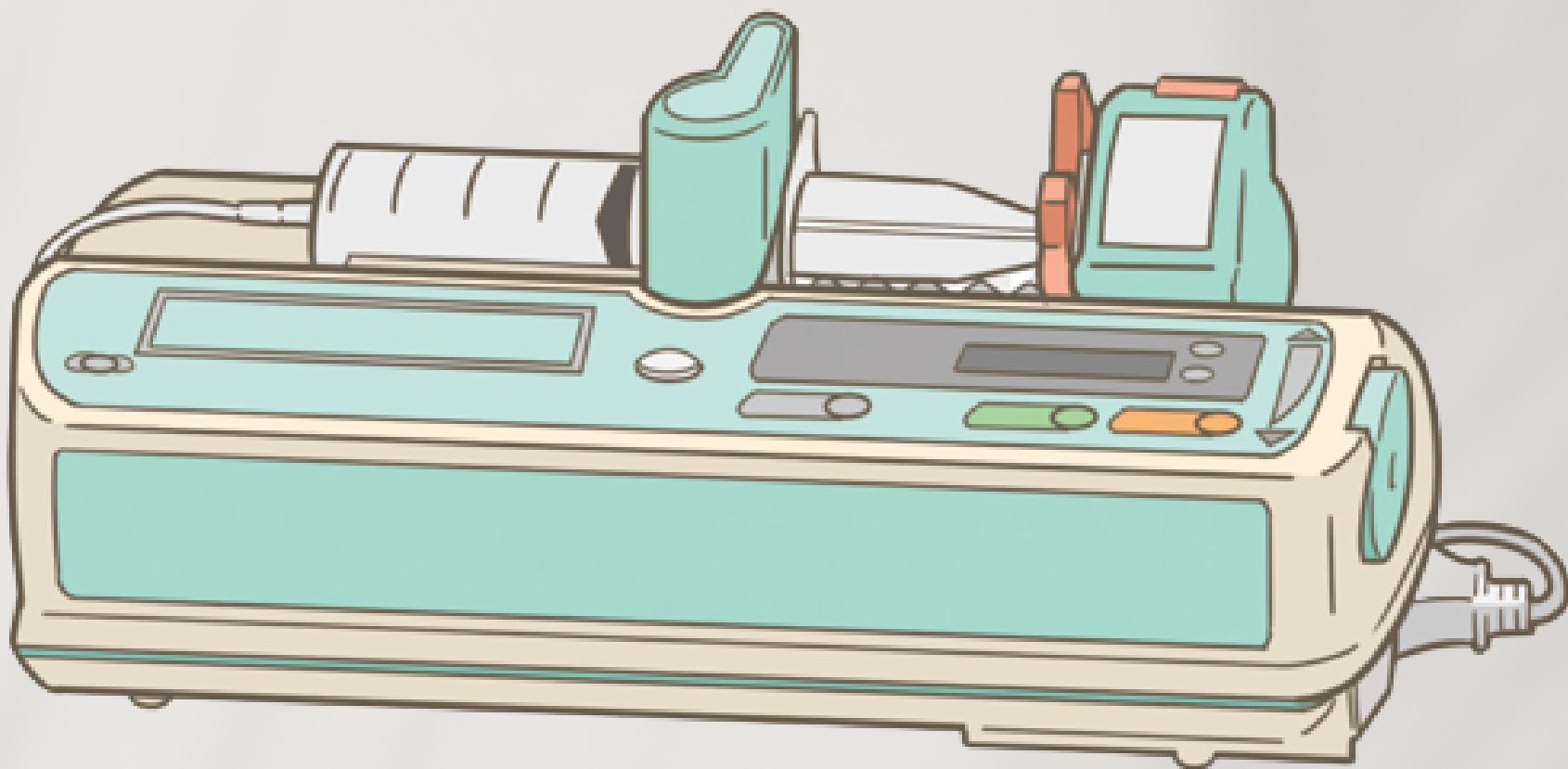
- Integrating the device to the cloud platform

SYRINGE PUMP?

A syringe driver, also known as a syringe pump, is a small infusion pump, used to gradually administer small amounts of fluid (with or without medication) to a patient or for use in chemical and biomedical research

Some syringe drivers can both infuse and withdraw solutions.

