Frederick Houghton

MEC ENG 102B

Stuart; Kazerooni

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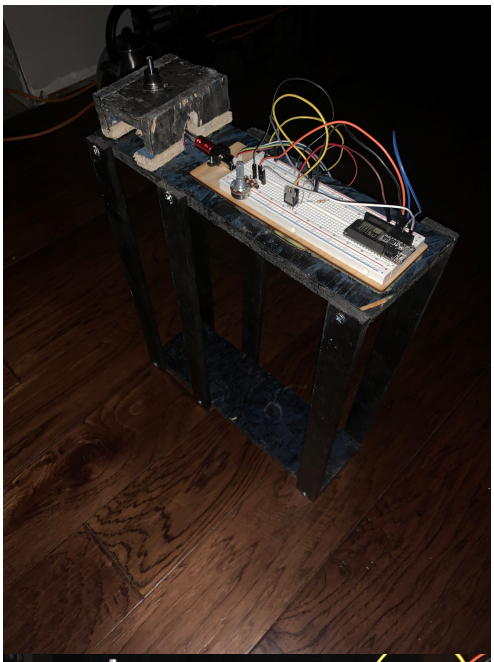
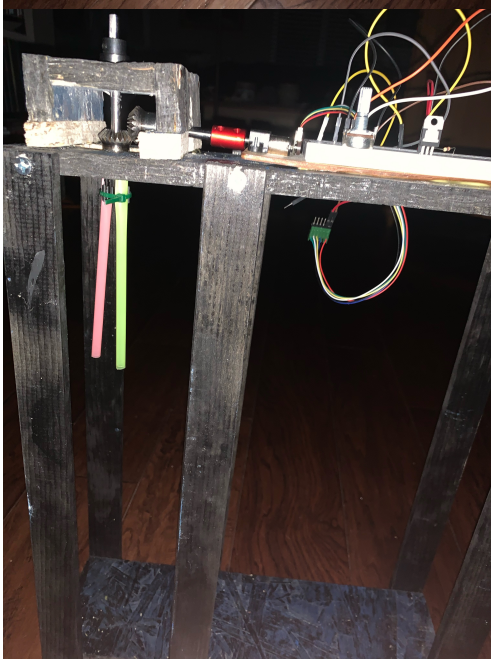
Drink Stirrer

