

EN 2091 - ANALOG PROJECT

# AUTOMATIC SOLAR TRACKER

BY TEAM SOCKET BURNERS



# INTRODUCTION

- **Solar energy is a growing sustainable energy source, especially beneficial for countries near the equator like Sri Lanka.**
- **The project focuses on improving photovoltaic (PV) system efficiency by designing a single-axis automatic solar tracker.**
- **The tracker adjusts the solar panel's angle to keep sunlight perpendicular for optimal energy generation.**

# PROJECT OBJECTIVES

- 01** Main Goal: Increase the efficiency of solar panels by ensuring they are always perpendicular to the sun's rays.
- 02** Control Mechanism: Implement a single-axis tracking system with an Analog PID Controller.
- 03** This system adjusts the solar panel's position to capture maximum sunlight, improving energy generation.

# BLOCK DIAGRAM

Sunlight  
sensing

Error  
Generation

PID Controller

PWM  
generation

Motor  
Control

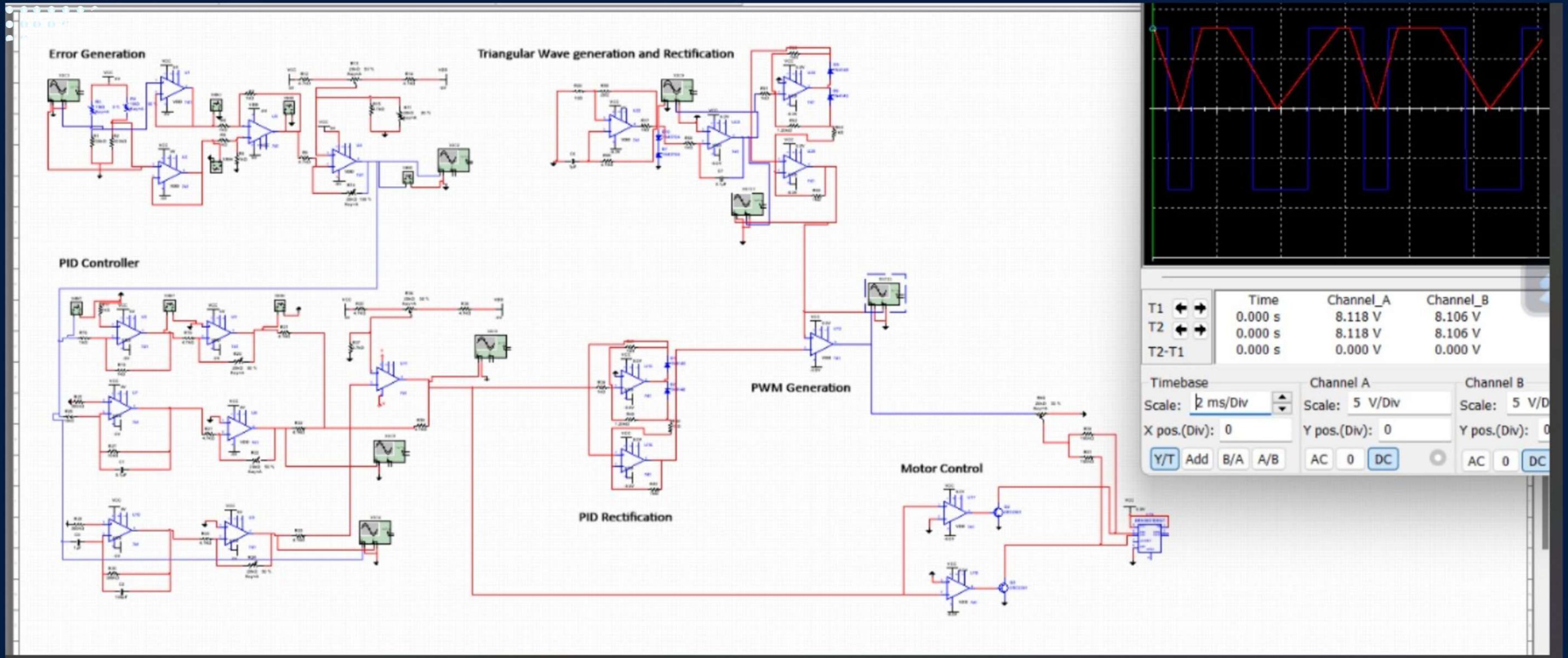
Motor  
Output

# SYSTEM OVERVIEW

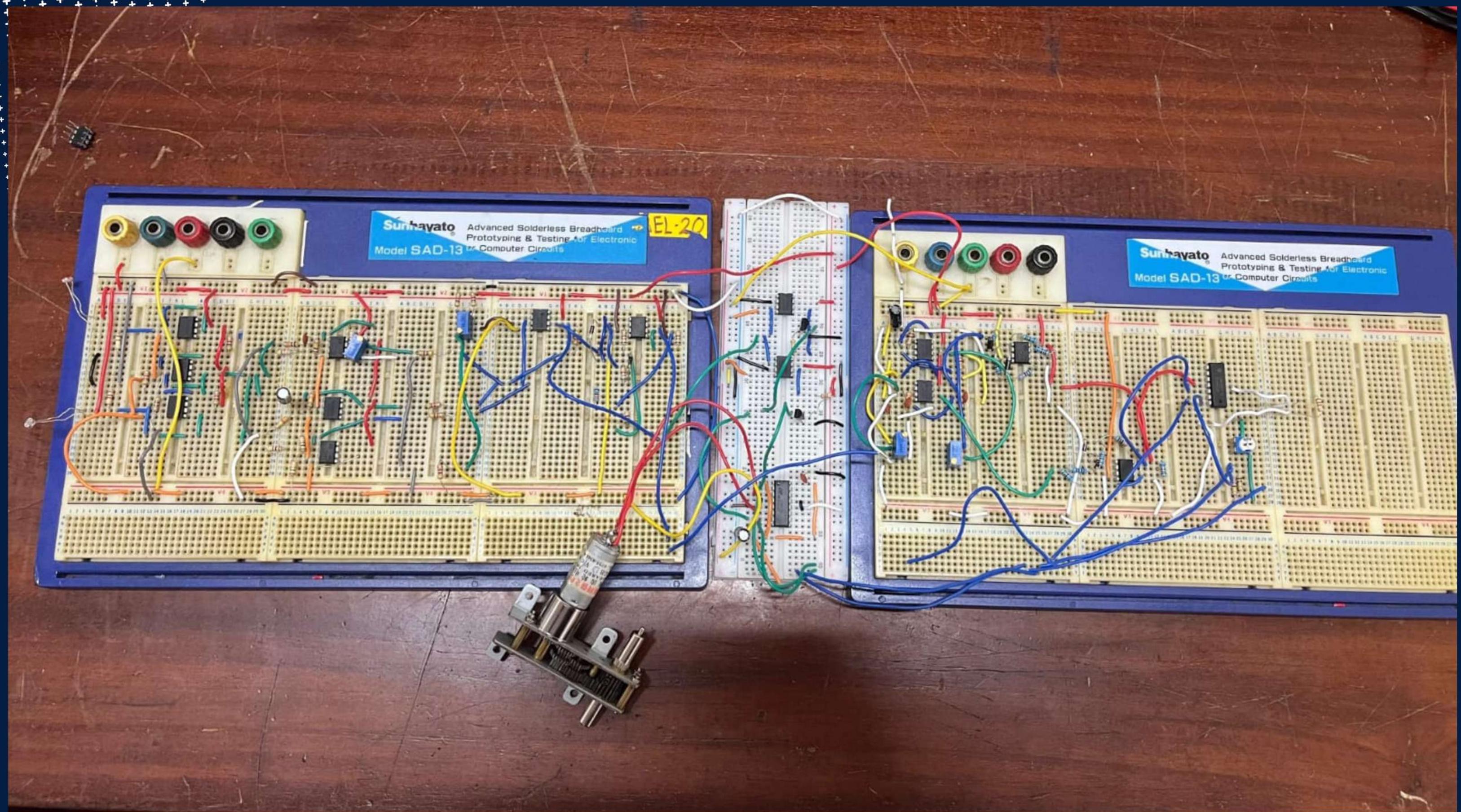
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- **Sensors:** Two Light Dependent Resistors (LDRs) detect sunlight intensity and generate error signals based on light differences.
- **PID Controller:** Corrects the error by adjusting the position of the solar panels.
  - Proportional (P), Integral (I), and Derivative (D) components used for fine-tuning.
- **Motor Driver:** Receives PWM signals generated by the PID controller to adjust the panel's angle.

