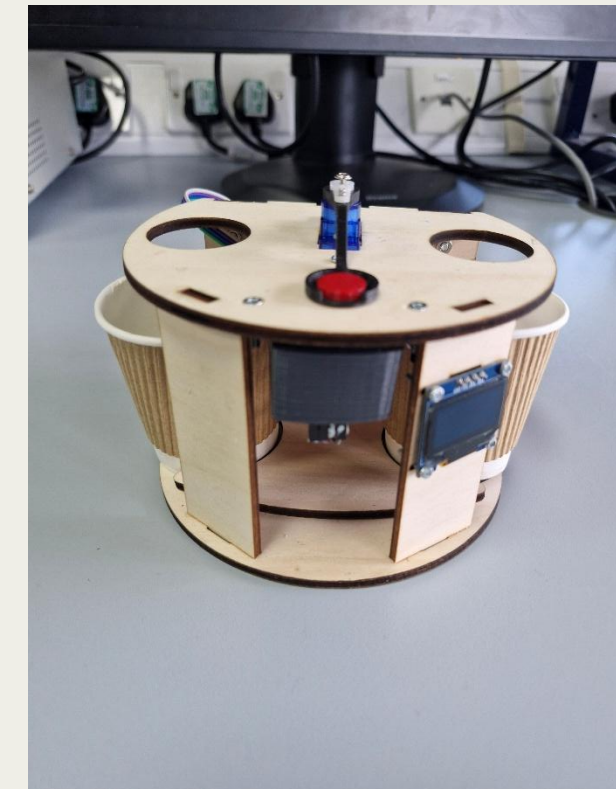# EENG3110

First Year Engineering Applications Project: Colour Sorting System

Sania Sayeed
Login: ss2805
Student ID: 24062010
Electronic and Computer Engineering

AIMS AND OBJECTIVES

- Aim: Design and build a system to detect different coloured tokens using a colour sensor and servo motor.
- Objectives: The system should use a servo to sort a chosen colour (e.g. Red) from the other colours in the mix. The colours used are blue, green, black, white and red and detected by the sensor. The detected colour and RGB values is displayed on an OLED screen.
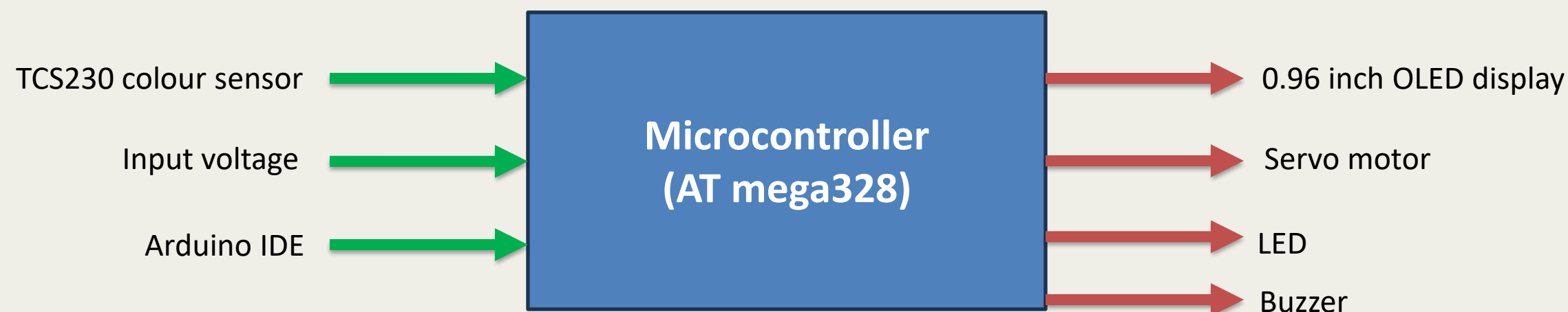
PROJECT SPECIFICATION OVERVIEW

Key functionalities:

- LED x2 turns on to indicate button has been pressed and system starts
- Detects token colour using TCS230 sensor
- Buzzer sounds when red is detected
- Uses servo to sort token into cups
- Displays detected colour on OLED screen
- Additional feature: e.g. track and display accepted and rejected tokens

TCS230 colour sensor →

Input voltage →

Arduino IDE →

Microcontroller (AT mega328)