- **Intravenous therapy**
- **Palliative care**
- **Research**
-





adafruit



SOFTWARE

ARDUINO IDE

- Accelstepper Library
- Adafruit IO Library



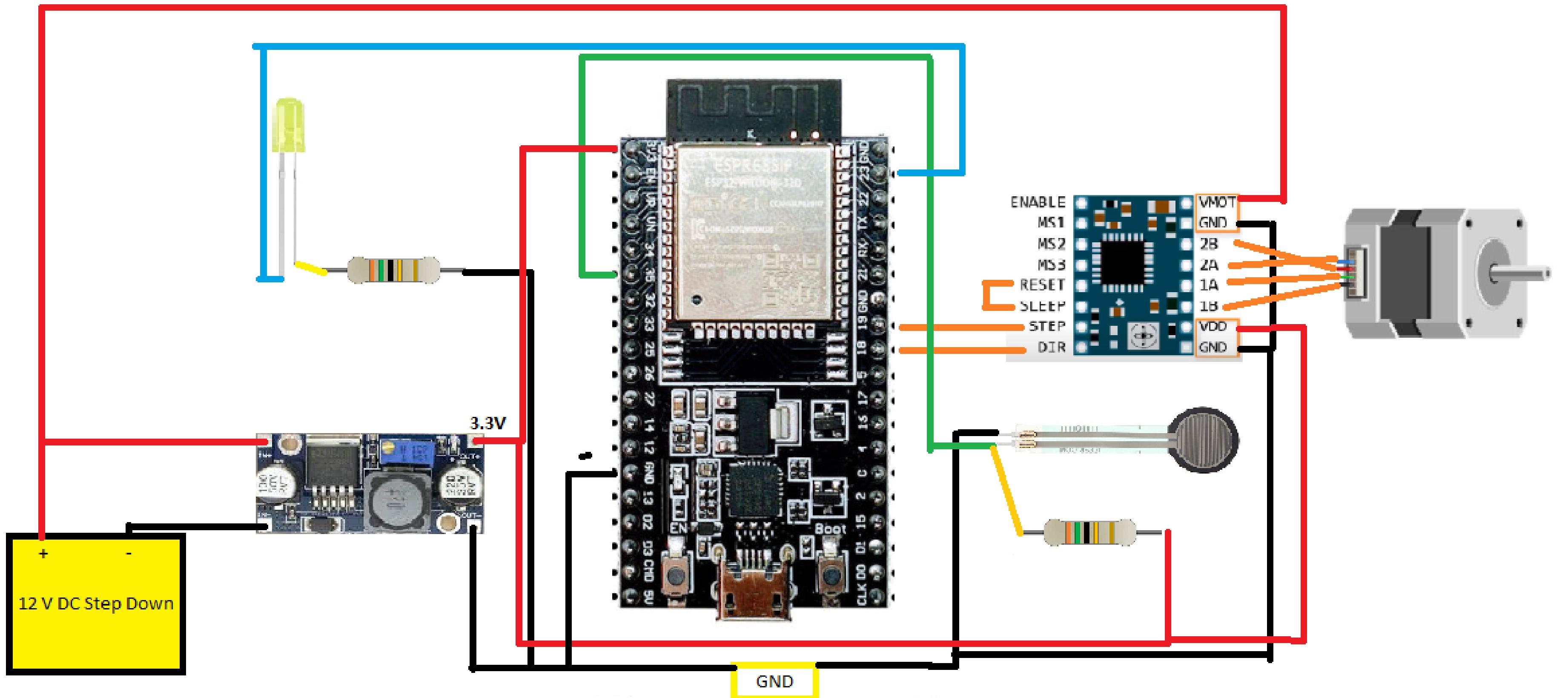
Adafruit IO IoT Platform



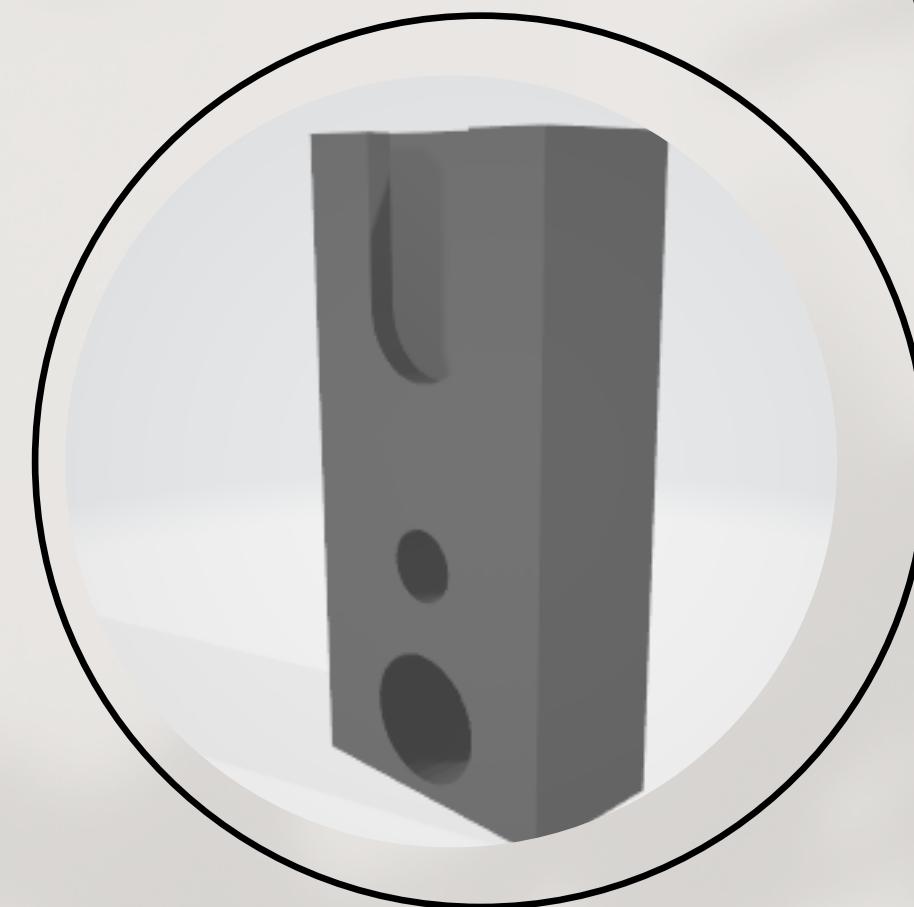
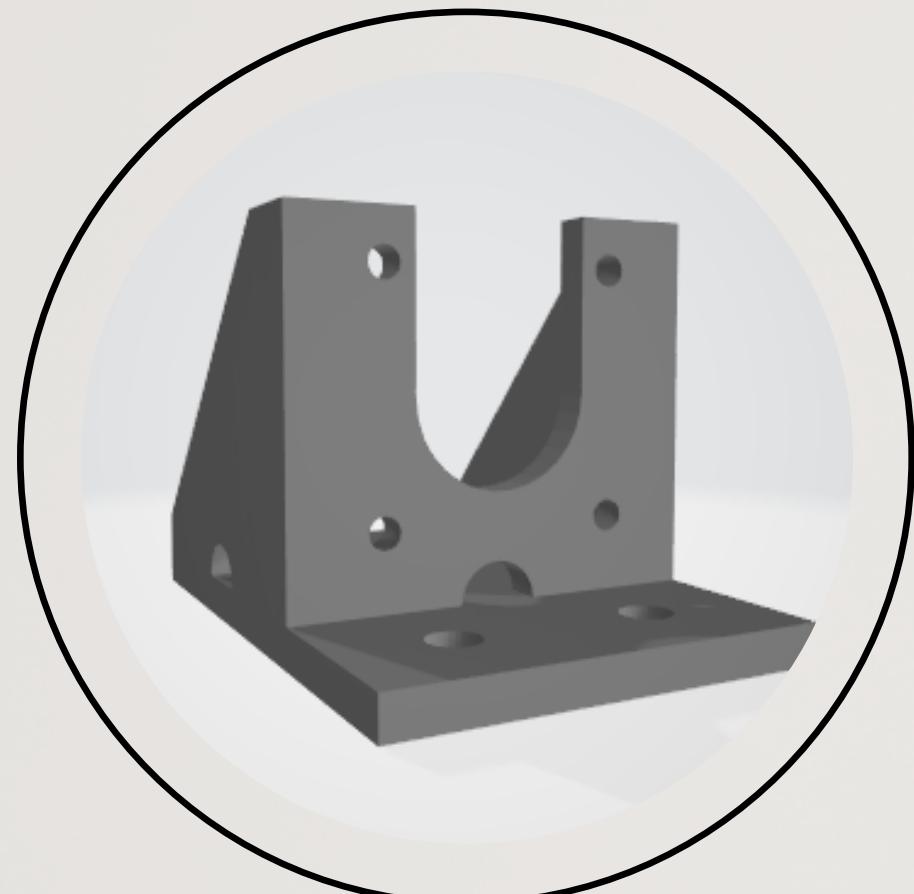
HARDWARE