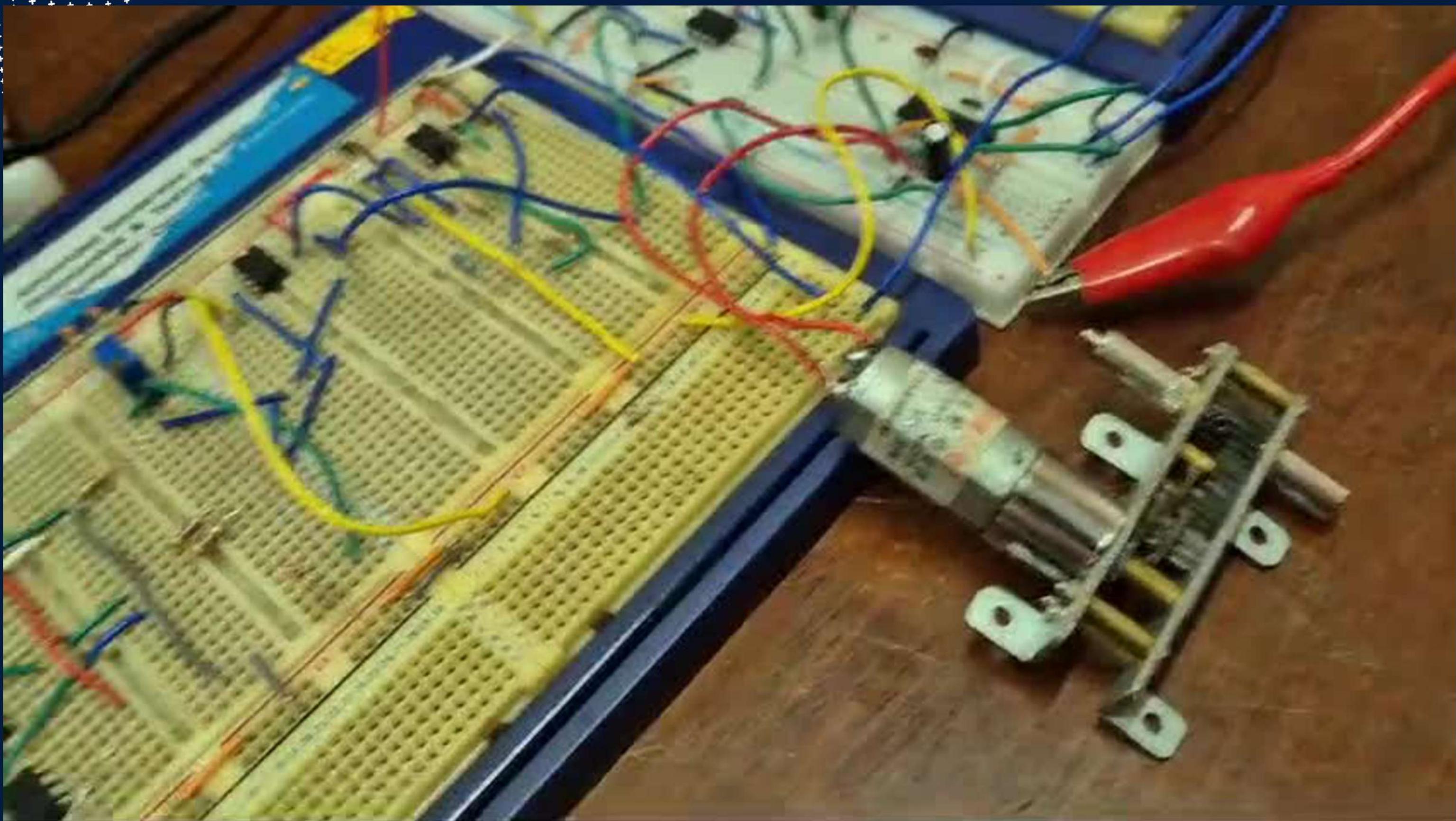
# SIMULATION



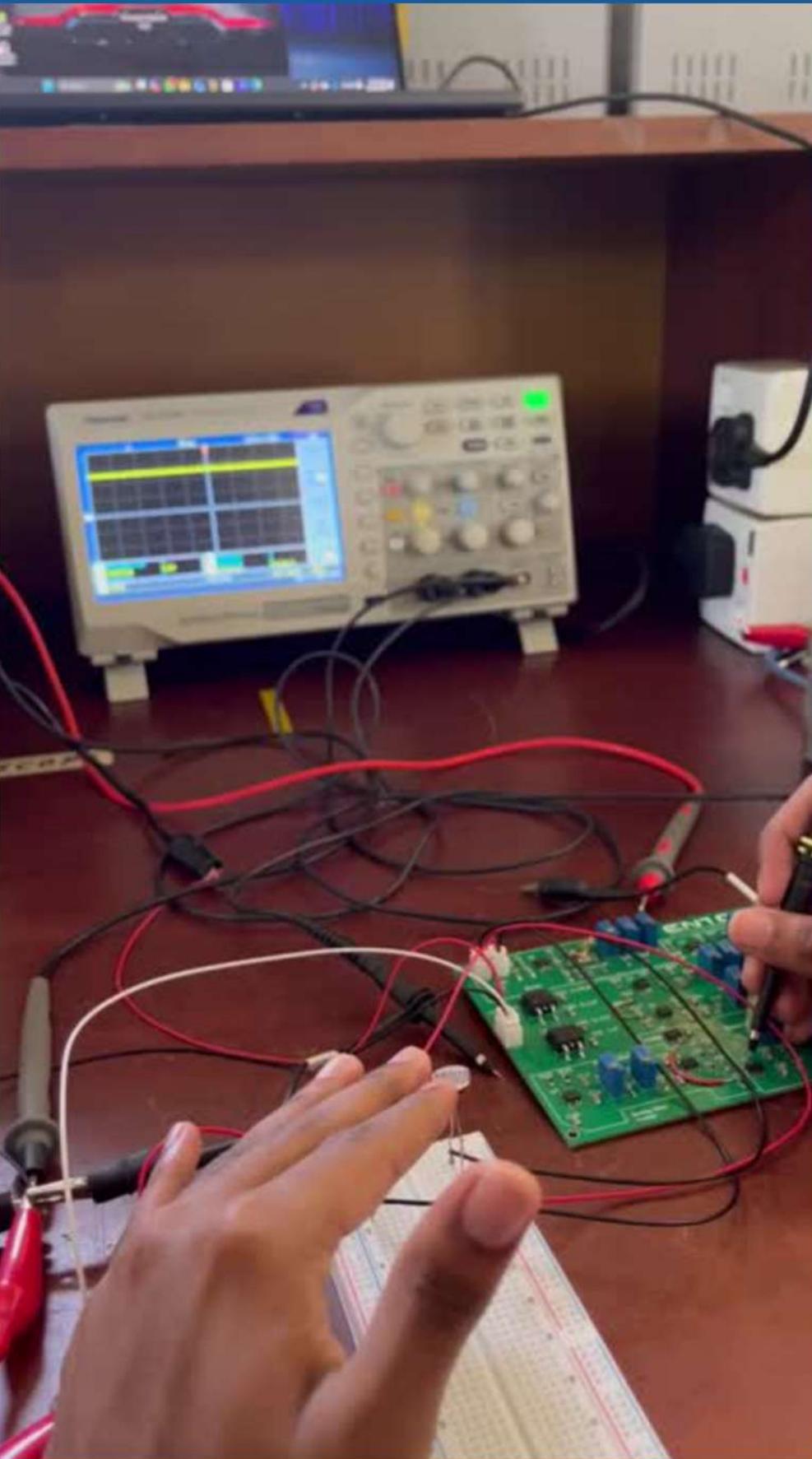
# BREADBOARD IMPLEMENTATION



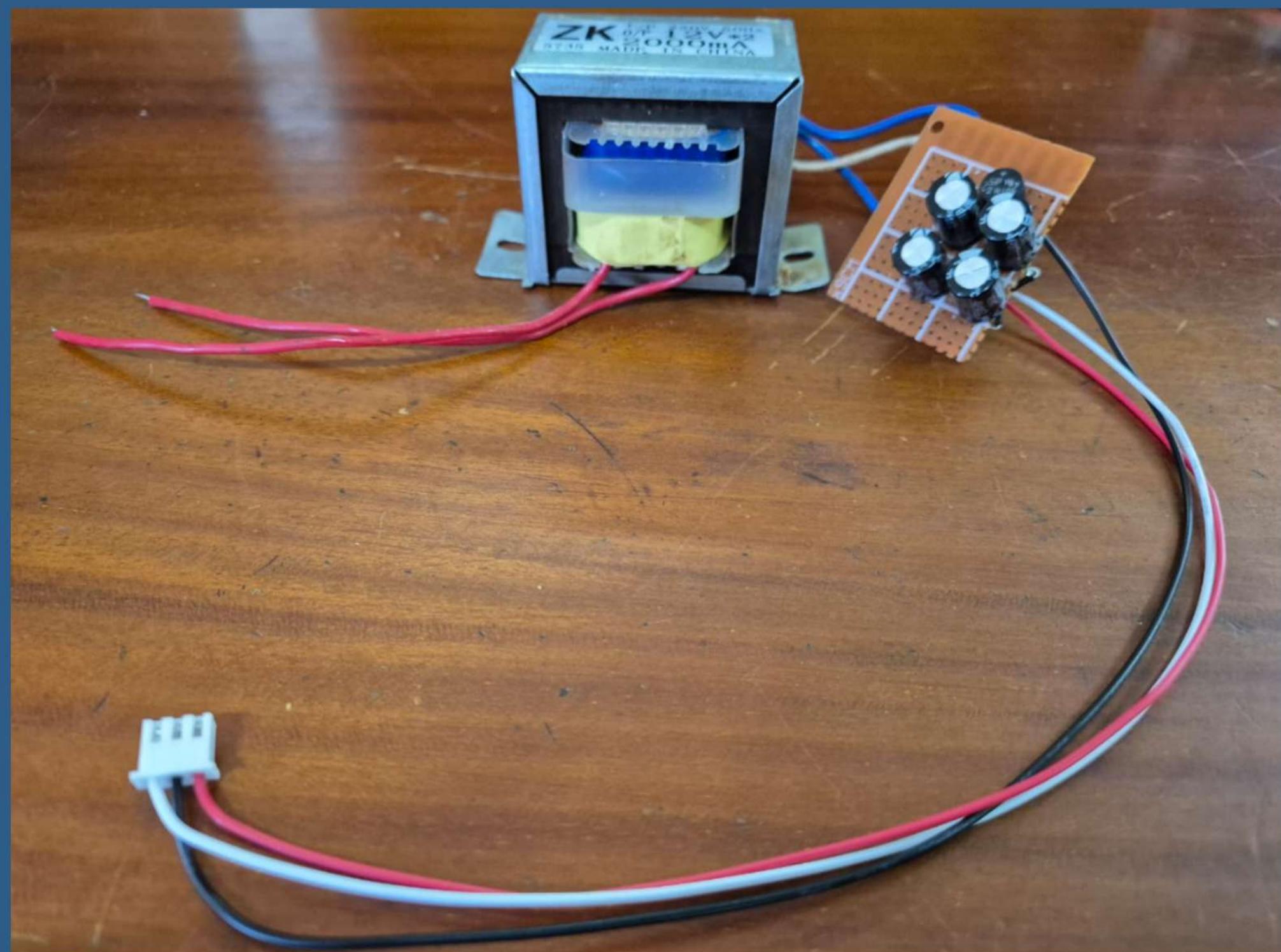
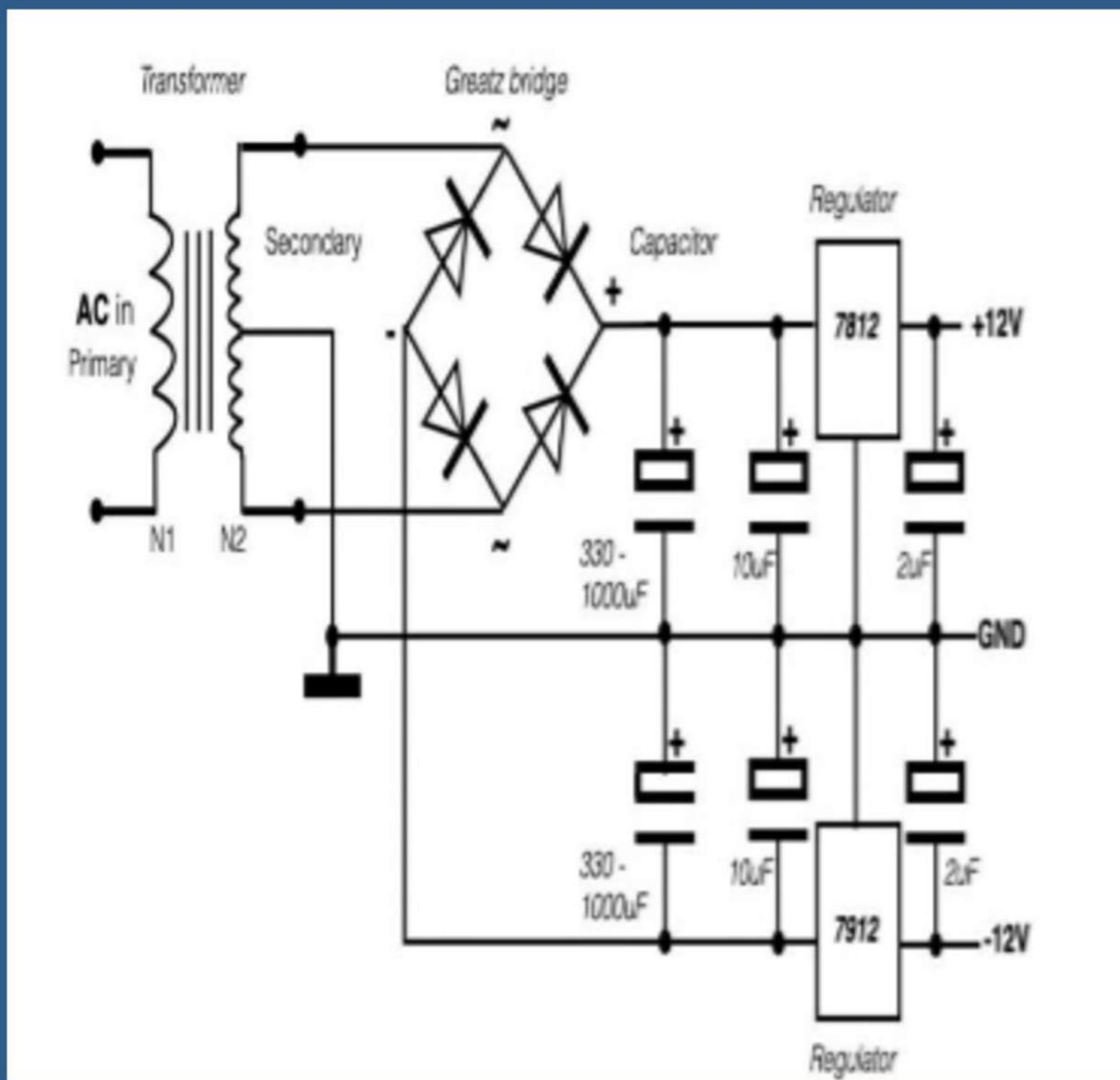
# BREADBOARD IMPLEMENTATION