→ 0.96 inch OLED display

→ Servo motor

→ LED

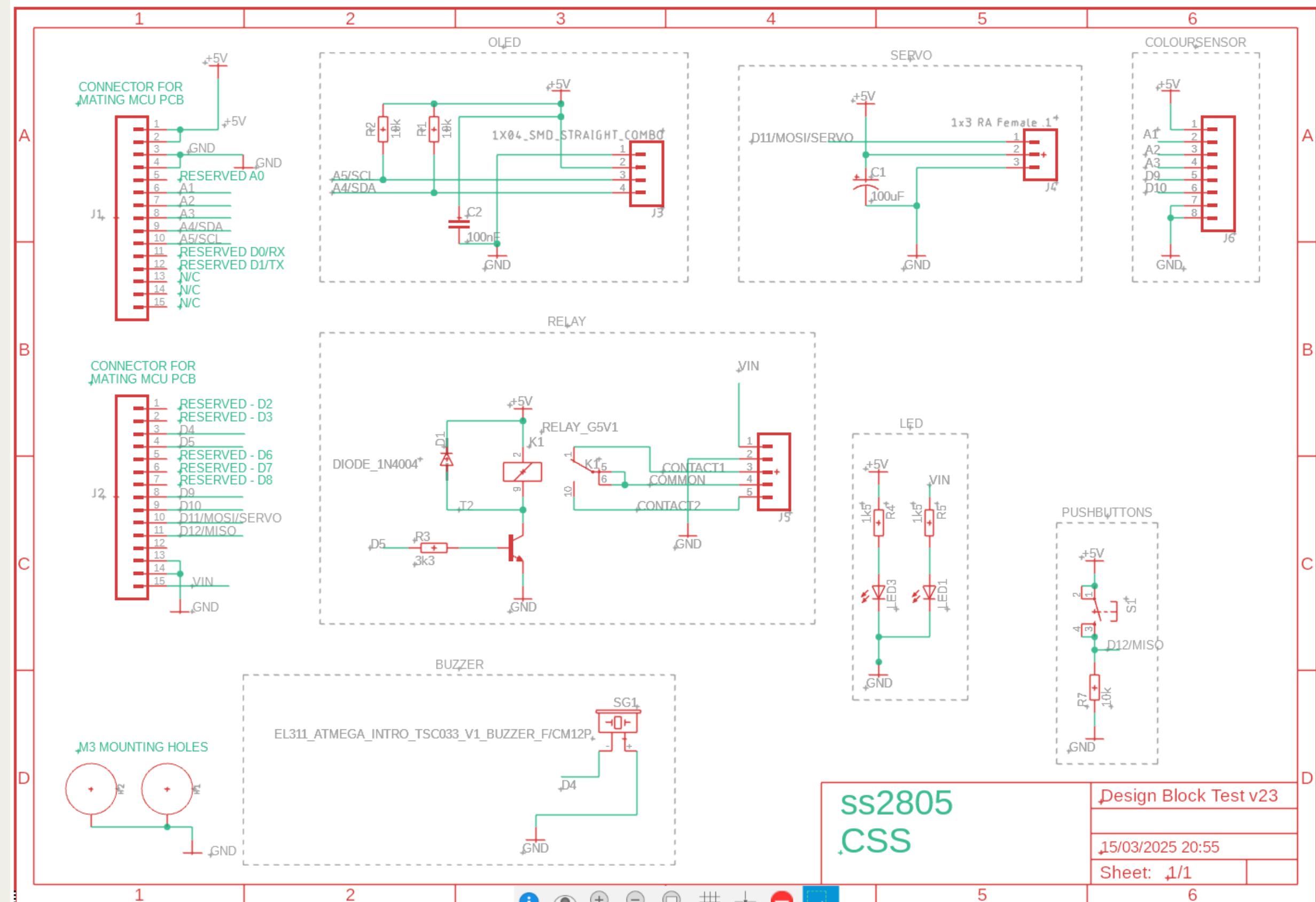→ Buzzer

Block Diagram

PCB SCHEMATIC

Designed using
Autodesk Fusion 360:

It includes:
- A colour sensor (A1, A2, A3, D9, D10)
- A servo (D11)
- An OLED (A4, A5)
- Button (D12)
- LED's x2
- A buzzer (D4)
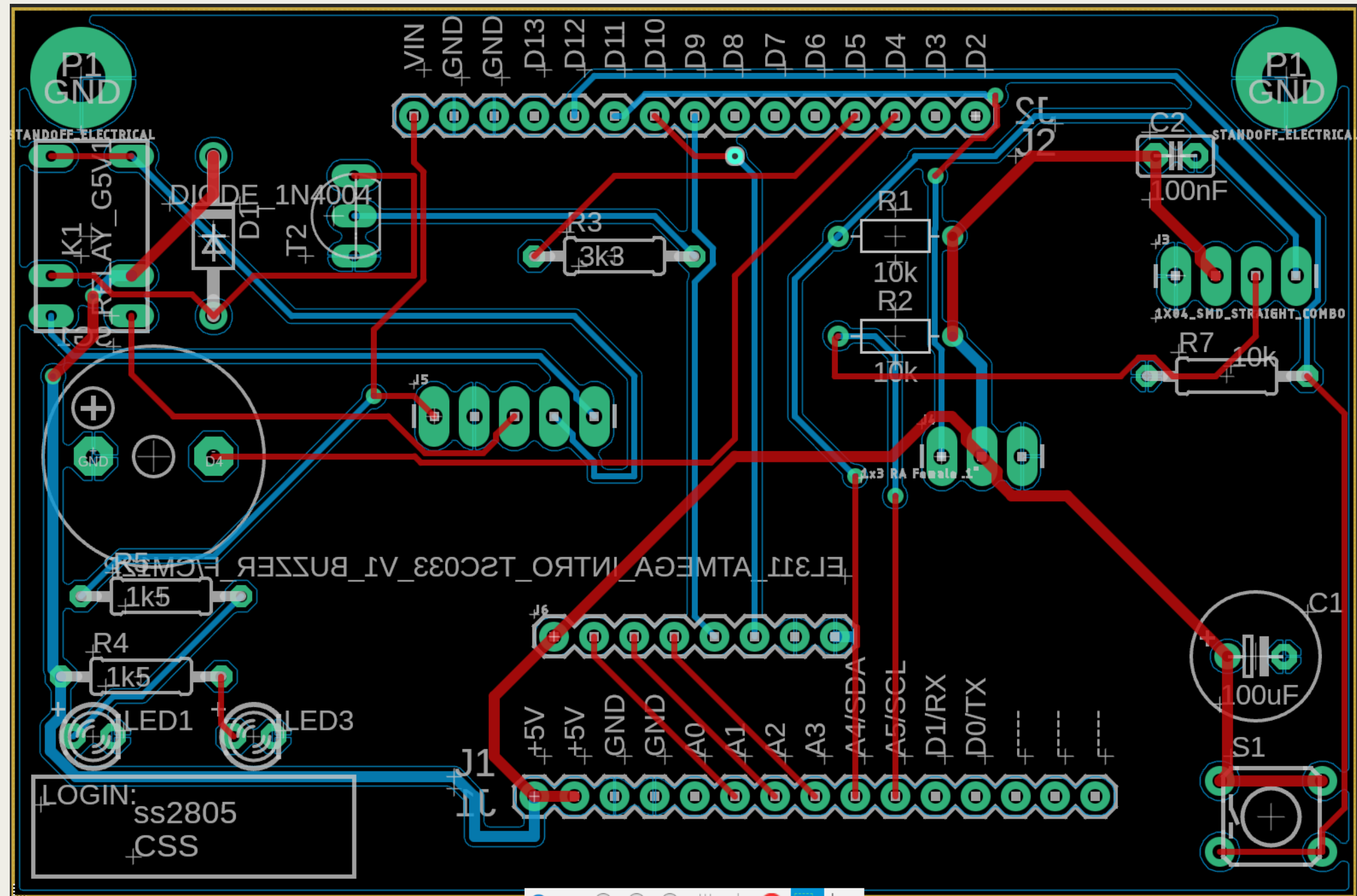- A relay (D5)

PCB LAYOUT DESIGN

Design Block:

Blue wiring = top board
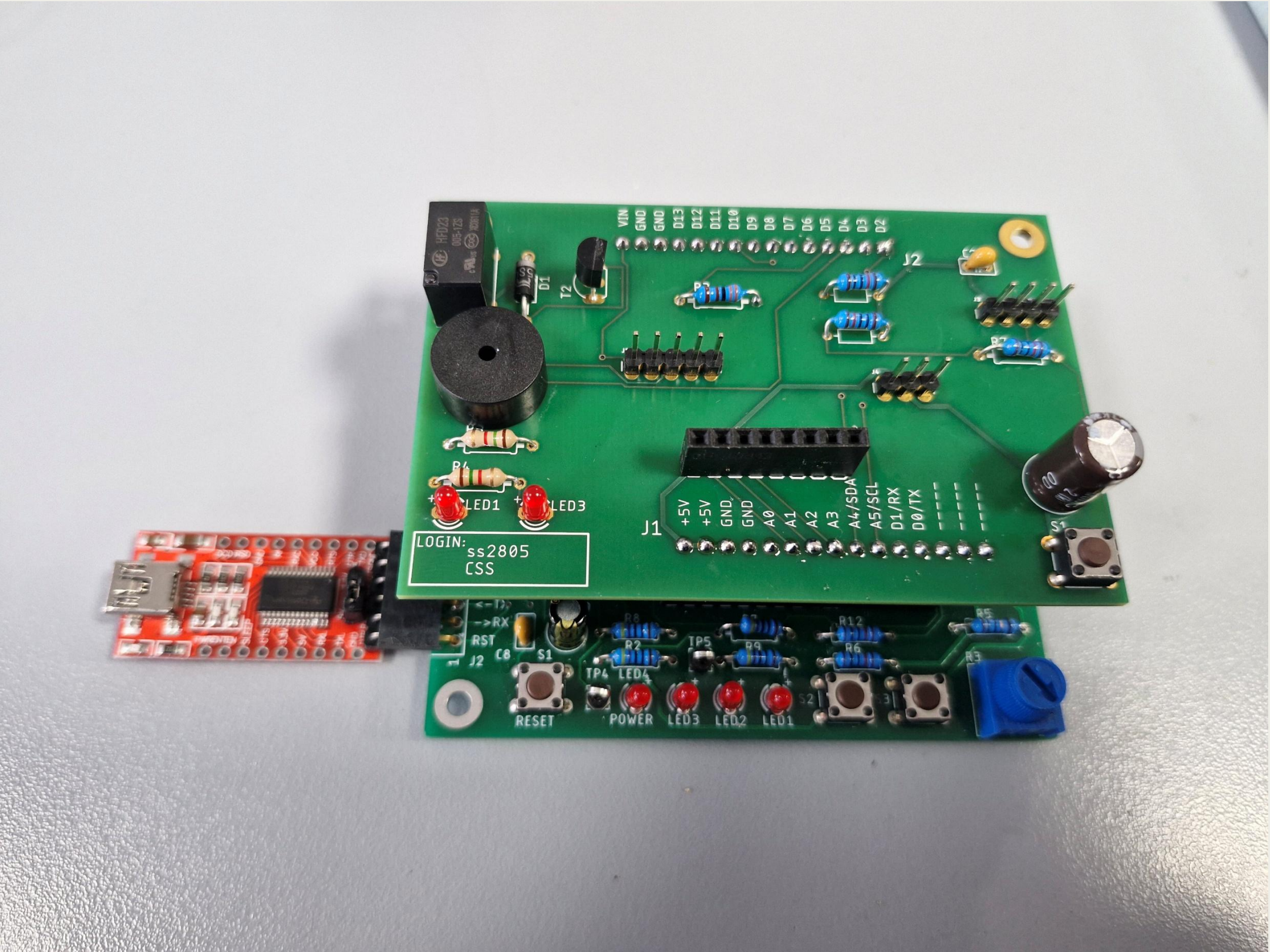Red wiring = bottom board

Components:
- Electrolytic capacitor
- Header pins/connectors
- Diode
- Resistors
- Capacitors
- Transistor
- LED's x2
- Buzzer
- Relay