- Nema 17 Stepper Motor
- A4988 Stepper Driver
- FSR402 Force Sensor
- ESP32
- Syringe Pump & Tubing
- Socket Cap Screw and T-Nut
- Aluminium Extrusion
- Stainless Steel Threaded Rod
- Stainless Steel Hex Nut
- Fixed Alignment Linear Ball Bearing
- 5x8 Motor Shaft Coupler

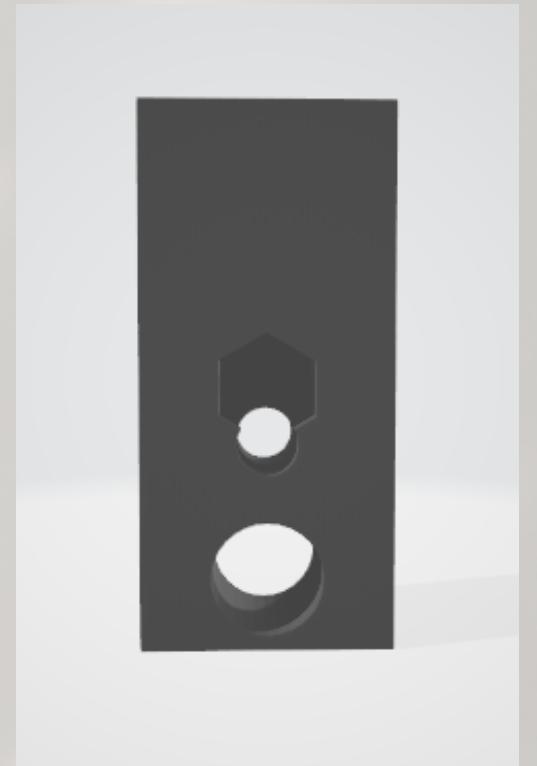
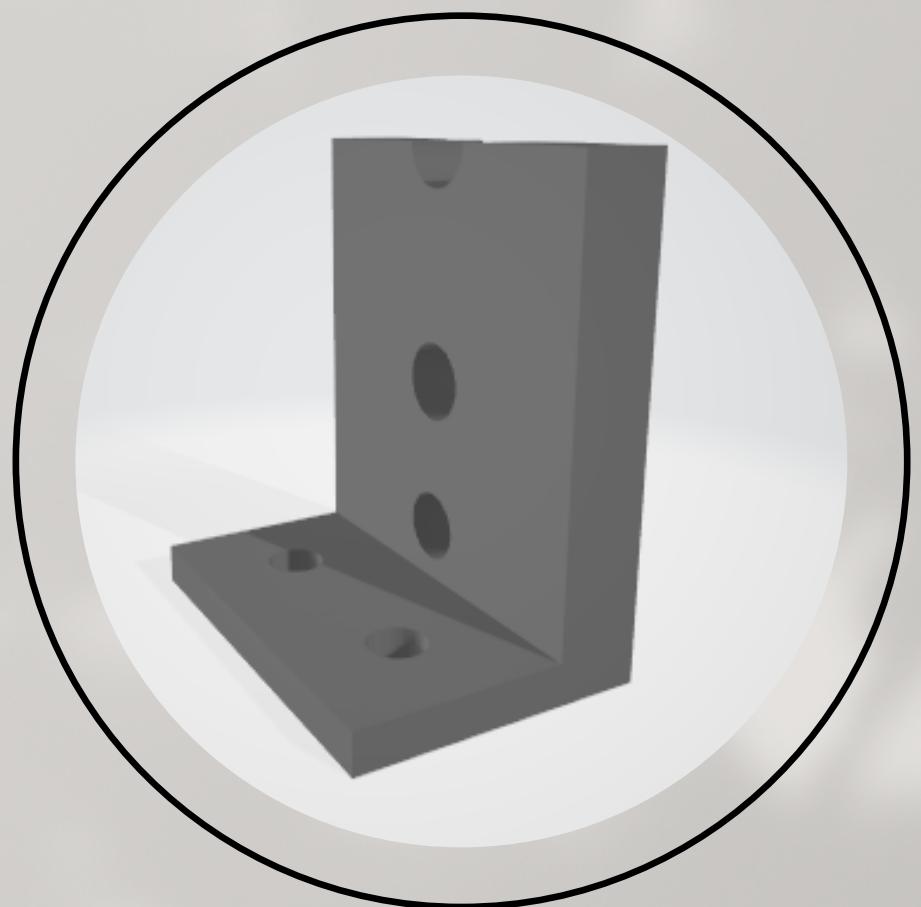
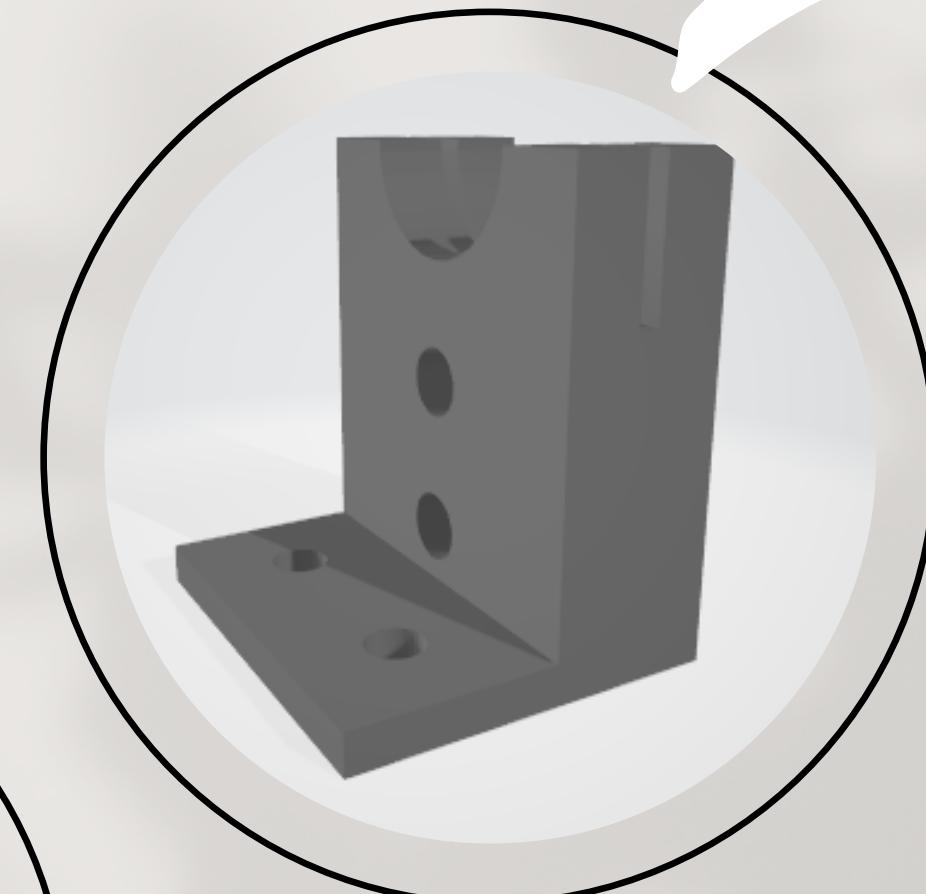
CIRCUIT