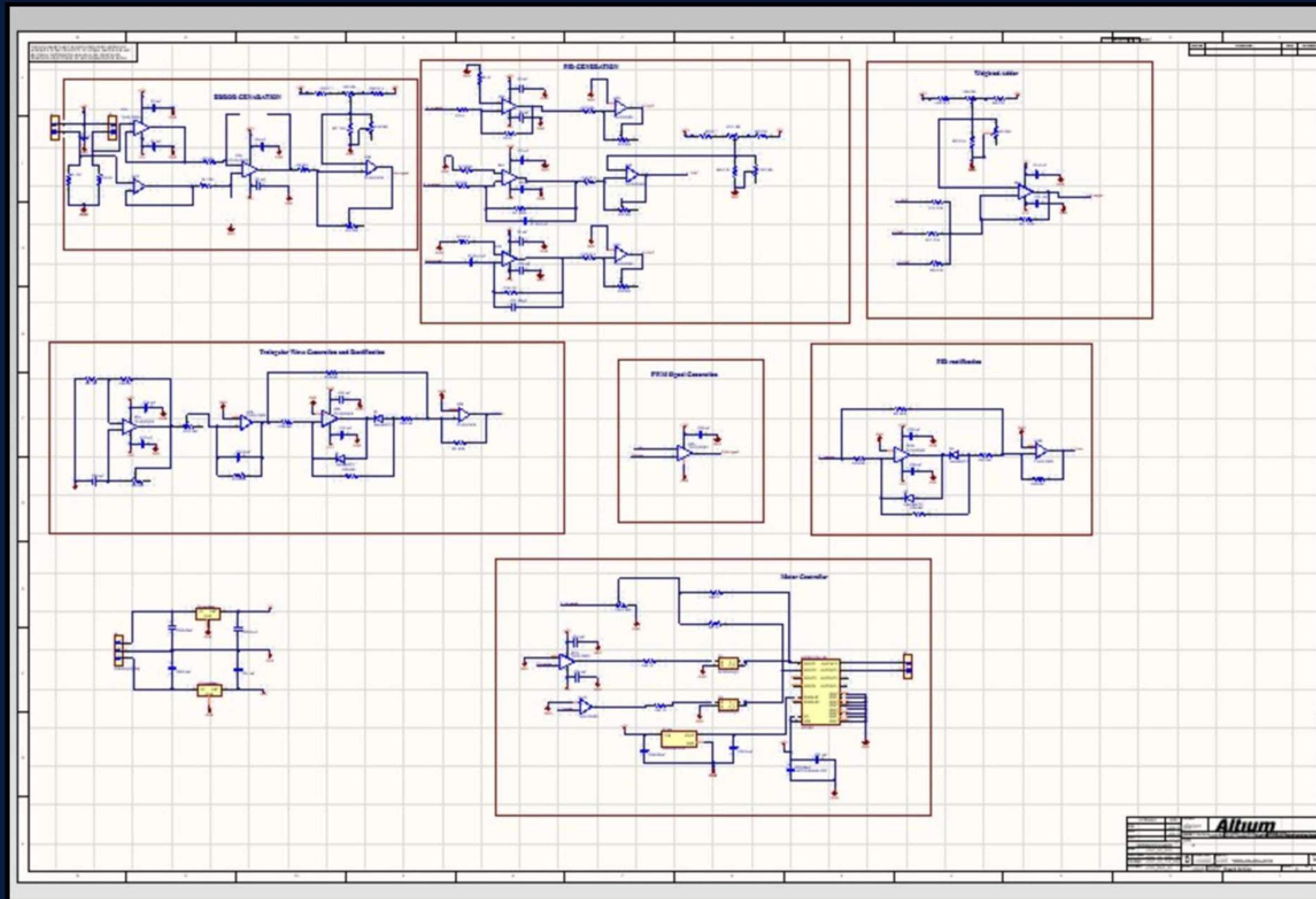
# PWM GENERATION FOR MOTOR CONTROL



# POWER SUPPLY

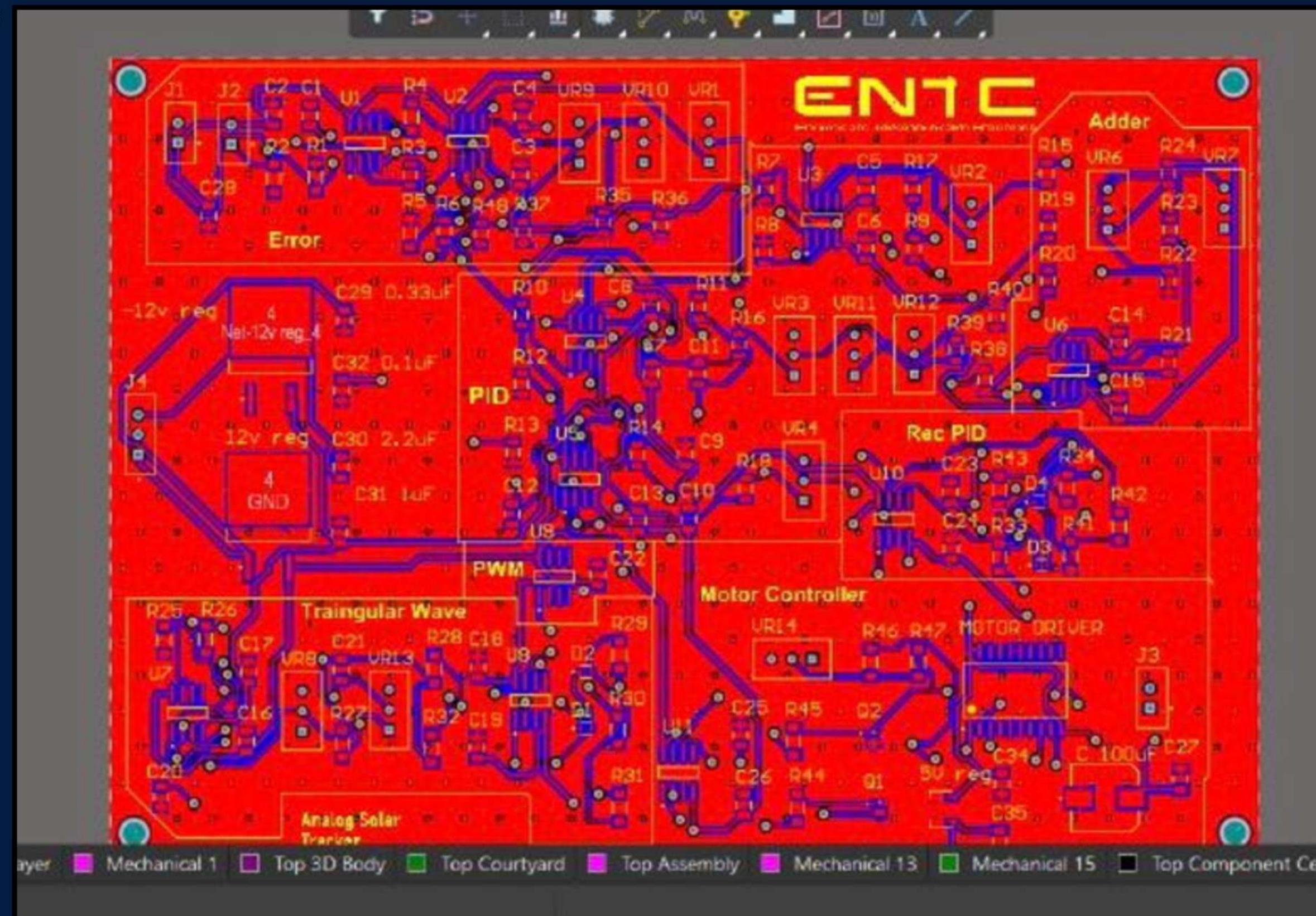


