
Installation Guide for Rc robot

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Introduction

This guide provides step-by-step instructions for assembling and configuring the RC robot used in our research project. The RC robot, powered by ESP32-WROOM-32 module, controlled by a web app

is designed to navigate a maze using a combination of onboard sensors and reinforcement learning algorithms.

Safety Precautions

- Always disconnect the device from the power source before assembling or disassembling.
- Be cautious of sharp edges on the metal or plastic parts.
- Handle the battery with care. Do not puncture, disassemble, short contacts, dispose of in fire, or expose to high temperatures.

Components List

- ESP32-WROOM-32 module (Refer to the datasheet at Espressif)
- 3D printed parts from Thingiverse (hc-sr04, top plate + alternative for the robot kit)
- Motor Driver - available at DFRobot
- 2WD robot kit - available at DFRobot
- Mini OLED screen - available at Amazon
- Sensors - available at Amazon
- Battery For RPI 5 - available at Amazon
- Battery Holder For ESP 32 - available at Amazon
- Nuts and bolts (M3) - available at brico
- Screws - available at brico
- wood for the maze - available at brico

Tools Required

- Screwdriver
- Wire cutter/stripper
- ...

Assembly Instructions

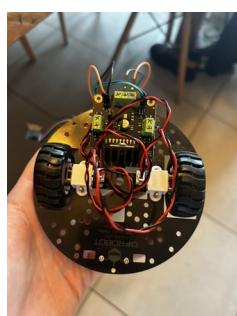
Step 1: Base Assembly

To assemble the base, you can follow this youtube video from the makers themselves:



Step 2: Attach Motor Driver

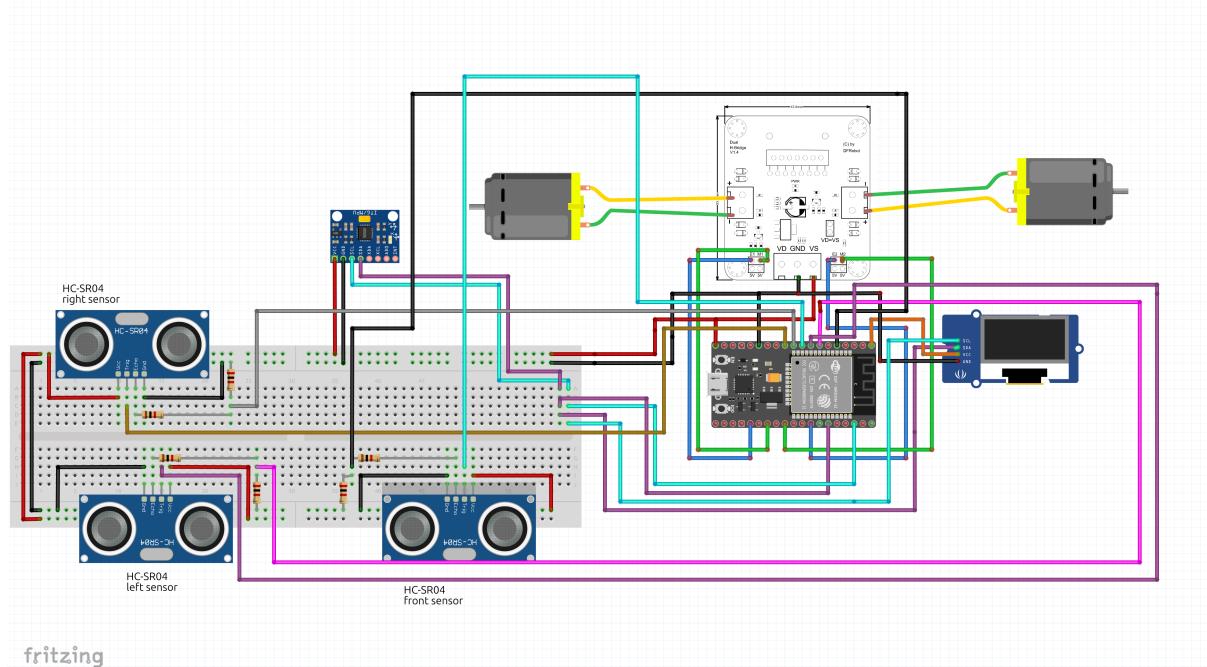
Attach the motor driver to the base using the 2 screws that came with the kit. The motor driver should be positioned on the base such that it fits snugly without obstructing any other components.