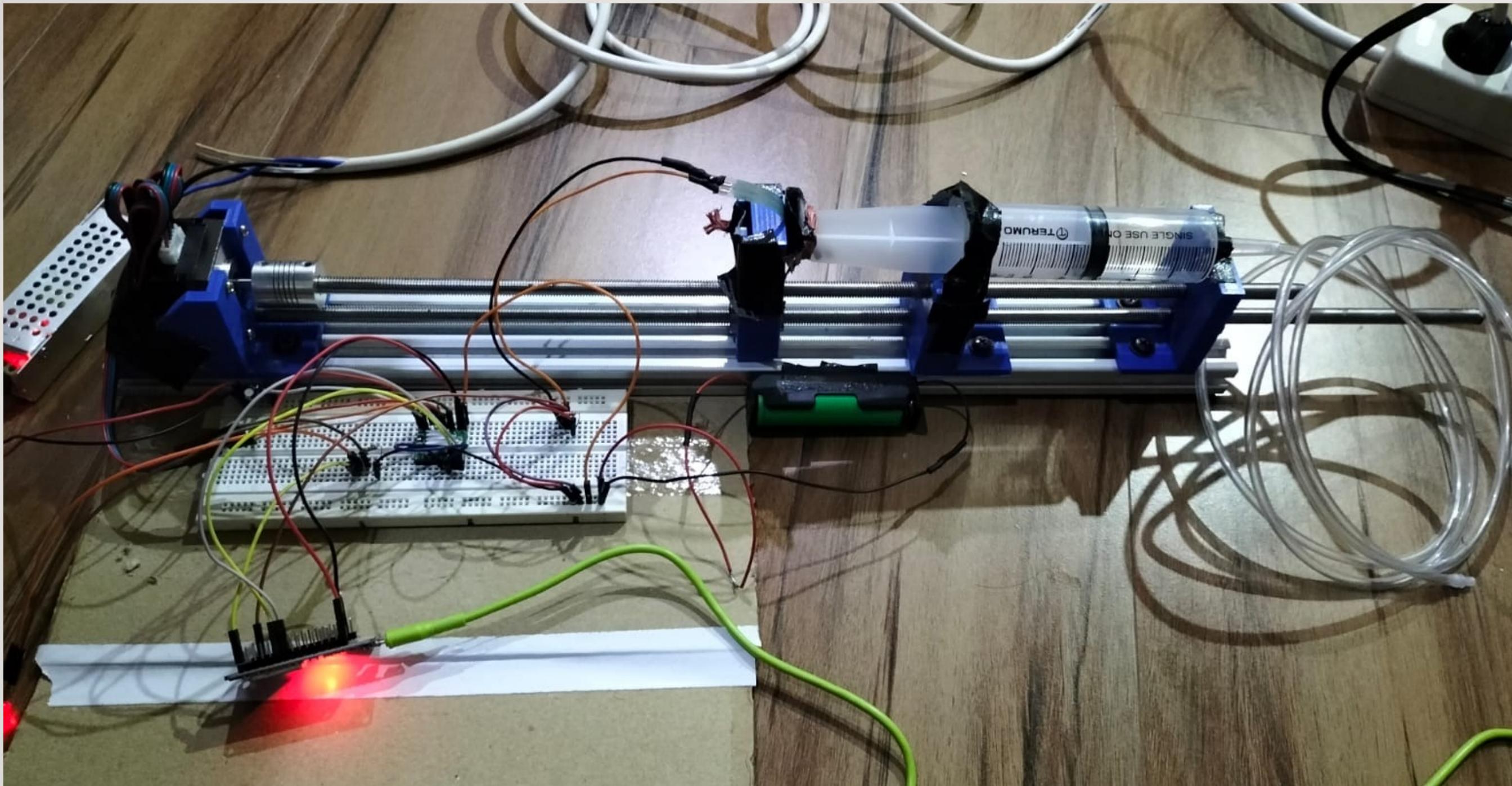
3D PRINTING



BACK VIEW



HARDWARE APPEARANCE





DASHBOARD APPEARANCE

NickyLay2607 / Dashboards / IoT Syringe Pump

Procedure
1. Please renew the volume, time, and mode of the syringe pump by sliding the slider.

2. Slide the start slider to 1. Don't change the parameters until the time reaches 0.

Time Left (sec)

0 second

Pressure Exerted by the Syringe

231 $\times 10^{-2}$ V

Absorb or Eject

0 (0=eject, 1 = absorb)

Volume of Medication (ml)

39 ml

Start

0 (1 = start)

