Mechanical Overview

Year: \_\_\_2019\_\_\_ Semester: \_\_\_\_Fall\_\_\_\_ Team: \_\_8\_\_\_

Project:\_\_\_Condiments Express\_\_\_\_

Creation Date: \_\_\_\_9/20/2019\_\_\_\_\_\_\_ Last Modified: September 20, 2019

Author: \_\_\_\_\_\_\_\_\_Minghao Sun\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_sun627@purdue.edu\_\_\_\_\_\_\_

Assignment Evaluation:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Score (0-5)** | **Weight** | **Points** | **Notes** |
| **Assignment-Specific Items** | | | | |
| **Commercial Packaging Analysis 1** | 4.5 | x2 | 9 | Inline |
| **Commercial Packaging Analysis 2** | 4.5 | x2 | 9 | Inline |
| **CAD Model Illustrations** | 4.5 | x4 | 18 | Inline |
| **Project Packaging Specifications** | 4 | x2 | 8 | Inline |
| **PCB Footprint Layout** | 3.5 | x2 | 7 | Inline |
| **Writing-Specific Items** | | | | |
| **Spelling and Grammar** | 4.5 | x2 | 9 |  |
| **Formatting and Citations** | 5 | x1 | 5 |  |
| **Figures and Graphs** | 4 | x2 | 8 | Add captions |
| **Technical Writing Style** | 5 | x3 | 15 |  |
| **Total Score** | 88 | | |  |

5: Excellent 4: Good 3: Acceptable 2: Poor 1: Very Poor 0: Not attempted

Comments:

Impressive work on CAD design and having the PCB footprint.

1. Commercial Product Packaging
   1. Product #1 --- small-liquid-filling-machine

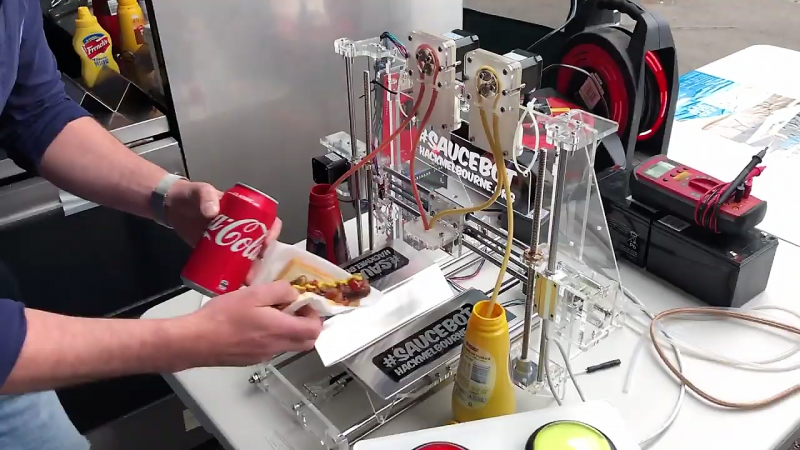
This product is a filling machine that can fill liquid into the container with a certain amount of volume. For this product, it shares some similar features as ours. It uses a piston pump and cylinder stroke to fill and regulate the liquid. Their method of dispensing liquid can accurately control the volume of liquid and it supports various types of liquid including honey, water, oil and so on.

The package design is metallic and consists of several plastic tubes which is heavy and expensive. This design may be suitable for industrial utilization, but our design is mainly used in a household. Therefore, our design needs to take the good looking into consideration as well as the functionality. Instead of metal materials, we tend to use 3D printing material which is lighter and a bit more beautiful than metal, and since we use aluminum to build the major parts that hold the weight of the overall machine, the machine will still be robust. Also, the size of this design is too large for products that are placed in the kitchen since it can only dispense one type of liquid at one time, so many of them have to be used at the same time to satisfy kitchen needs. This means those machines will take up lots of space in people’s kitchen. For our design, we need to reduce the size as we need to place a few condiments. [1]



small-liquid-filling-machine

* 1. Product #2 --- saucebot



saucebot

This design is a liquid or sauce dispenser. This design is packaged with the use of two peristaltic pumps and sucking sauces from the bottle placed on the table. This design used a similar method as us to dispense liquid condiments. We both use the peristaltic pump to accurately control the number of condiments that are adding. In this design, peristaltic pumps are placed on the top and the sauce bottles are placed lower than the pump. This kind of design is easier for the user to replace the sauce bottle once it is run out, but the flowing speed of the sauce is limited since it needs to overcome gravity.