Step 3: Attach ESP32-WROOM-32 module to the motor driver

Connect the Wires of the motor driver to the ESP32-WROOM-32 as shown in the electrical schematic below. with

```
int E1 = 2; //PWM motor 1  
int M1 = 17; //GPIO motor 1  
int E2 = 19; //PWM motor 2  
int M2 = 4; //GPIO motor 2
```



Step 4: Cut the support beams

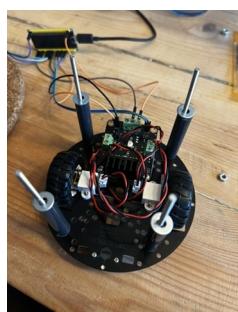
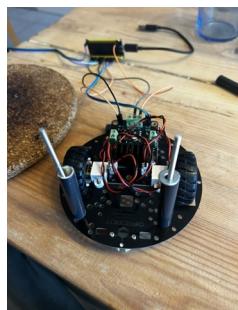
Cut the support beams so that we can securely attach the top plate to the base. I cut them to ~7cm.



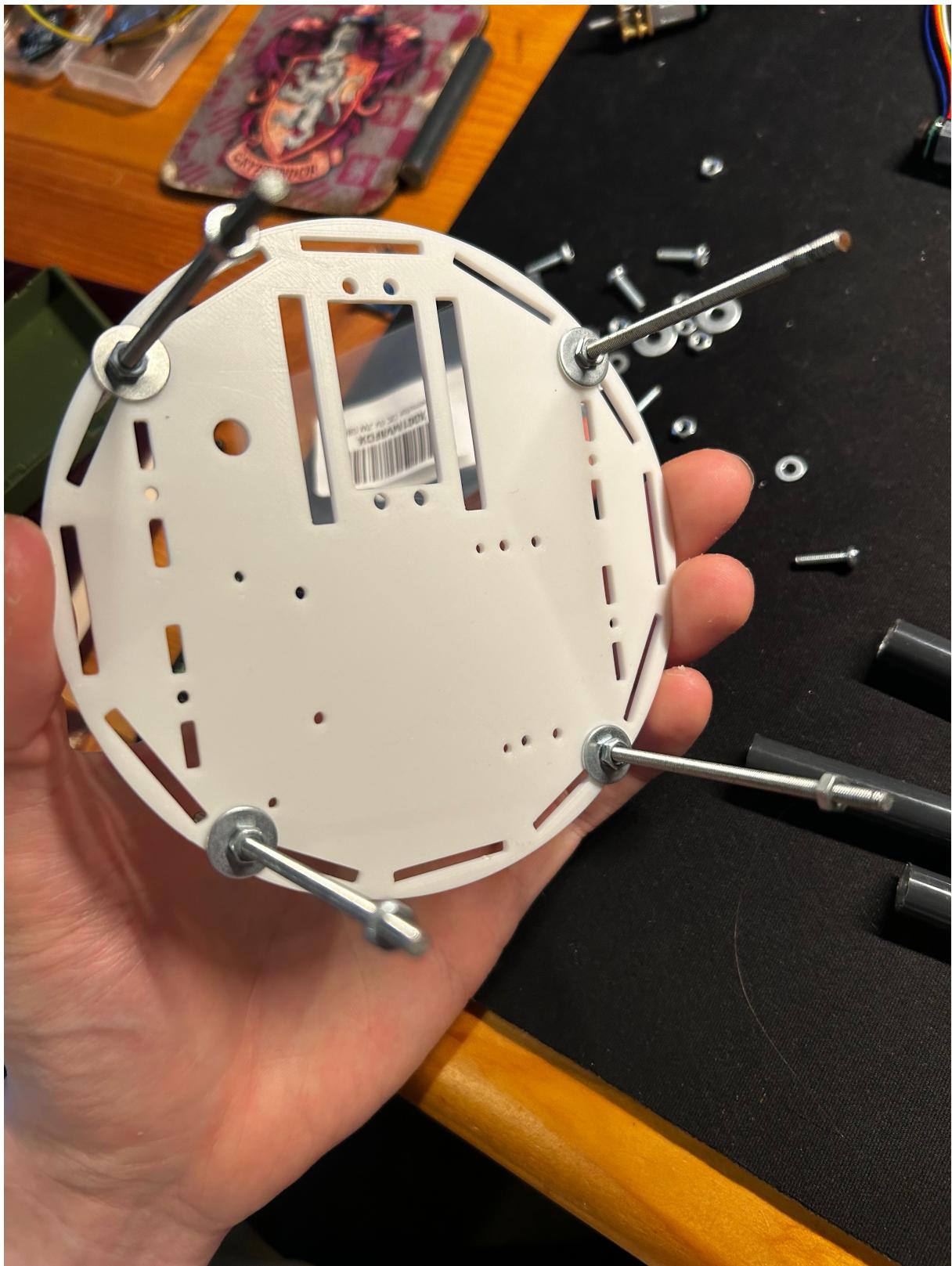
Step 5: Screw in the supports on the bottom of the bottom plate