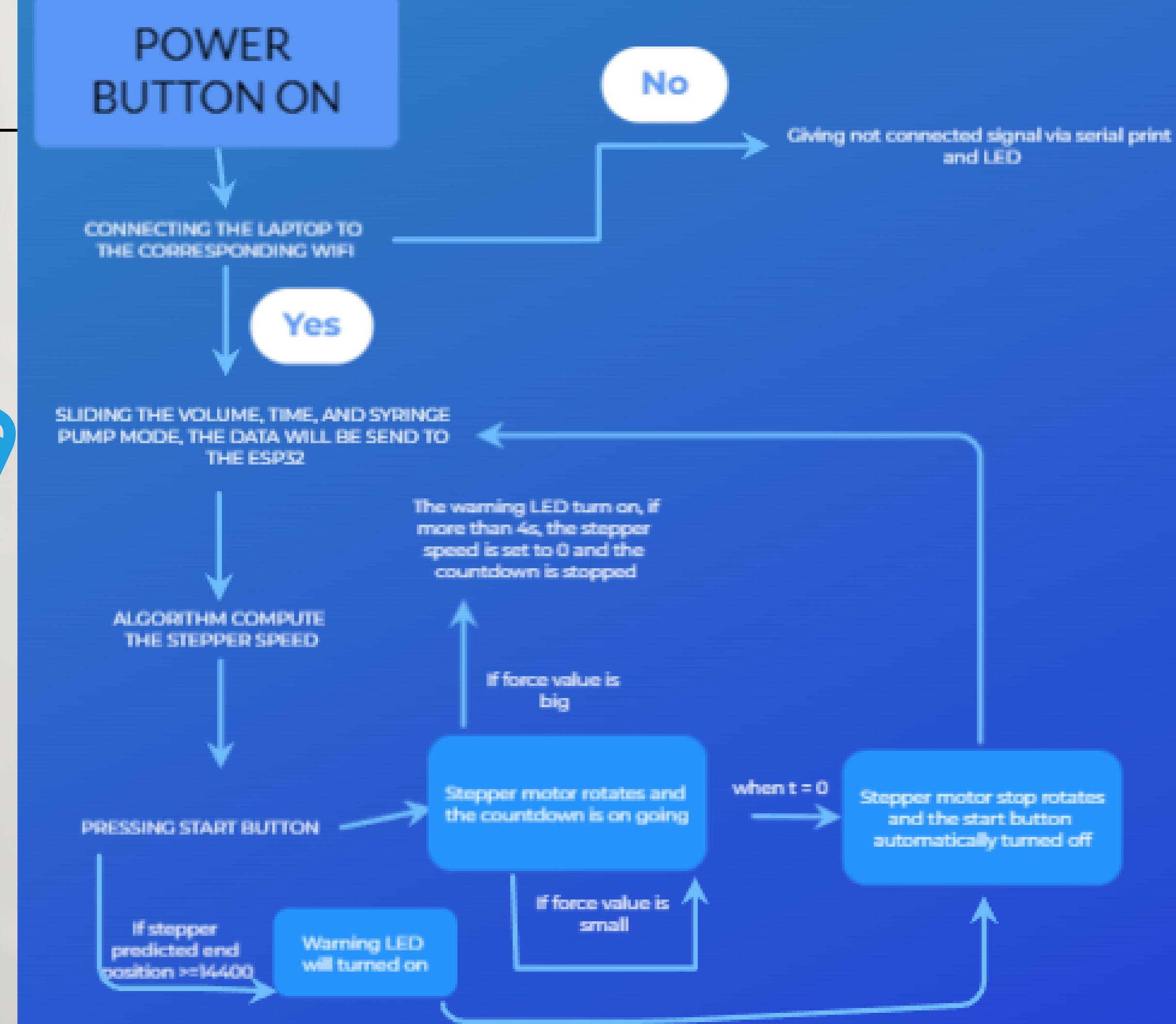
Pumping Time (min)

268 second

The dashboard interface is designed for controlling an IoT syringe pump. It features several interactive elements:

- Procedure:** Two numbered steps for setting up the pump.
- Time Left (sec):** A circular gauge showing 0 seconds, with scale marks at 10 and 1800.
- Pressure Exerted by the Syringe:** A circular gauge showing 231 units ($\times 10^{-2}$ V), with scale marks at 50, 0, and 330.
- Absorb or Eject:** A slider set to 0 (eject).
- Volume of Medication (ml):** A slider set to 39 ml.
- Start:** A slider set to 0 (start).
- Pumping Time (min):** A slider set to 268 seconds.

ALGORITHM FLOW



STRENGTH

- Easy to operate
- Precise & Accurate
- Complete Features
- Simple and Informative Dashboard
- Portable

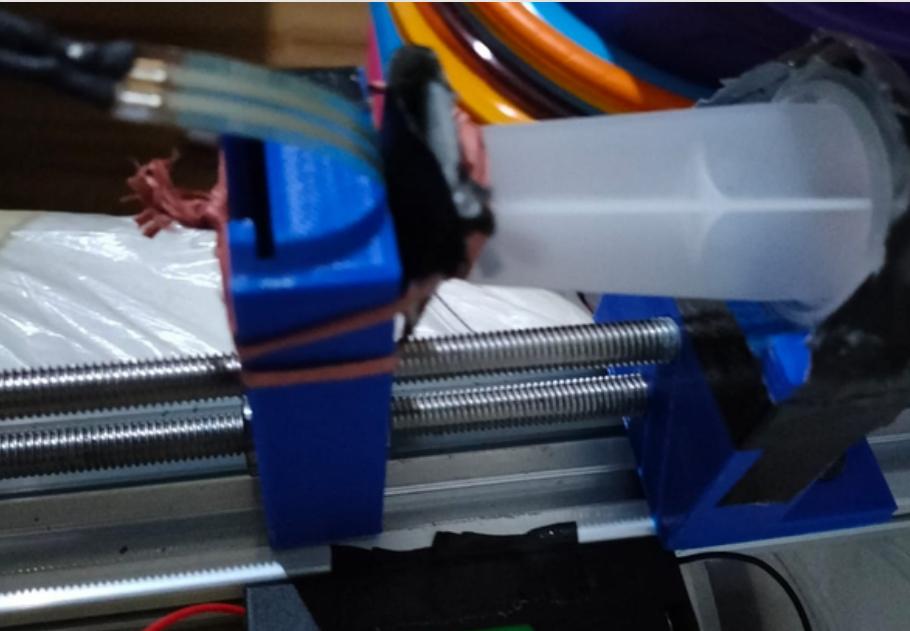
WEAKNESS

- Limited literature on the force ideal value
- New project with limited guide in the internet
- Limited data transfer, only up to 20 data per minute