In our design, since we have an x-y grabbing system that is on the bottom, so we must put all of the condiments on the top part and peristaltic pumps under those bottles. The advantage of it is that the flowing speed can be easily controlled by a peristaltic pump. However, we need to design a filling system once the user needs to fill in more condiments into bottles. [2]

3.0 Sources Cited

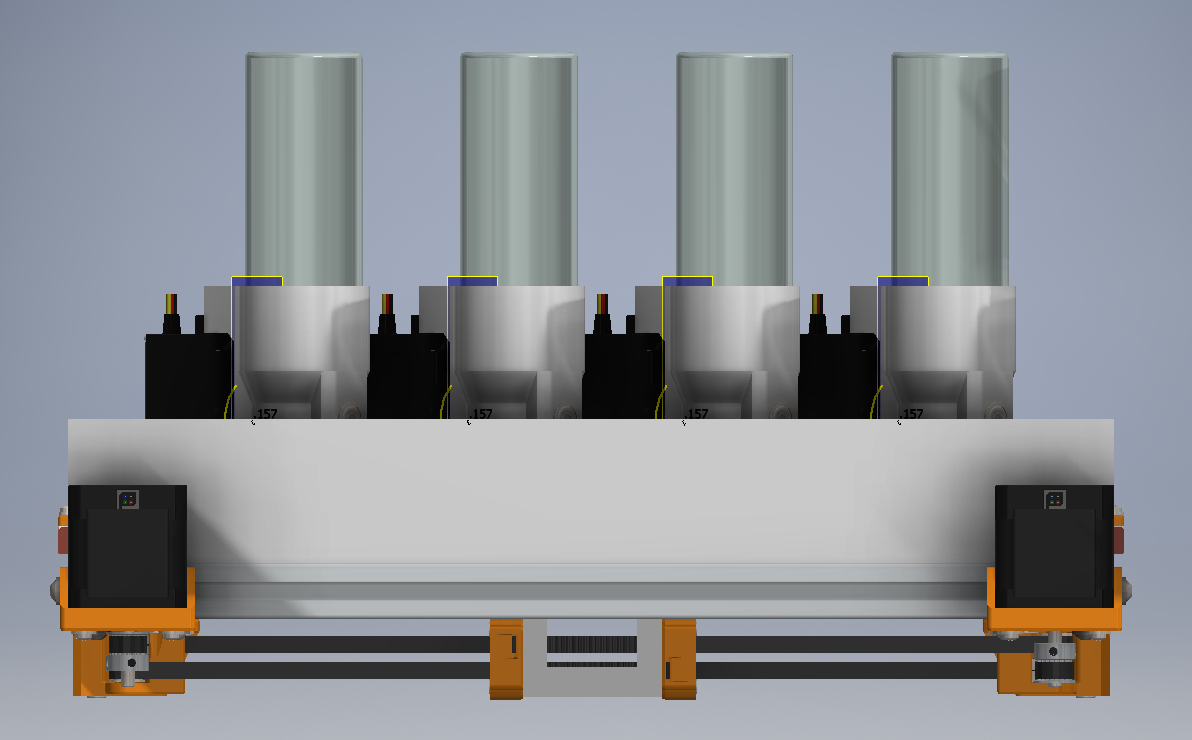
[1] Maloney, D. (2019). SauceBot Uses G-Code To Apply Condiments With Precision. [online] Hackaday. Available at:

https://hackaday.com/2018/11/29/saucebot-uses-g-code-to-apply-condiments-with-precision/ [Accessed 20 Sep. 2019].

[2] Small Liquid Filling Machine, Shampoo, Drink, Oil Dispenser - Buy Automatic Liquid Dispensing Machine, Manual Liquid Filling Machine, Essential Oil Filling Machine Product on Alibaba.com. [online] Available at:

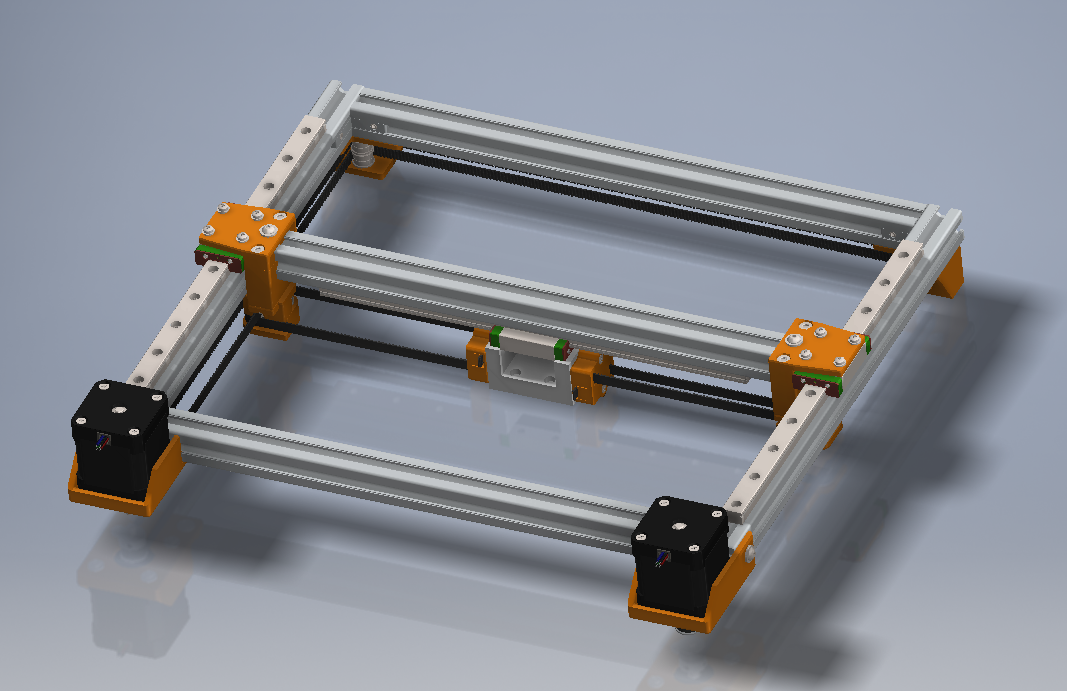
https://www.alibaba.com/product-detail/small-liquid-filling-machine-shampoo-drink\_60672282228.html?spm=a2700.7724838.2017115.12.1c8910dbCbIvw1 [Accessed 20 Sep. 2019].