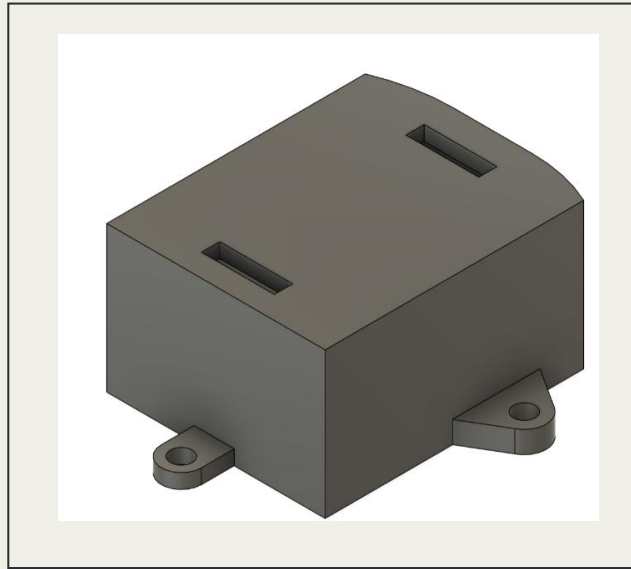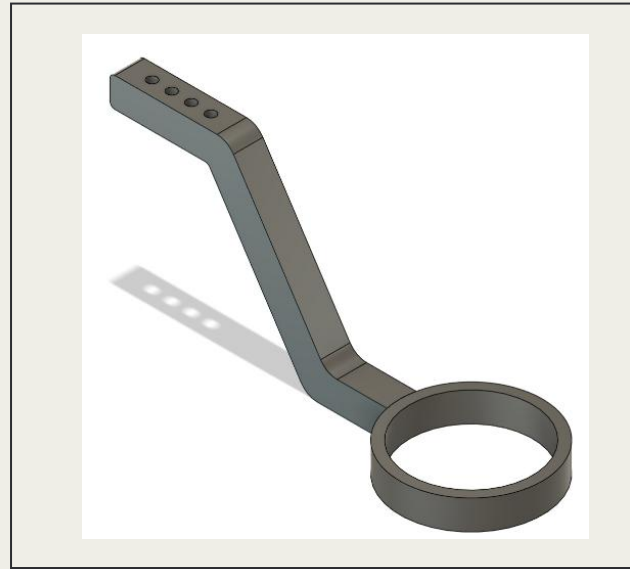# MY PCB AFTER FABRICATION AND SOLDERING
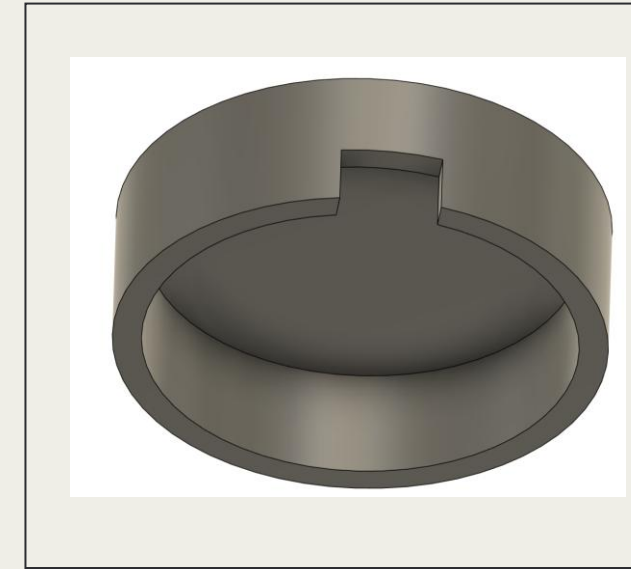
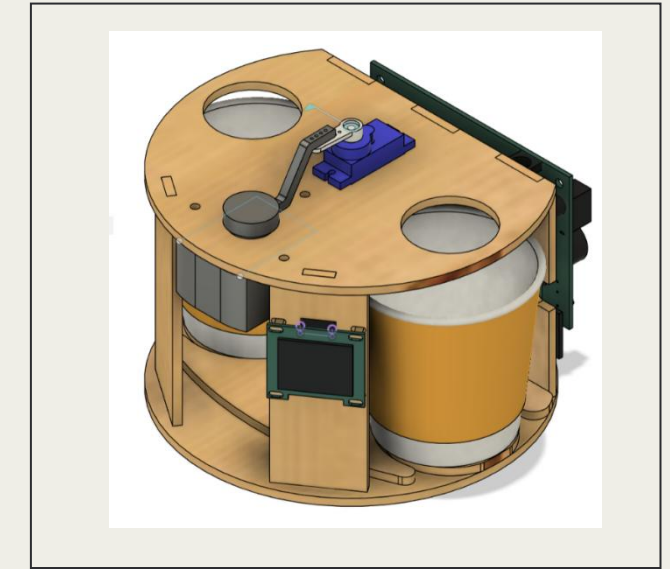# MECHANICAL DESIGN CAD MODELS AND ASSEMBLY