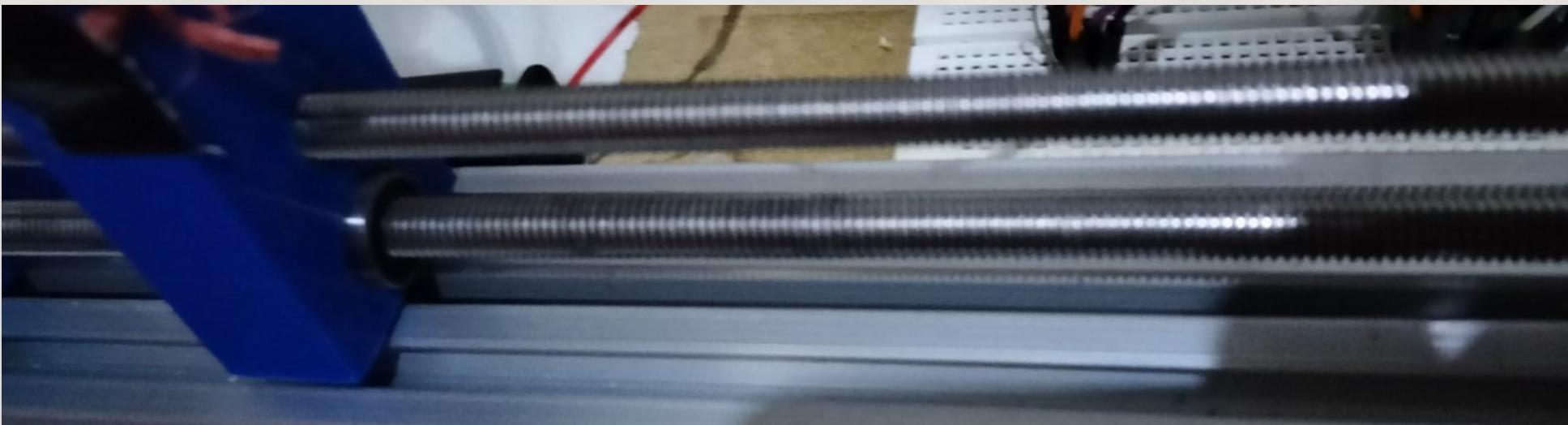


FUTURE IMPROVEMENTS

- Adjusting the 3d design of the syringe holder and pusher



- Shifting from breadboard to PCB
- Algorithm of acceleration of stepper motor to enhance the flow
- Changing the threaded rod for support into a smooth linear rod



START UNTIL END 1



START UNTIL END 1



START UNTIL END 2

The screenshot shows a computer monitor displaying an Arduino IDE window and a Windows taskbar.

Arduino IDE Content:

```
Final_exam_compilation_version3 config.h
left_time = left_time - 2;
if(left_time<= 0){
    speed_stepper = 0;
    stepper.runSpeed();
}
speed_stepper = 0;
left_time = 0;
time_left->save(left_time);
start_low = LOW;
delay(3000);
start_button->save(start_low);
Serial.print("start button is ");
Serial.println(start_low);
revolution_value = stepper.currentPosition();
Serial.print("Revolution position");
Serial.println(revolution_value);
delay(3000); }

else{
    Serial.println("Too much volume");
    digitalWrite(VOLUME_PIN,HIGH);
    delay(3000);
    start_low = LOW;
    start_button->save(start_low);
}
}
else{
    Serial.println("Press Start Button to Begin The Process");
}

Uploading:
Writing at 0x0006110d... (36 %)
Writing at 0x000663ce... (39 %)
Writing at 0x0006b6bd... (42 %)
Writing at 0x000709c5... (45 %)
```

Taskbar:

- Windows Start button
- Type here to search
- File icon
- Recycle Bin icon
- File Explorer icon
- Google Chrome icon
- Power icon
- Network icon
- System tray icons (Speaker, Battery, Network)
- 24°C Cerah weather icon

DO YOU HAVE
ANY QUESTION?

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