ENGINEERING PORTFOLIO

Haohui (Helen) Wang

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Profile

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About this portfolio

This portfolio aims to supplement my resume by presenting some selected projects I developed during my undergraduate studies. I believe that one of the most important things in any undergraduate is to participate in hands-on projects. As you will see, during my undergraduate in Mechanical Engineering, I got involved with different projects with different levels of knowledge. For each project, I provide a description, design sources, pictures, and Github links. If you have any questions about any project, feel free to get in touch with me by e-mail.

Mechanism of Particle Deposition

Overview

- **Background**

The client had a method of layering adhesive and various powders on an inkjet conveyor that does not meet their standards.

- **Problem**

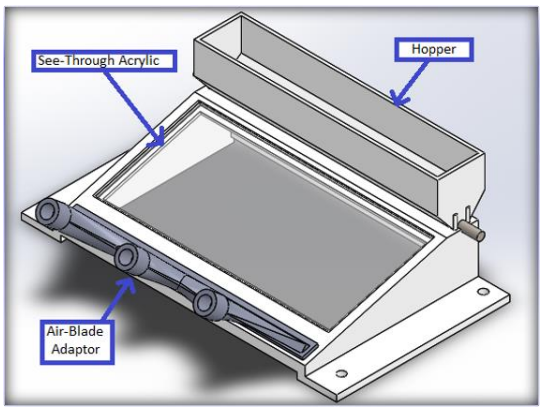
Provide proof of principle, using glitter as a substitute for various powders. The module is to be attached to a conveyor belt along with an Inkjet printer head that will dispense a uniform coating of glitter on an adhesive with a method to recover and reuse any additional glitter that is not used.

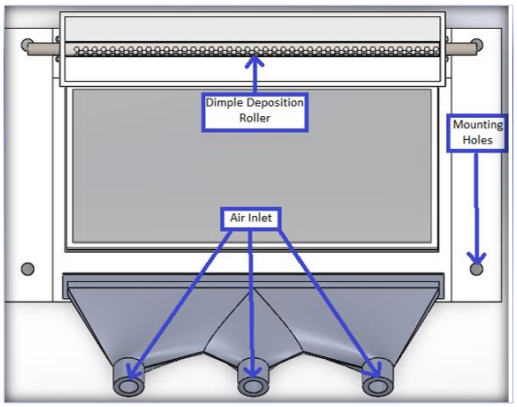
- **Benefits**

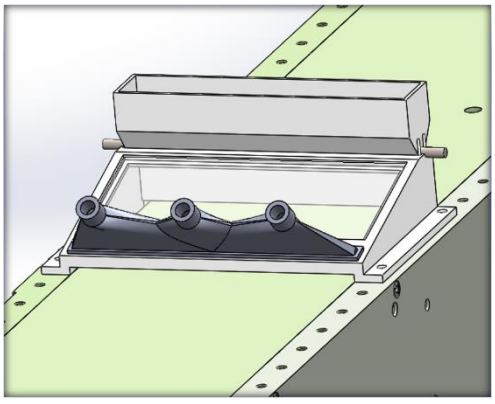
A fully functional module will prevent material waste and reduce cost while producing high quality/ high resolution prints for clients across several industries.

- **Client Requirements**

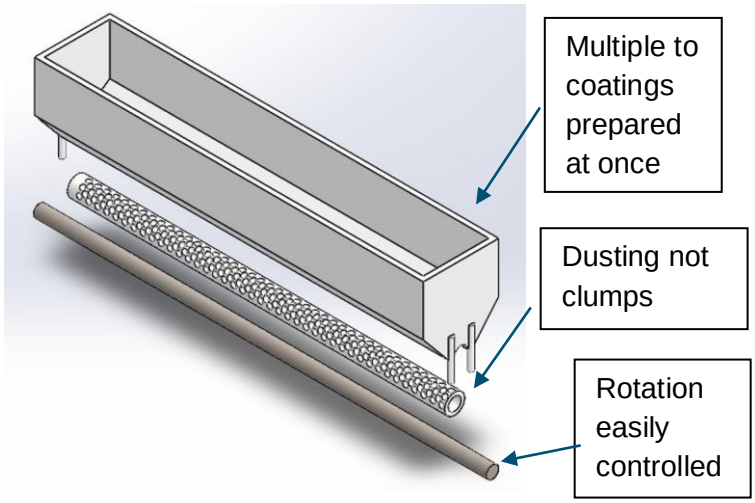
  - Maintain clean workspace and ensure minimal glitter escapes the box
  - Maximize glitter use to create less waste and reduce cost on materials
  - A way to easily control device to stop or divert the glitter flow
  - Must only remove excess glitter and not glitter that has been adhered
  - Be able to do multiple colors of glitters and multiple layers of glute/glitters
  - Must not exceed surface area of conveyer belt plate: 7.5" x 7.5"







- Hopper allows multiple coatings and can be used for multiple layers without replacing
- Dimple dusting ensures glitter covers adhesive efficiently and evenly distributed
- Rotation control gives a way to easily stop or divert glitter flow