# PCB DESIGN

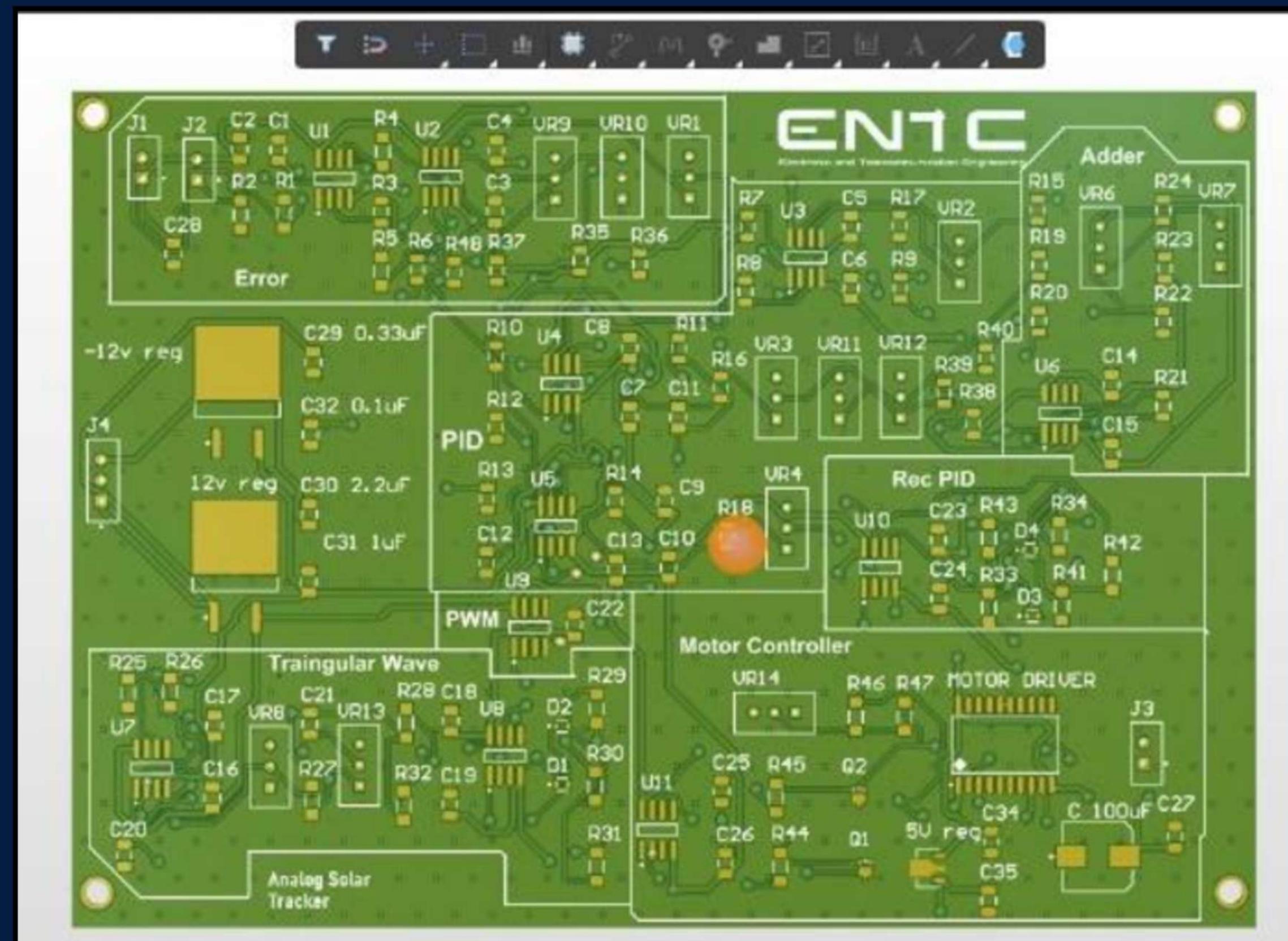


## Schematic

# PCB DESIGN



# PCB DESIGN

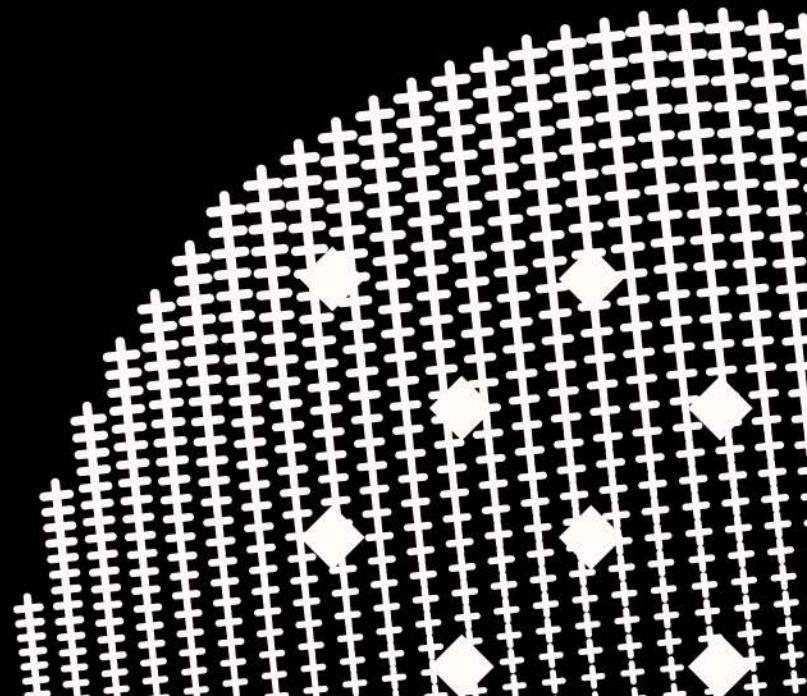
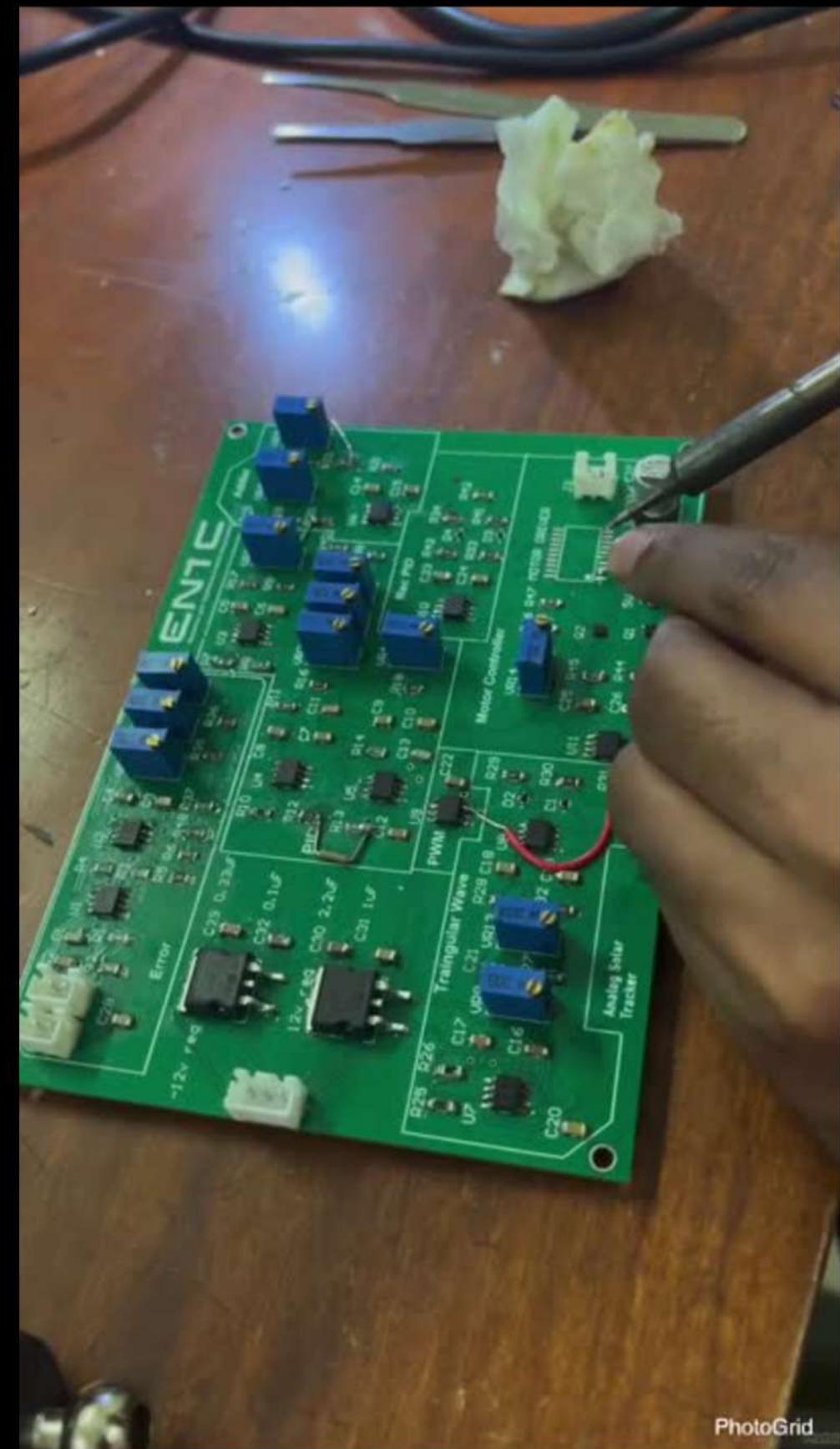