Colour Sensor Housing

Armature

Token Cover

Assembly

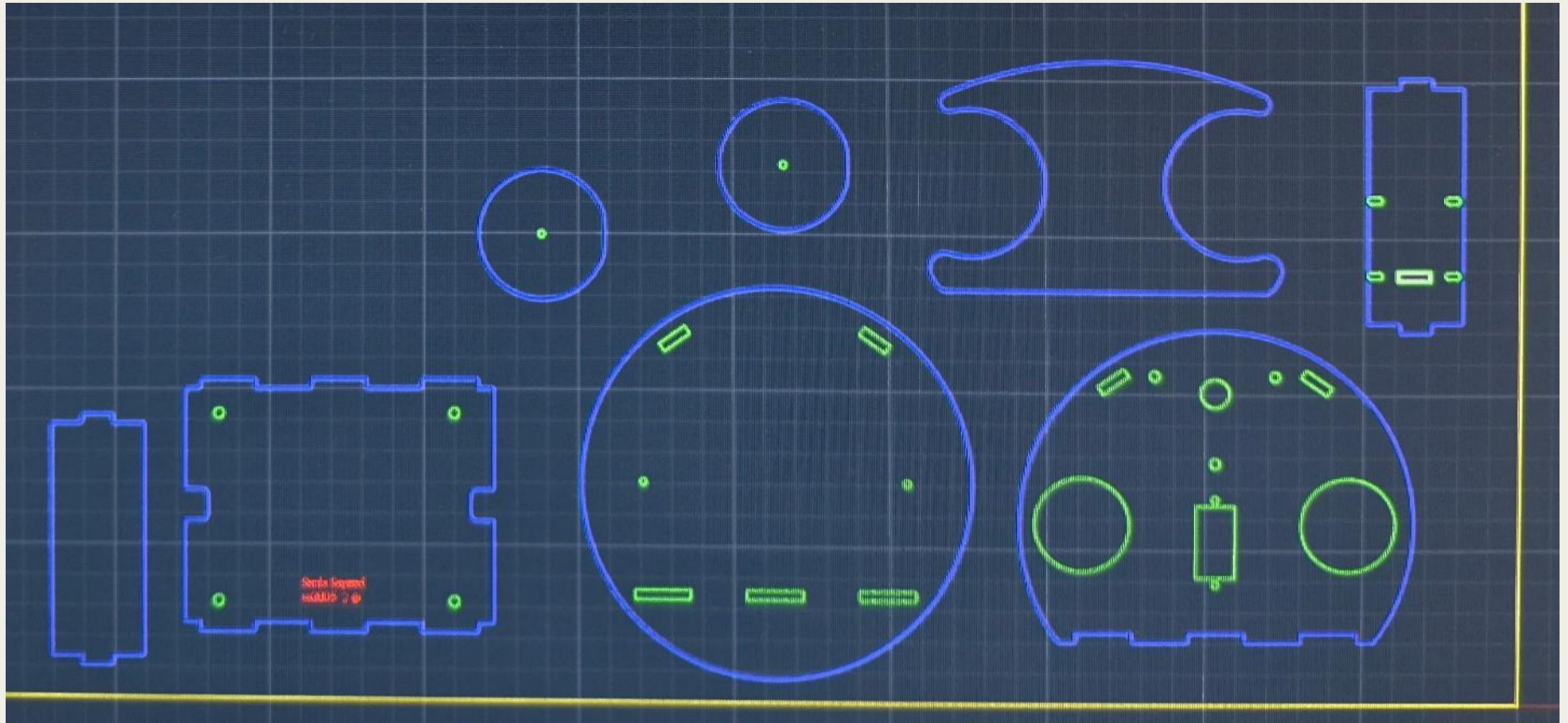3 components were required to be designed on Autodesk Fusion 360:

- Colour Sensor housing : ensures the sensor is not affected by external lighting and provides a dark environment
- Armature : attaches to servo arm and moves token to accepted or rejected pile
- Token Cover : minimises effect of light from the environment on the sensor
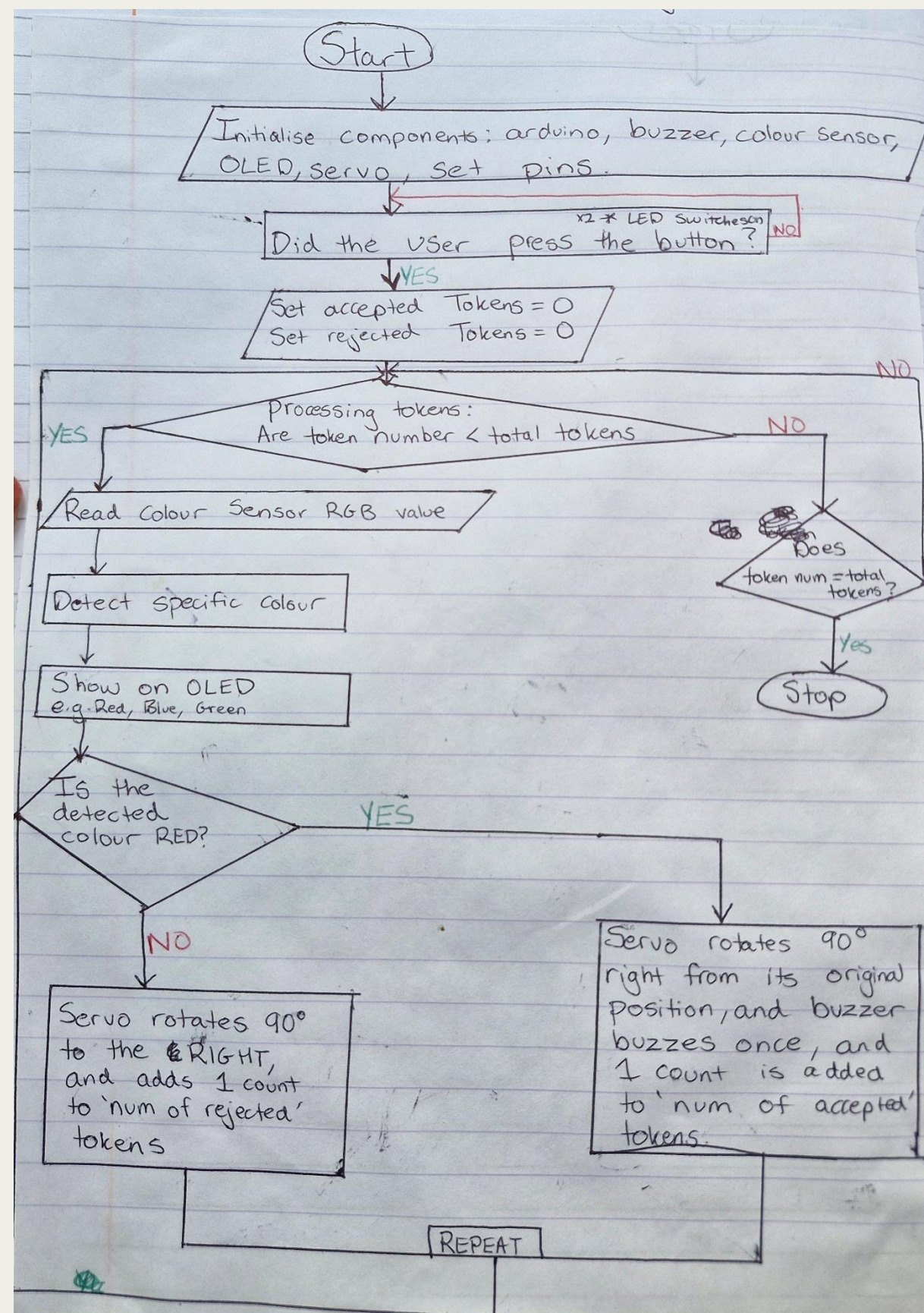
MECHANICAL DESIGN MODELS – LASER CUTTING

Used Autodesk
Eagle software

FLOWCHART

SOFTWARE INTEGRATION

- Used Arduino IDE
- Libraries used: TCS230 sensor, OLED display, Servo

Main program structure:

detects RGB colour values → assigns appropriate colour → activates servo → display result

Advanced feature = Track the number of 'accepted' and 'rejected' tokens and display the results on a digital display (as shown in 2nd image)

PROJECT DEMO VIDEO

Set sample of 8 tokens

- Button pressed + 2 LED's turn on = System started
- When RED is detected, buzzer sounds and is separated from the other colours