Appendix 1: CAD Model Illustrations

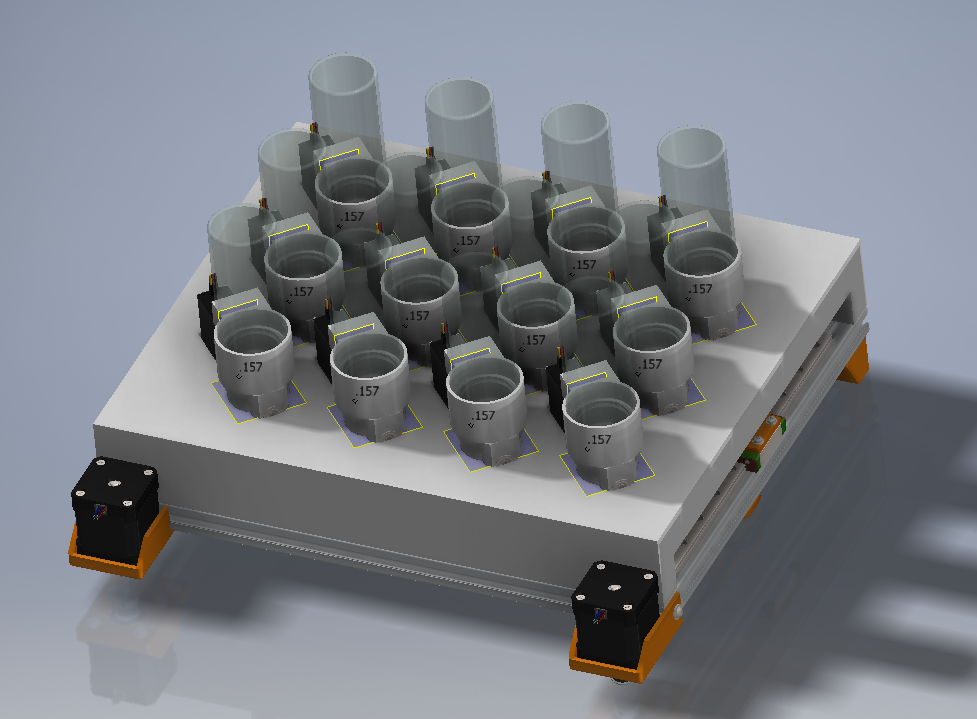


Front view of top plate

15 x 16 inch



XY mecahnism



Top view of Top plateAppendix 2: Project Packaging Specifications

|  |  |
| --- | --- |
| Peristaltic pump | $18.83 |
| Plastic Bottle | $3.07 |
| Plastic Bottle | $3.21 |
| Monochrome 2.7" 128x64 OLED Graphic Display Module Kit | $39.95 |
| Trinamic Stepper Driver (5pack) | $35.99 |
| Adafruit HUZZAH32 – ESP32 Breakout Board | $13.50 |
| Adafruit DRV8871 DC Motor Driver Breakout Board - 3.6A Max | $7.50 |
| Adafruit HTU21D-F Temperature & Humidity Sensor Breakout Board | $14.95 |
| Vibrating Mini Motor Disc | $1.95 |
| Rotary Encoder + Extras | $4.50 |
| MCP23008 - i2c 8 input/output port expander | $1.95 |
| Weight Sensor | $4.88 |
| limit switch long hinger roller | $2.98 |
| limit switch | $4.22 |
| HX711 Weight Sensor Amp | $0.66 |
| 20x20 aluminium profile 6mm slot | $5.74 |
| MGN12 linear rail and carriage block | $9.68 |
| GT2 6mm belt | $11.12 |
| GT2 pulley 20 teeth 2 pcs. |  |
| F694ZZ ball bearing 16 pcs. | $10.99 |
| 2020 internal L-joint 4 pcs. |  |
| Eryone TMC2208 | $38.51 |
| 30-Pack 15 x 6.5 x 3 mm Rectangular Magnets | $11.97 |
| Rannb 10pcs 4mmx100mm | $8.55 |
| LM YN PCA9685 | $6.99 |