# PCB DESIGN

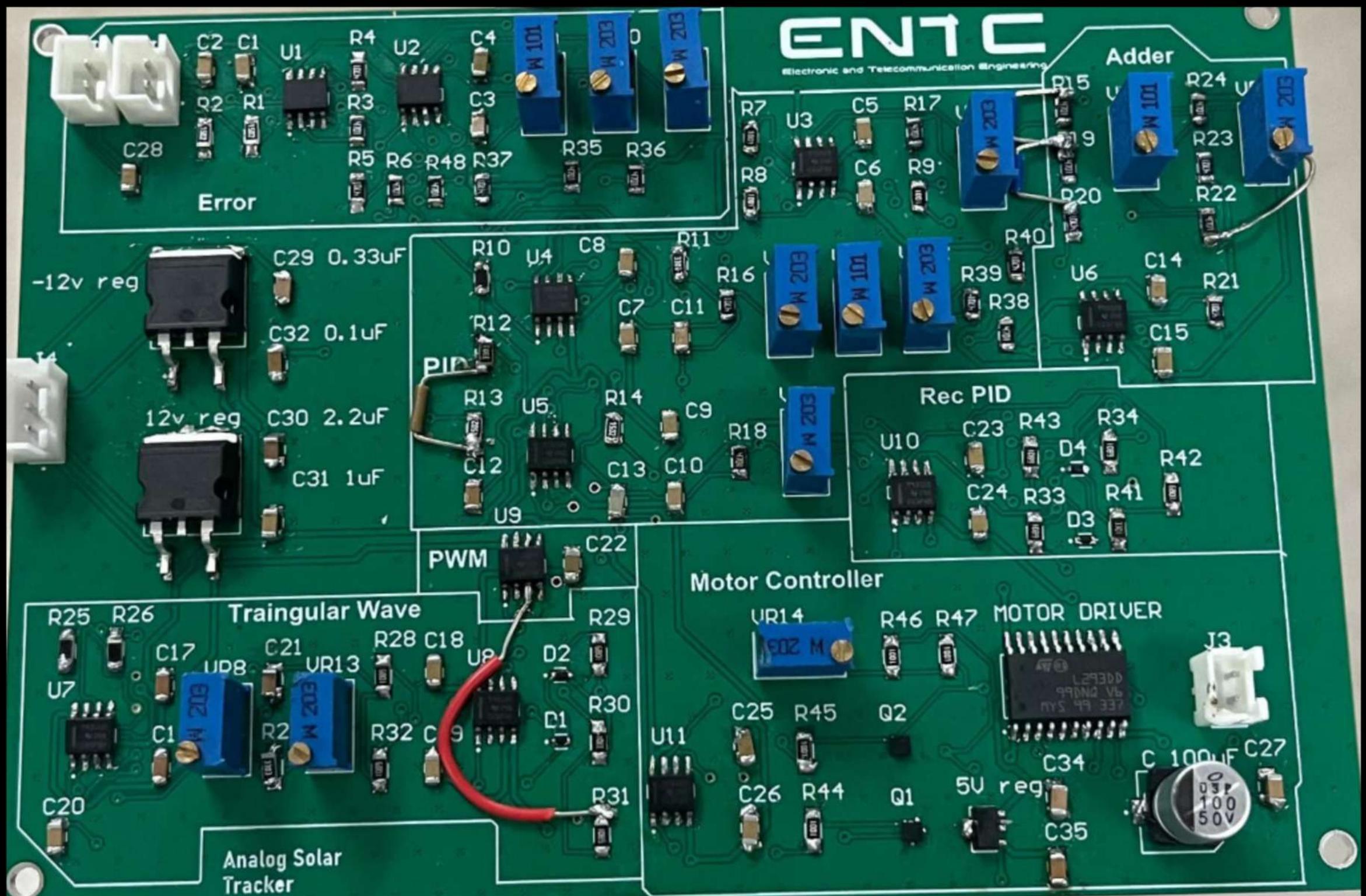


3D view

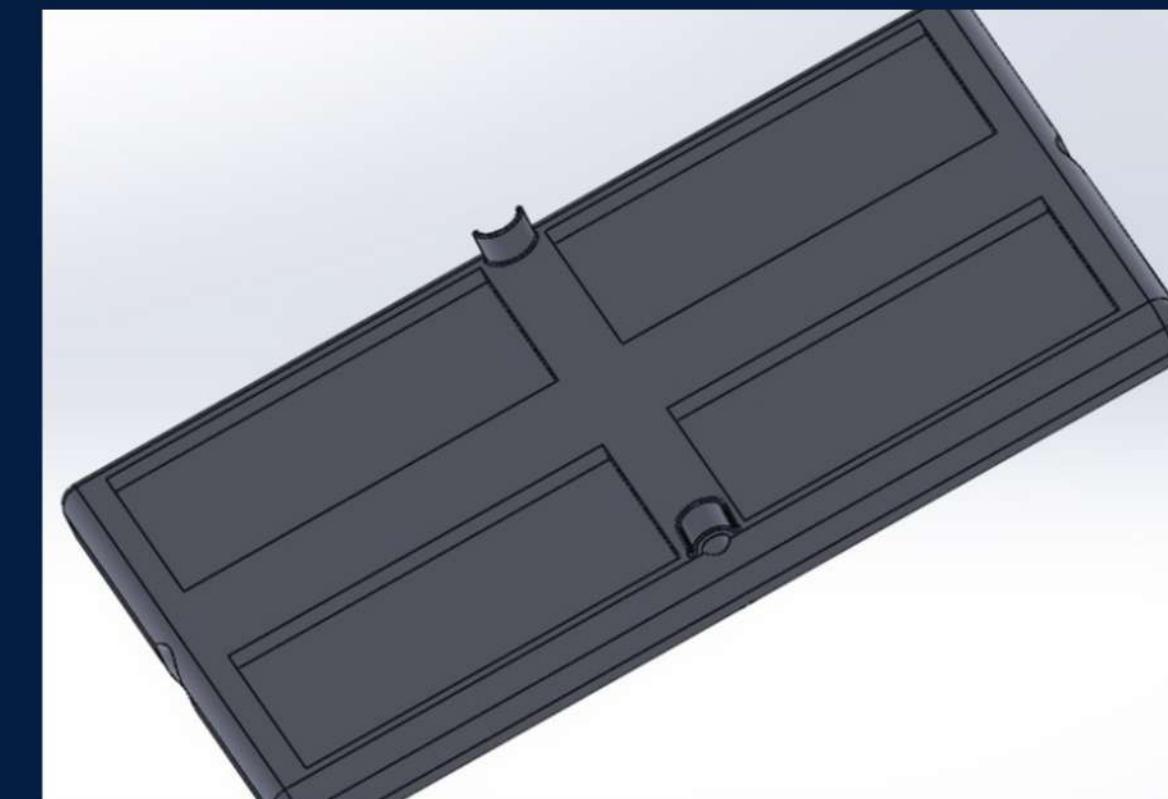