- The red craftsman pump was used in the testing session
- It provides a much higher flow output and won't allow a for a backflow, and in theory will blow the smaller particles along the correct path.
- The figure on the left with UVM logo was printed by the mechanism design with two different colors glitters

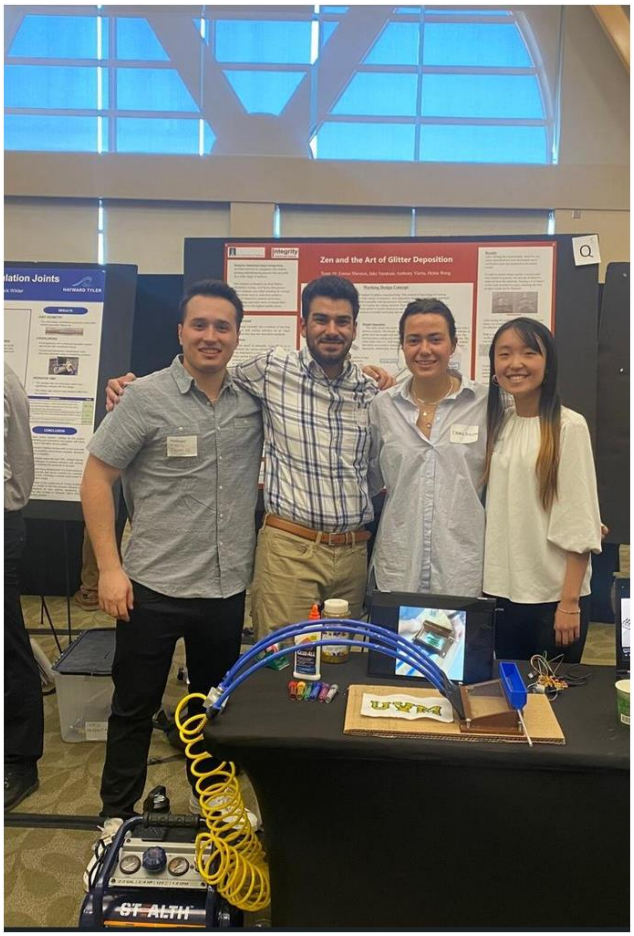
My Contributions

- I worked with 3 other team members on this project for 1 year.
- I was responsible for 3D CAD modeling, 3D printing prototyping, coding the Arduino, and communicating with the clients.

Results

- The mechanism design is able to achieve the client requirements.
- The design met almost all the determined specifications with a pass rate of 86%.
- The whole project is available on Github
- The Design Night Poster is available in this link
- You may see the mechanism's instruction and performance video on YouTube
- We also got featured at the Design Night at our school! Have a look at: UVM Senior Engineering Design Night 2022

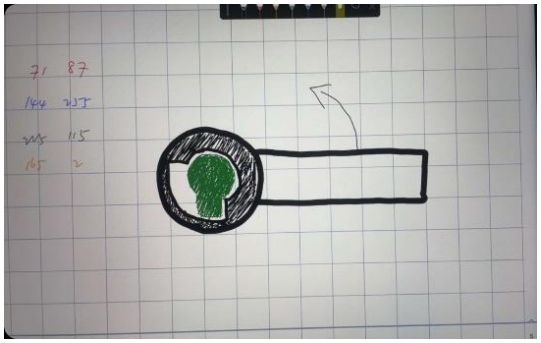
Team Pictures



3D Printing Projects

Overview

- This is a toilet paper holder design by using the idea of “limiter” mechanism
- Started from the sketch, then SOLIDWORKS design, Finally prototyped by Creality Ender3 3D printer at home.



3D Printing Gallery

Here it presents to you a collection of amazingly shot photos of my 3D printing projects with my Ender3 printer. Hope you find something interesting and/or amuse your eyes. Enjoy browsing!

iphone Case

Started this design with PLA material, however, PLA has stiff and crispy properties, so it is not the best option for phone case. Therefore, I started exploring new printing material –TPU, which is more elastic.

Aircraft Model

This print is an assembly for aircraft model. It is made of a few parts – the rotor, wings, body, and wheels.
Printing material: PLA
Total print time: 3.5 hrs
Design credits: Cults3d