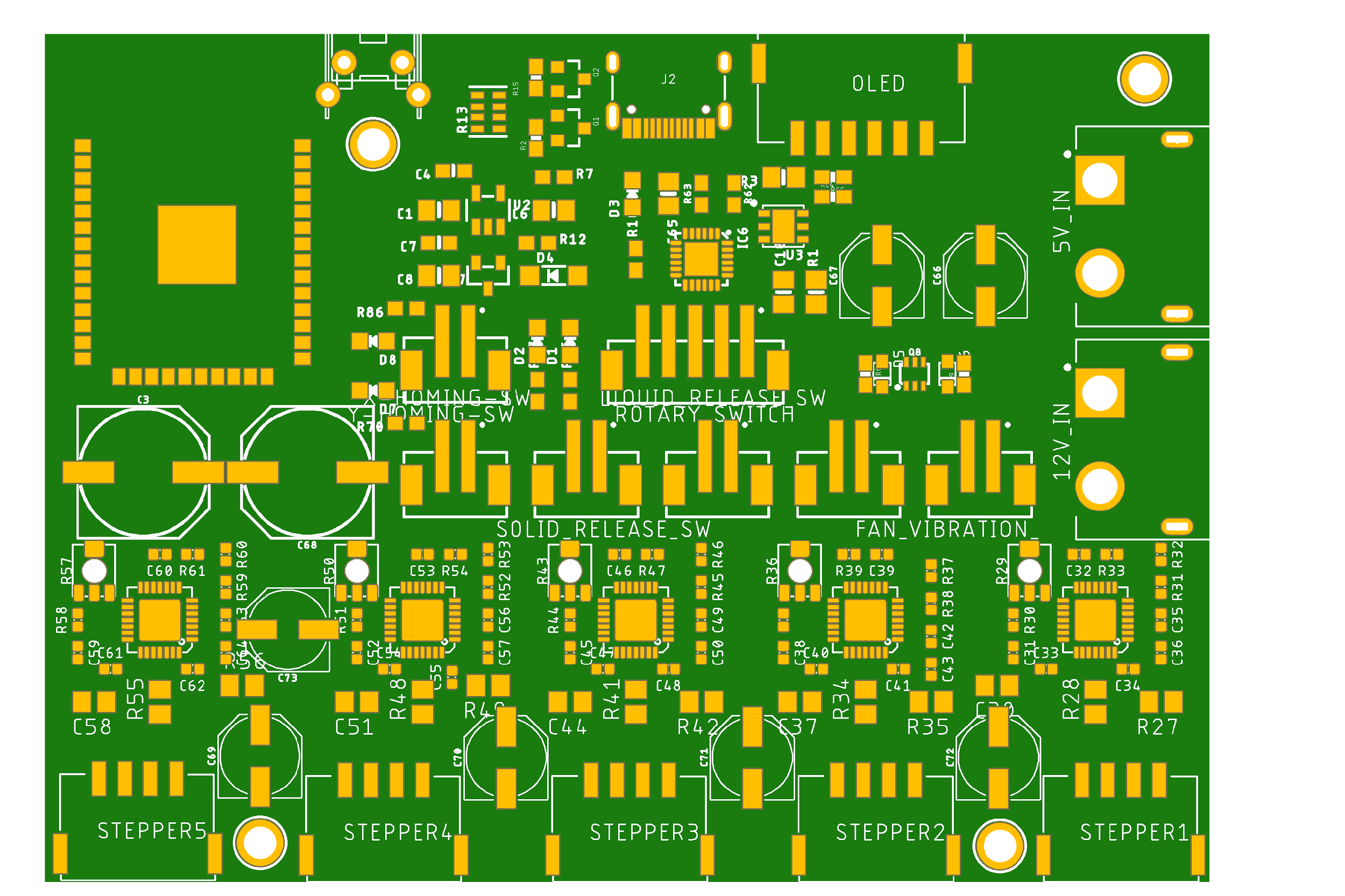
Estimated weight: 8 kg

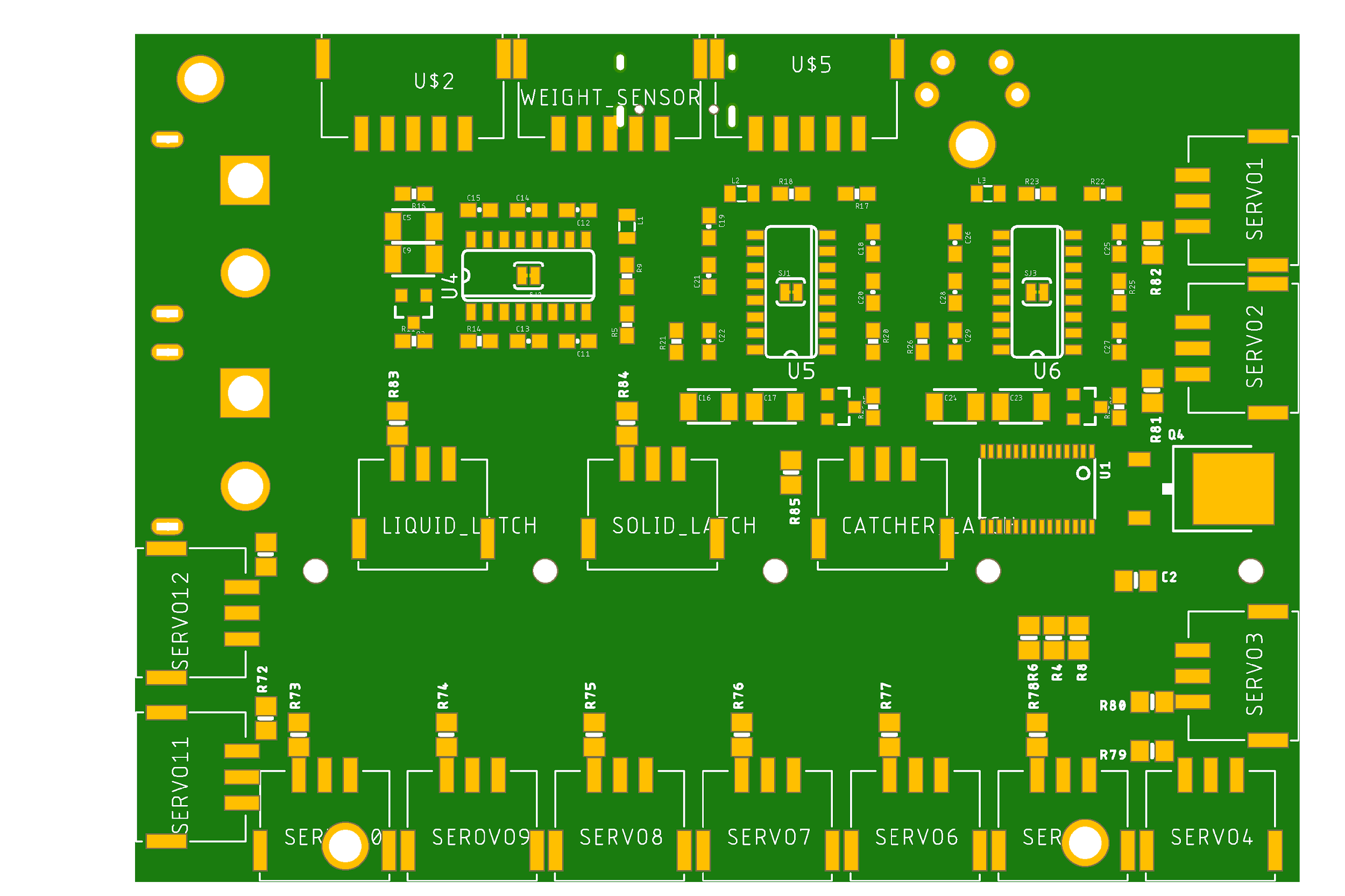
Materials: Aluminum, 3D printing material, Medium Density Fiber Board