I. Description



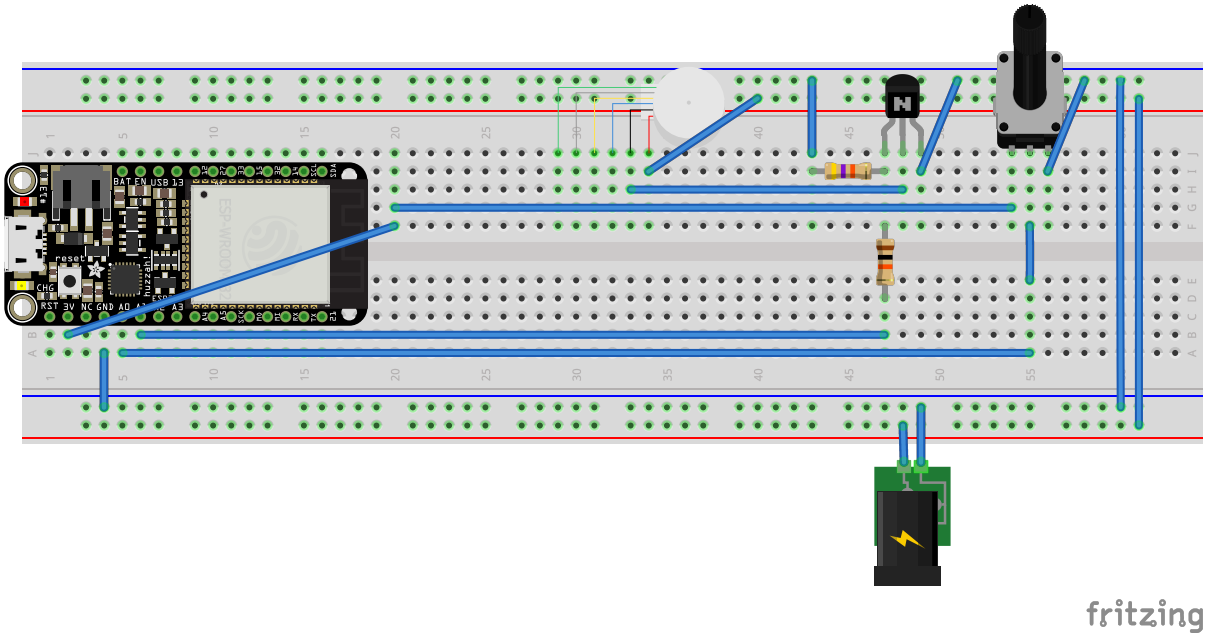


In a world of increasingly automated devices, I find that it will not be long before our food and drinks at fast food restaurants will be prepared at the touch of a button. That being said, I wonder how drinks like coffee with creamer would be stirred to ensure the various flavors are constant throughout the drink. Or maybe that weekend caipirinha tastes too much like cachaça because it was not stirred well enough. This product demonstrates one key component to moving toward this automation, as it now enables us to stir drinks as needed.

II. Construction

The housing and stand were built from standard half-inch wood, two-inch screws, and one-inch nails. On top of the stand was the breadboard, which was adhered using wood glue. For this portion of the assembly, it

should be noted that the screws allowed the legs to freely rotate as sets of parallelogram four bar linkages.



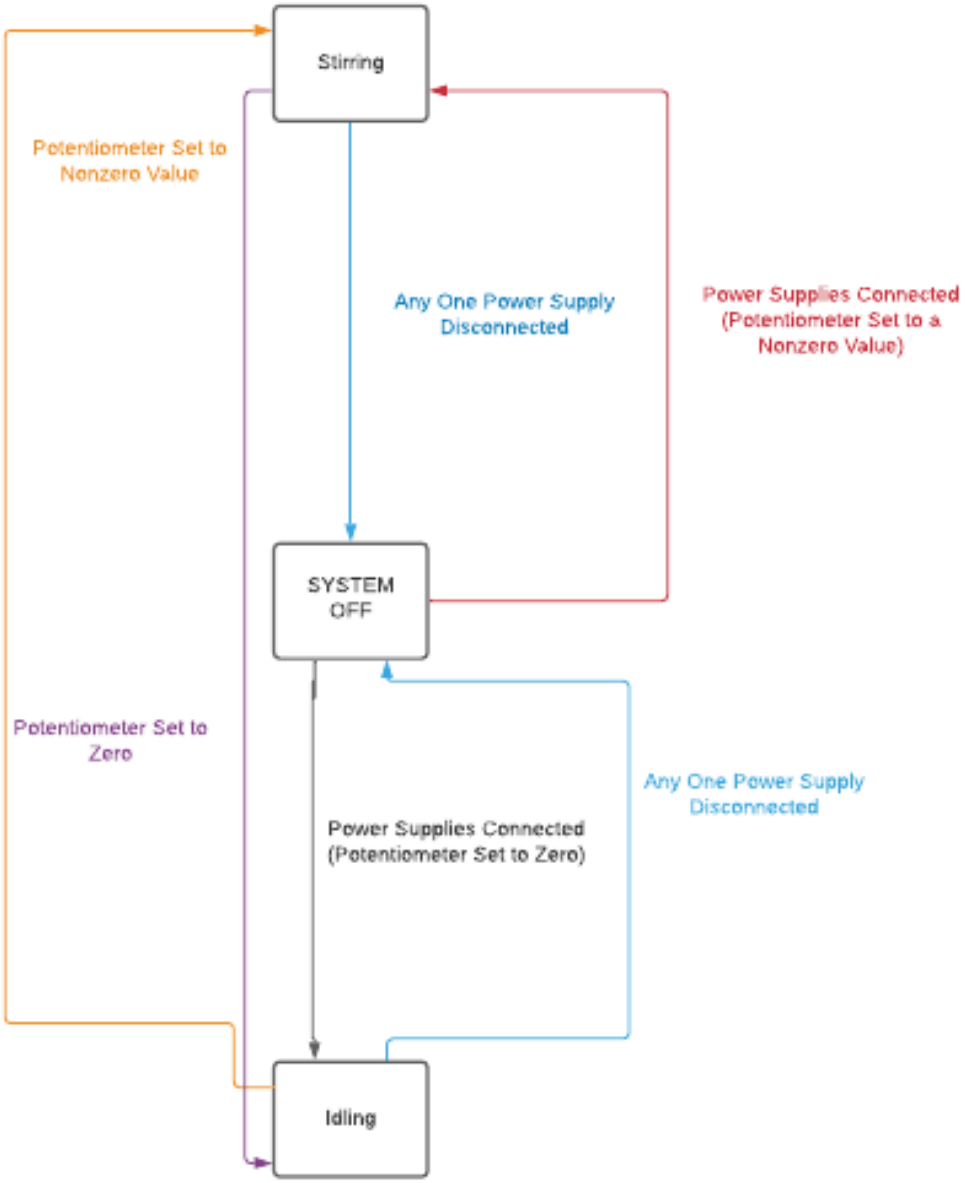
As for the mechanical and electrical components there were the following:

- Assembled Adafruit HUZZAH32 – ESP32 Feather Board – with Stacking Headers: This is our microcontroller, allowing for the change of motor speed in this case.
- 75:1 Micro Metal Gearmotor HP 6V with Extended Motor Shaft: Pololu motor that is acceptable for the application.
- PDB181-E420K-102B Linear Potentiometer: Variable resistor that is used to provide a voltage input to the micro which, in turn, produces a PWM output based upon the magnitude of said input.
- MOSFET Transistor N-Channel 60V: The MOSFET allows us to use the 5V input source and connect this to the microcontroller, indirectly.

- 2x Bevel Gear: 6mm hole, 45 steel, 20 teeth. Used to change the directionality of the rotation of the motor shaft.
- 2x 6mm Shaft; one is 2 inches (horizontal) and the other, 4 inches (vertical). Permits rotation of various parts.
- Shaft Coupler: 3mm to 6mm shaft converter in order to shift from the motor's shaft to the more appropriate 6mm shaft.
- Pinion Gear: 45 Steel, 15-tooth with 6mm hole diameter. Used to provide greater moment arm to stirring straws with respect to the center of rotation.
- Flanged Ball Bearing: 6x17x6mm shielded chrome steel bearings. This is used to reduce the friction of the vertical shaft's rotation and to support some of the axial load of this shaft.
- Shaft Collar: 6mm collar used to lock the ball bearing and itself above the transmission housing in order to fix the position of the vertical shaft.

Due to the design of the system, there was no need to order steps of assembly in any particular manner as parts and tools were maneuverable as needed.

III. Finite State Diagram



Appendix

Arduino Code:

```
int MOSFET = A1; //sets MOSFET pin
int pot = A0; //set pot pin
int Rin; //instantiate resistance of pot.
int freq = 1000; //freq. of PWM
int res = 10; //resolution of PWM
int aRes = 4096; //steps in analog input
int potMax = 1000; //max resistance of pot.

void setup() {
  pinMode(MOSFET,OUTPUT); //set mosfet to output
  pinMode(pot,INPUT); //set pot to input
  ledcSetup(0,freq,res); //PWM channel 0 with 1000 Hz and 10 bits
  ledcAttachPin(MOSFET,0); //attach PWM to the pin
}

void loop() {
  Rin = map(analogRead(pot),0,aRes,0,potMax); //resistance of potentiometer
  ledcWrite(0,Rin); //gives dutyCycle between 0-999
}
```