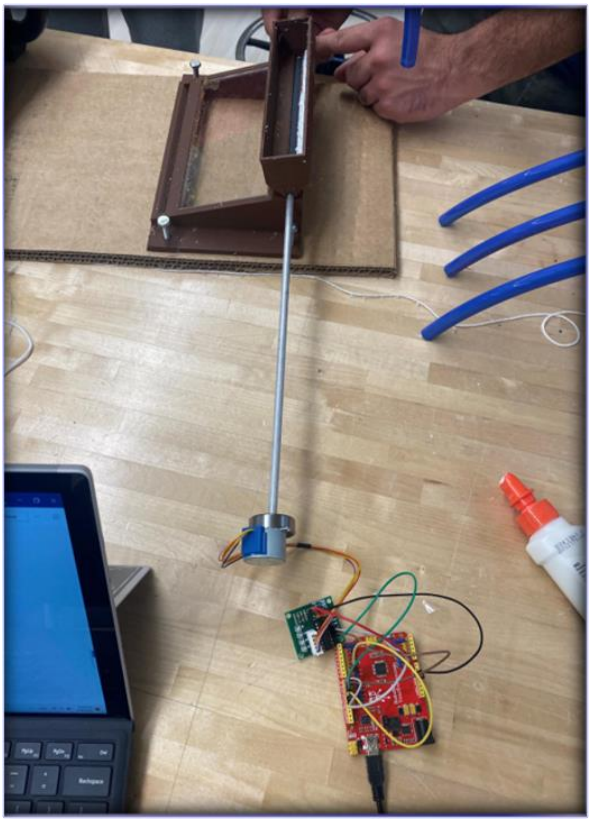
Pen Holder

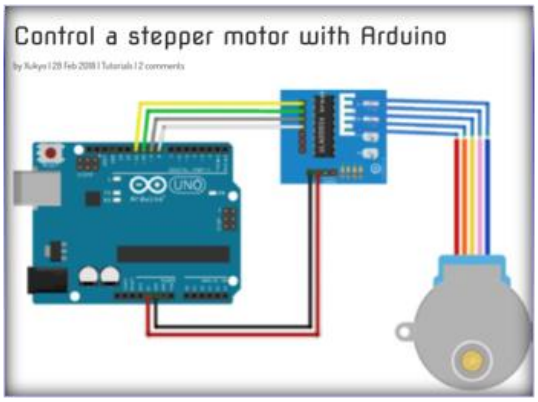
This is a design made via SOLIDWORKS. There is name extrusion design on the side and bottom of this pen holder. Total print time: 6.5 hrs

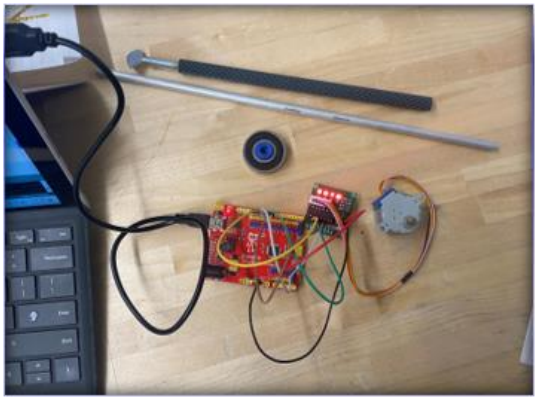
Arduino Projects

Stepper Motor Controlled Deposition

This is a continued development for Senior Capstone Design Mechanism (see page 4). Automated deposition has been added to the prototype. The addition of roller bearings has also reduced rotational friction in the deposition assembly, improving the process further.







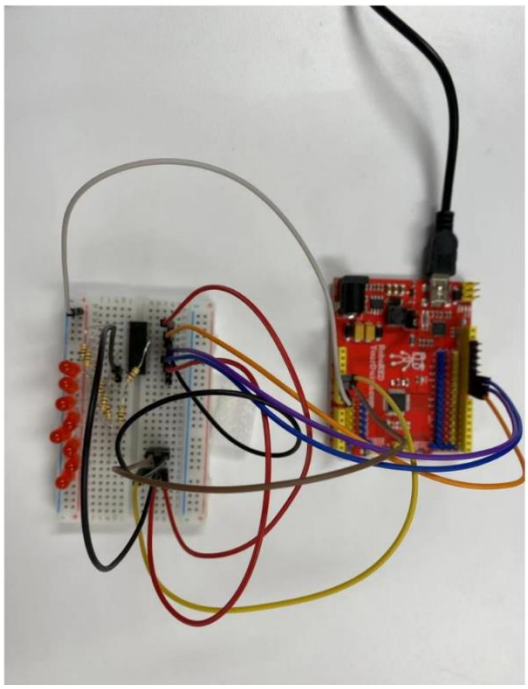
My Contributions

- Built the schematic and connect the Arduino Roboboard
- Modify Arduino code and added feature to control stepper motor rotation cycle

Arduino LED Light Control – Pingpong

Overview

- Using a serial to parallel shift register HC595 we can effectively turn two digital outputs from microcontroller into 8 outputs.
- utilize a series of LEDs attached to the shift register and the persistence of the human eye to create a few interesting visual effects. This project performs the pingpong effect, which controls the LED light flash periodically from one side to the other side.



```
pingpong
byte array[]={
B10000000,
B01000000,
B00100000,
B00010000,
B00001000,
B00000100,
B00000010,
B00000001,
B00000010,
B00000100,
B00001000,
B00010000,
B00100000,
B01000000,
B10000000,
};

int counter =0;
int size_=15;
void setup() {

  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
  pinMode(10, OUTPUT);

}


void loop(){

digitalWrite(9, LOW);
shiftOut(8, 10,MSBFIRST, array[counter]);
digitalWrite(9,HIGH);
delay(50);
counter++;

if (counter > size_){
  counter = 0;
}
}
```

My Contributions

- Interface a 74HC595 serial to parallel converter circuit to RoboRed microcomputer given a schematic.