Dimention: 15 x 16 inch

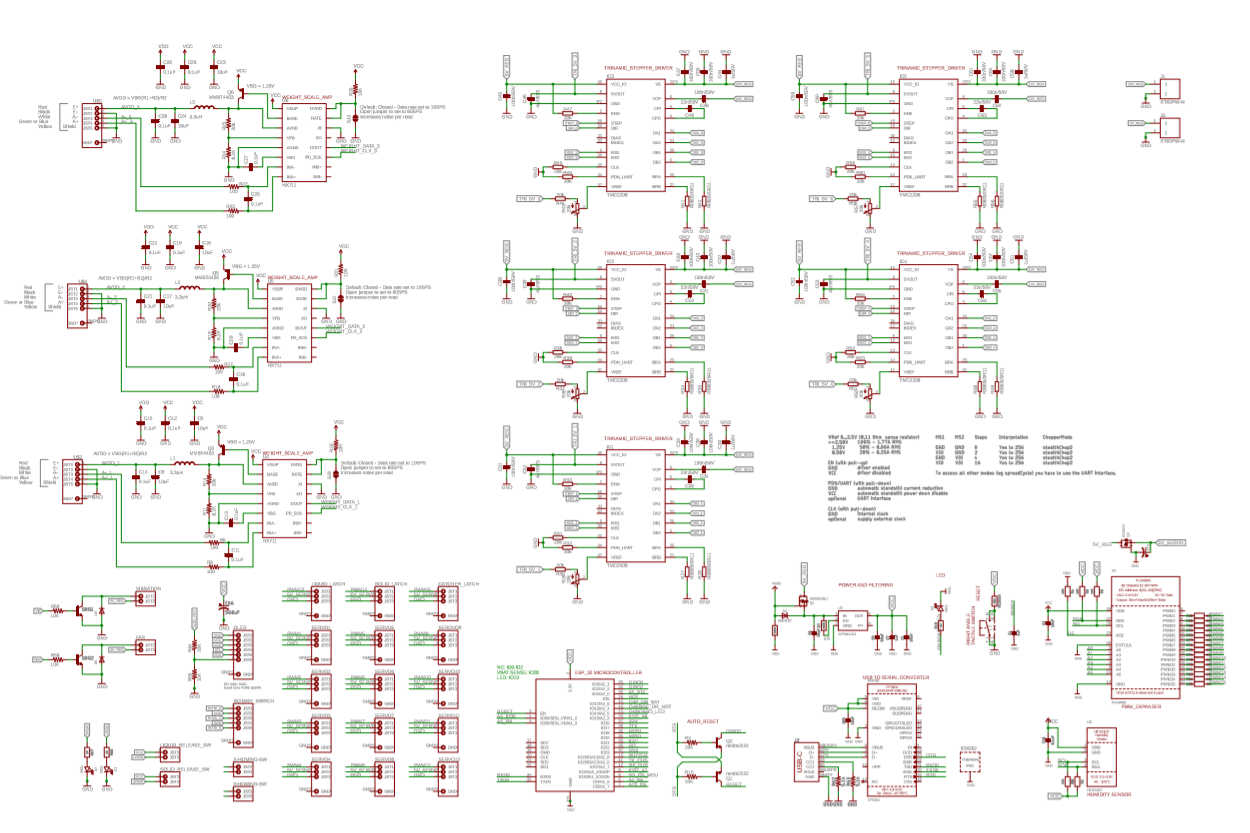
Tooling equipment: Screw driver

**Appendix 3: PCB Footprint Layout**

Top side of the PCB



Bottom side of PCB



Schematics