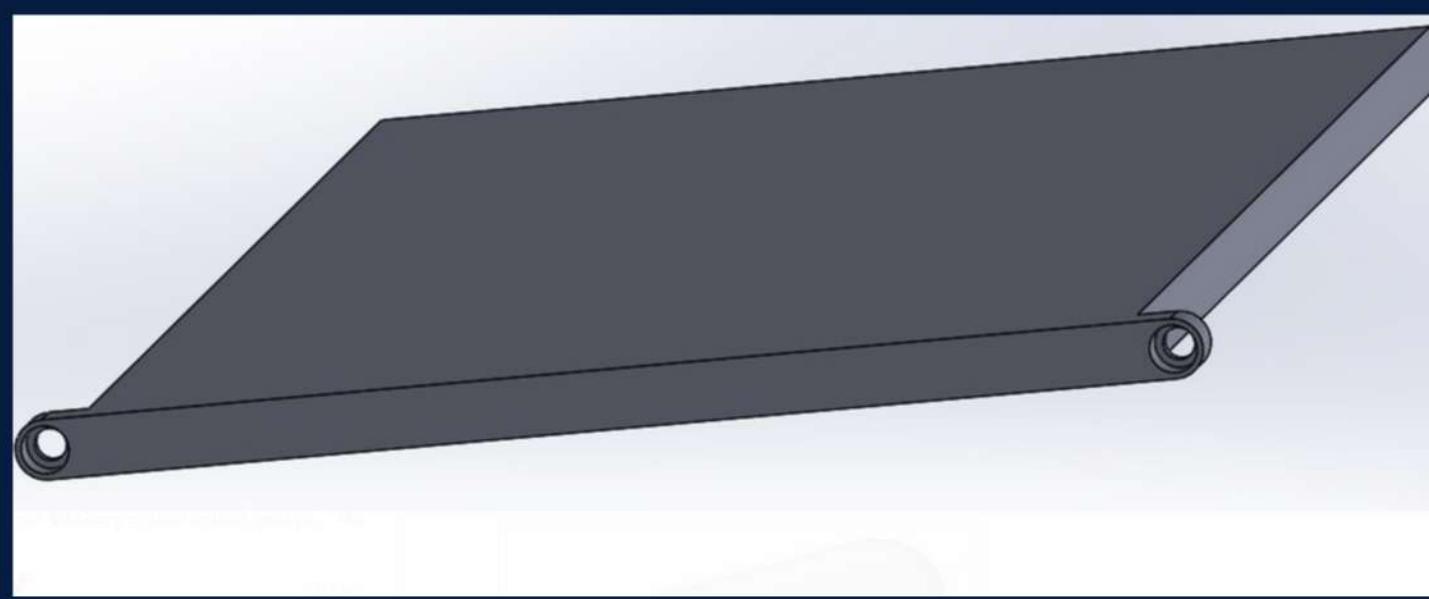
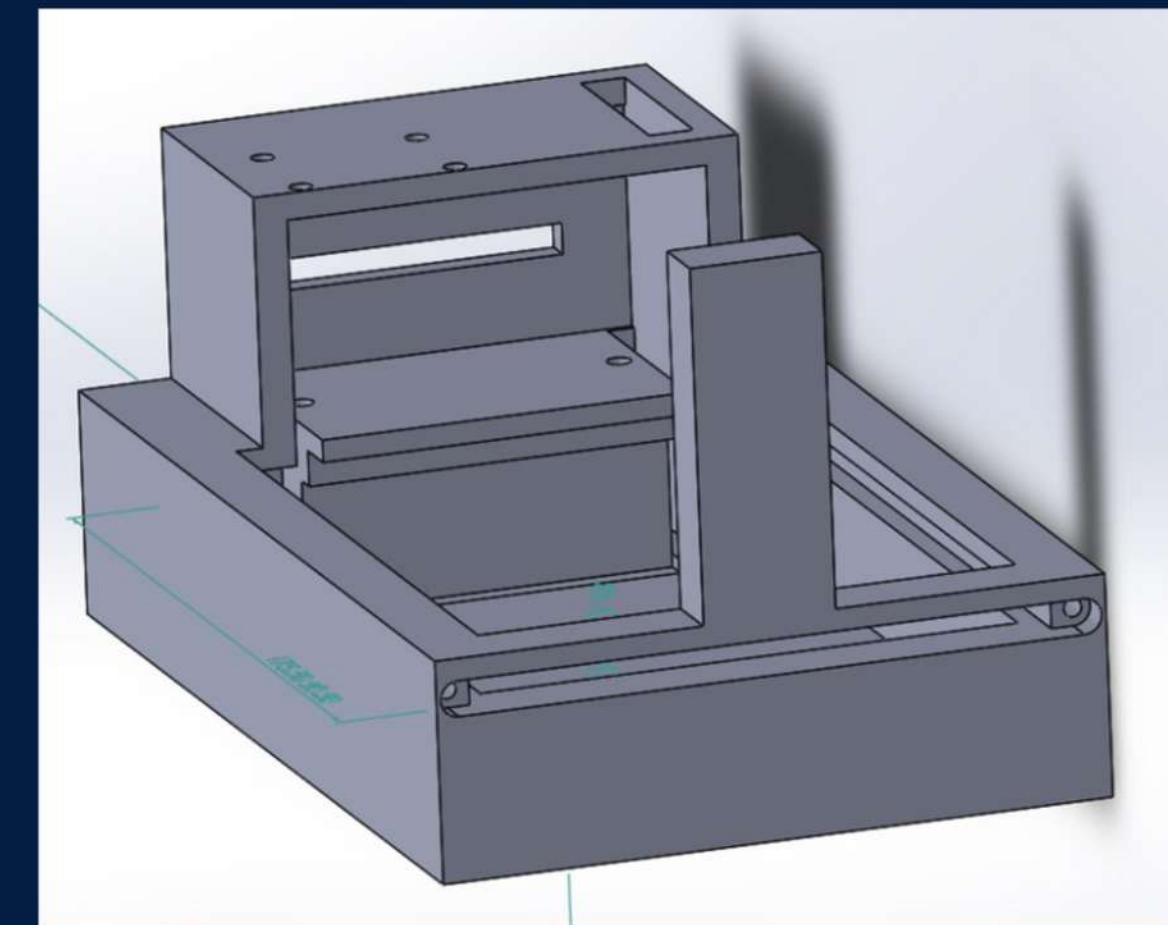
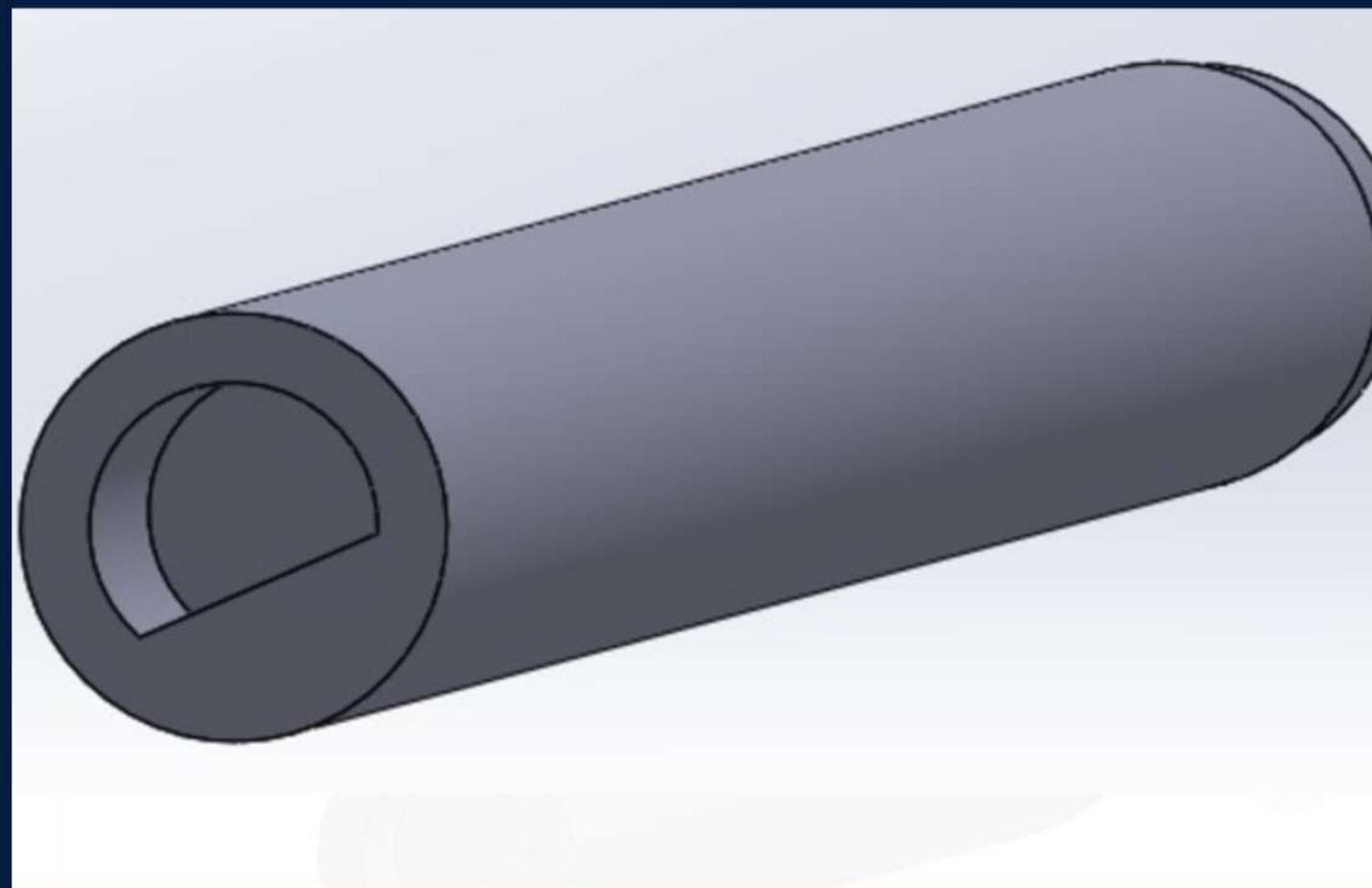
# PCB SOLDERING



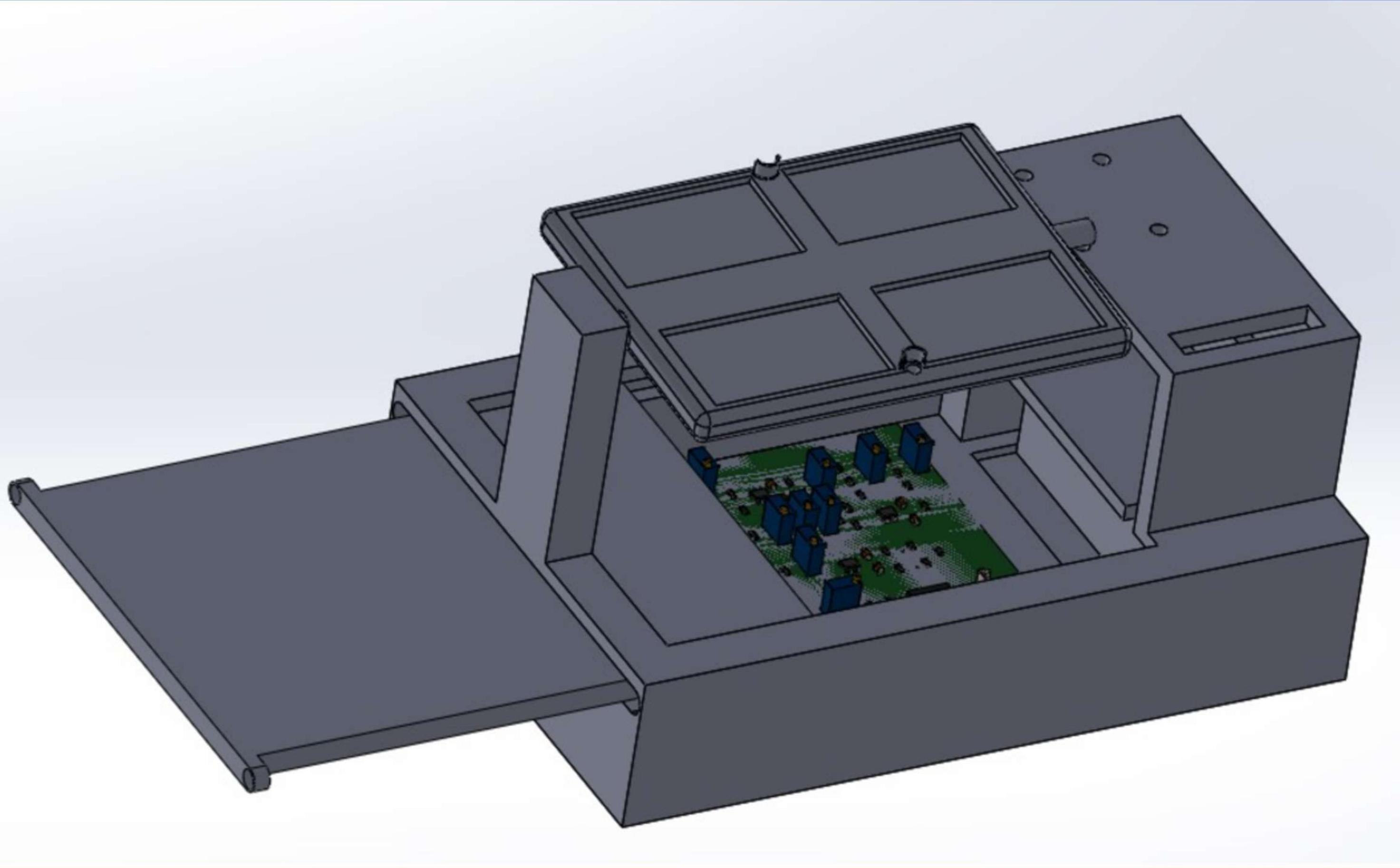
# PCB



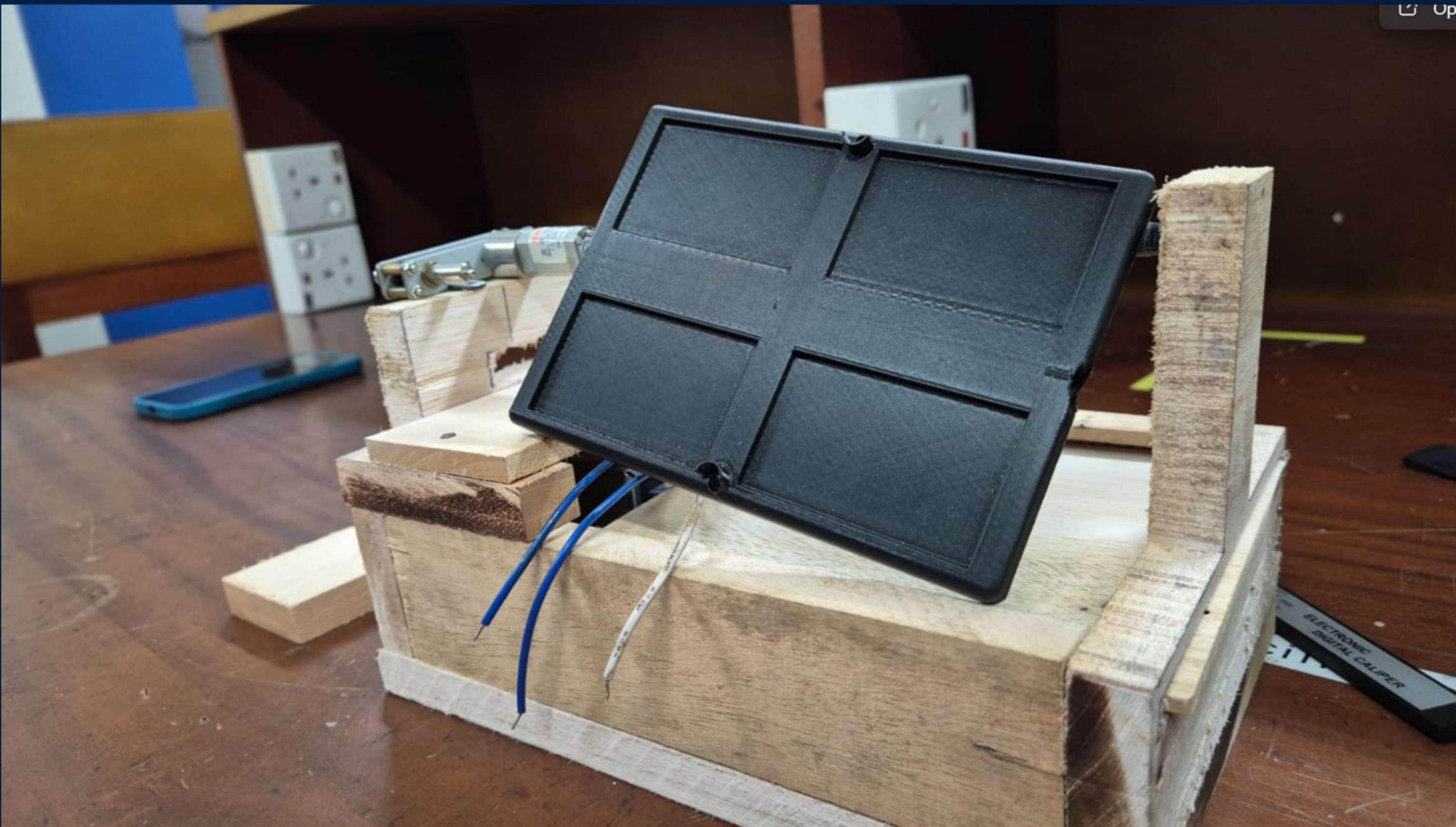
# ENCLOSURE DESIGN



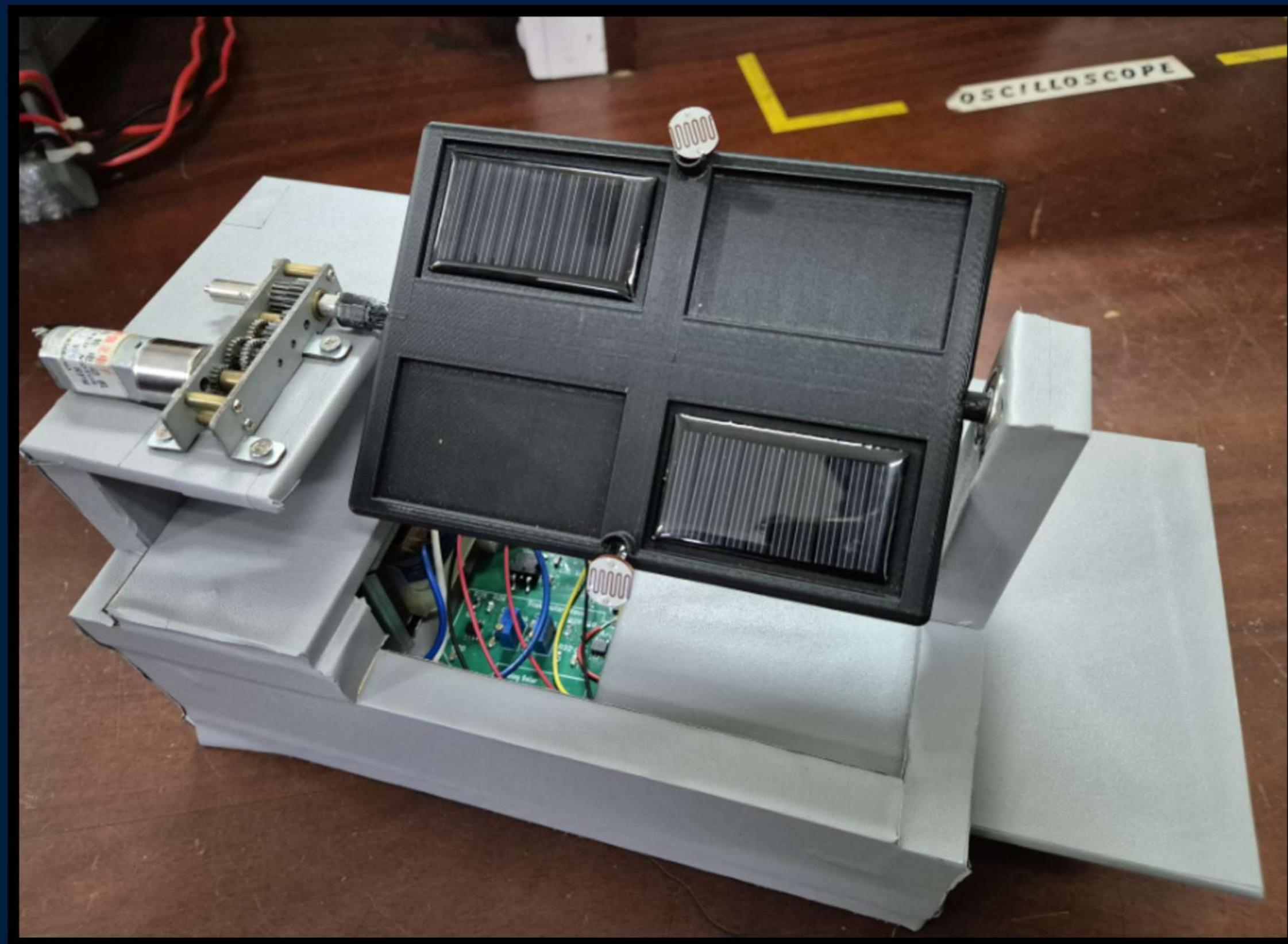
# FINAL ASSEMBLY



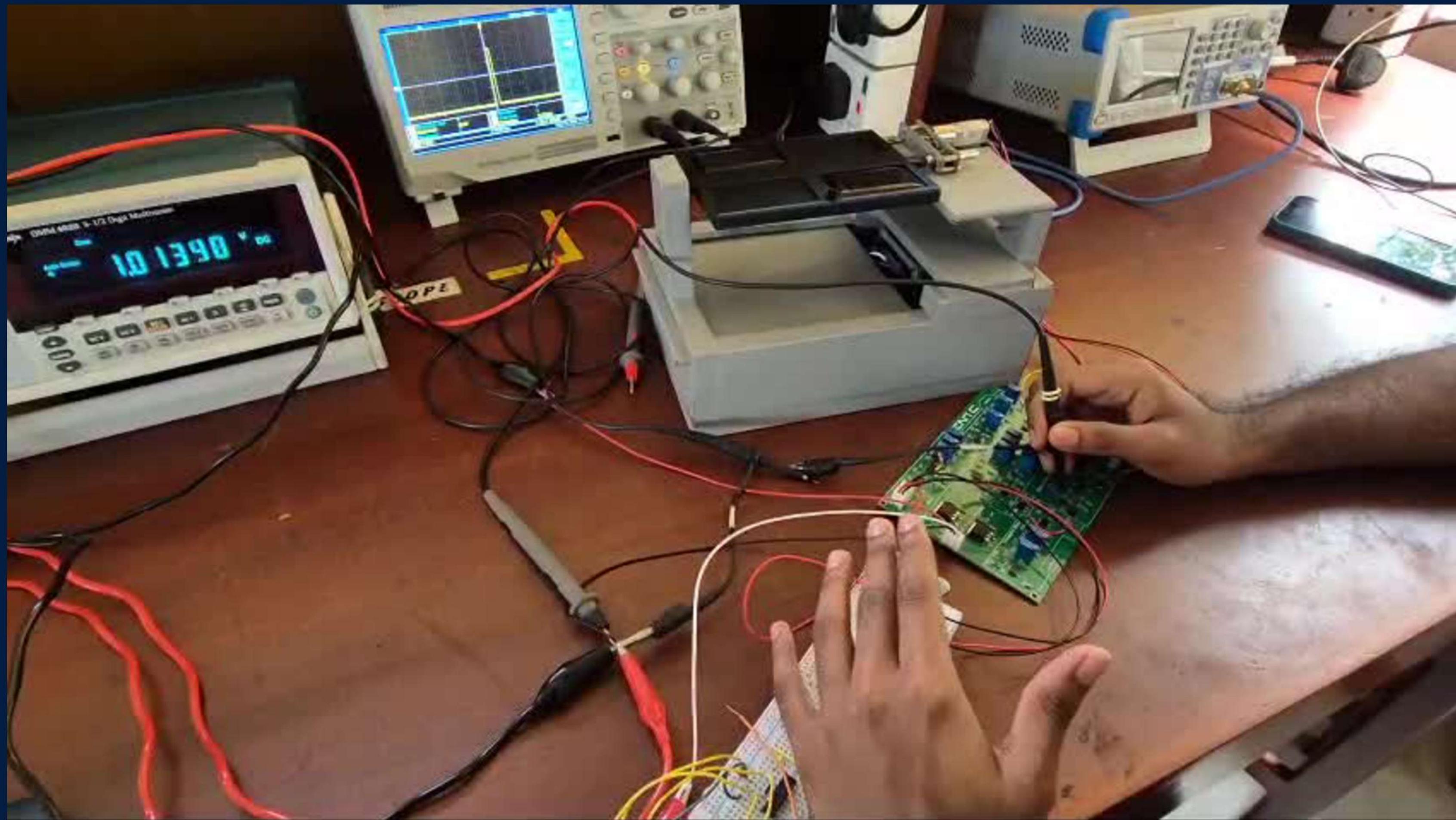
# ENCLOSURE



# FINAL DESIGN







## COMPONENTS

- Dual Op Amp - TLV9352IDR with a slew rate of 20 V/ $\mu$ s
- Motor driver - L293DD
- Motor - high torque 12V 10RPM open gearbox electric motor
- BJT - BC53PAS-QX
- +12 Regulator - L7812ABD2T-TR
- -12 Regulator - L7912CD2T-TR
- 5V Regulator - L78L05ACUTR
- Small signal switching diodes - 1N4148WT-76K
- SMD capacitors (1206)
- SMD resistors (1206)

**THANK YOU!**