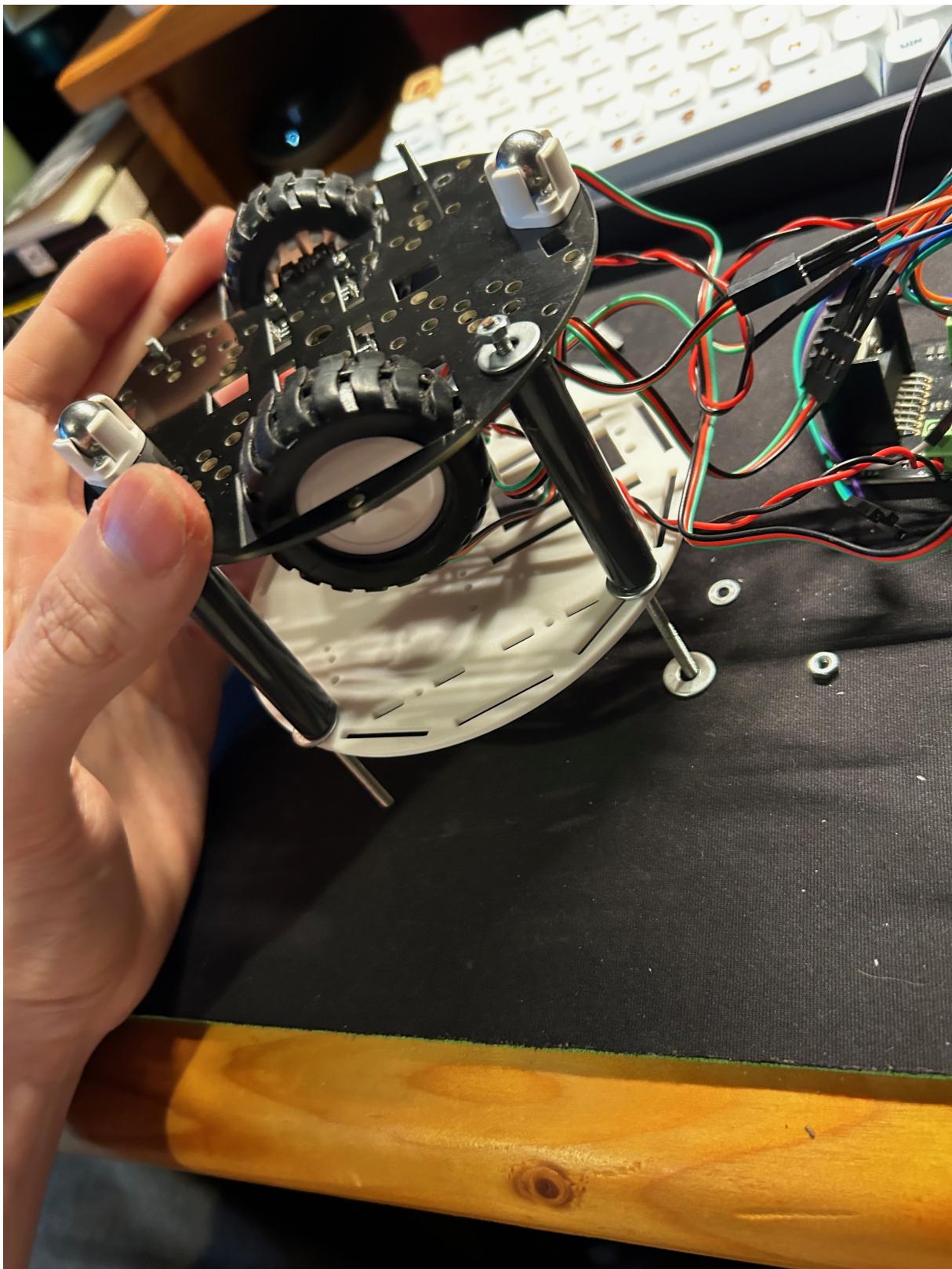


Step 6: Mount all the supports on the bottom plate



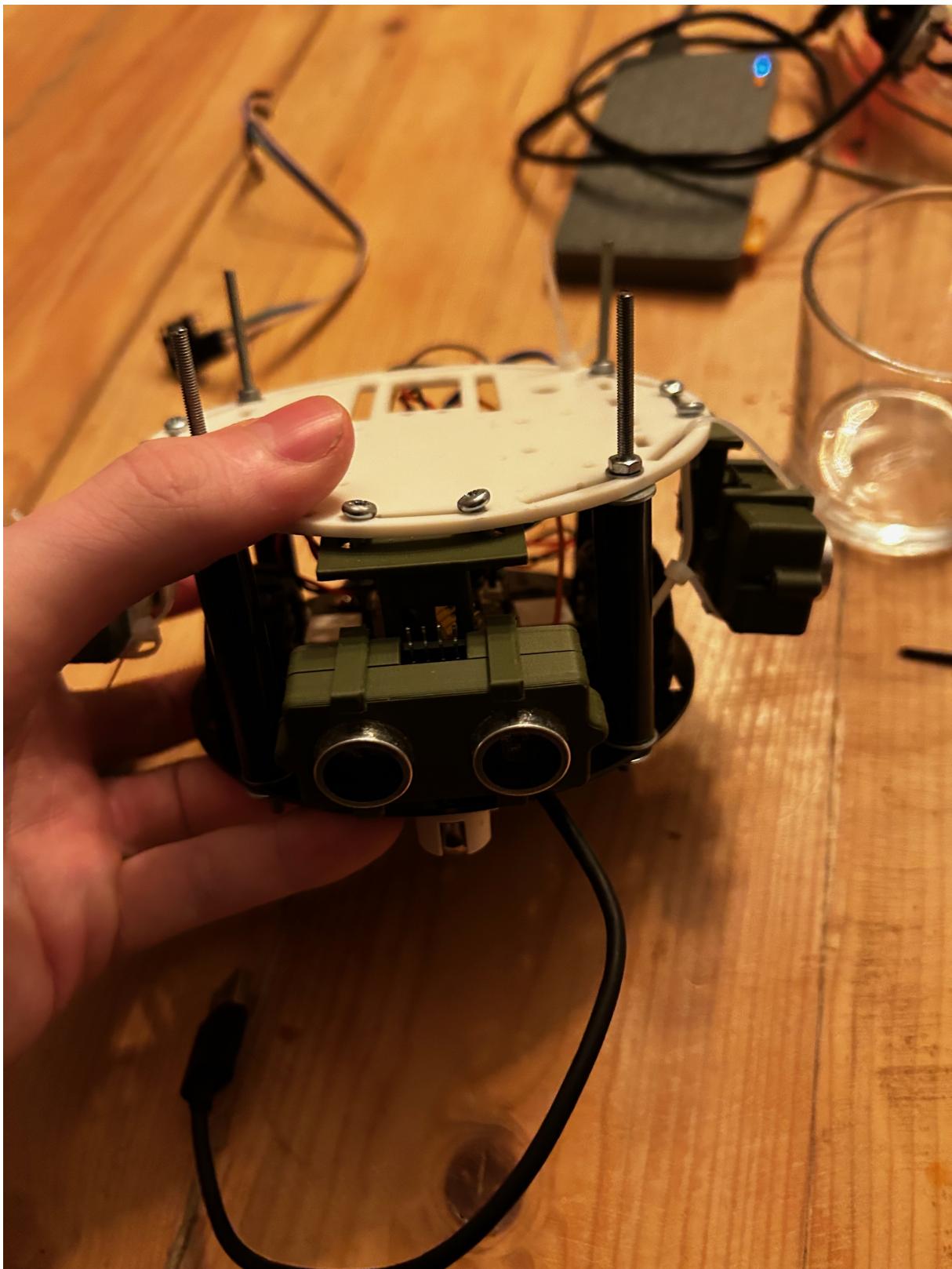
Step 7: Attach the top plate (you will need to drill holes so that the supports can fit through the top plate)





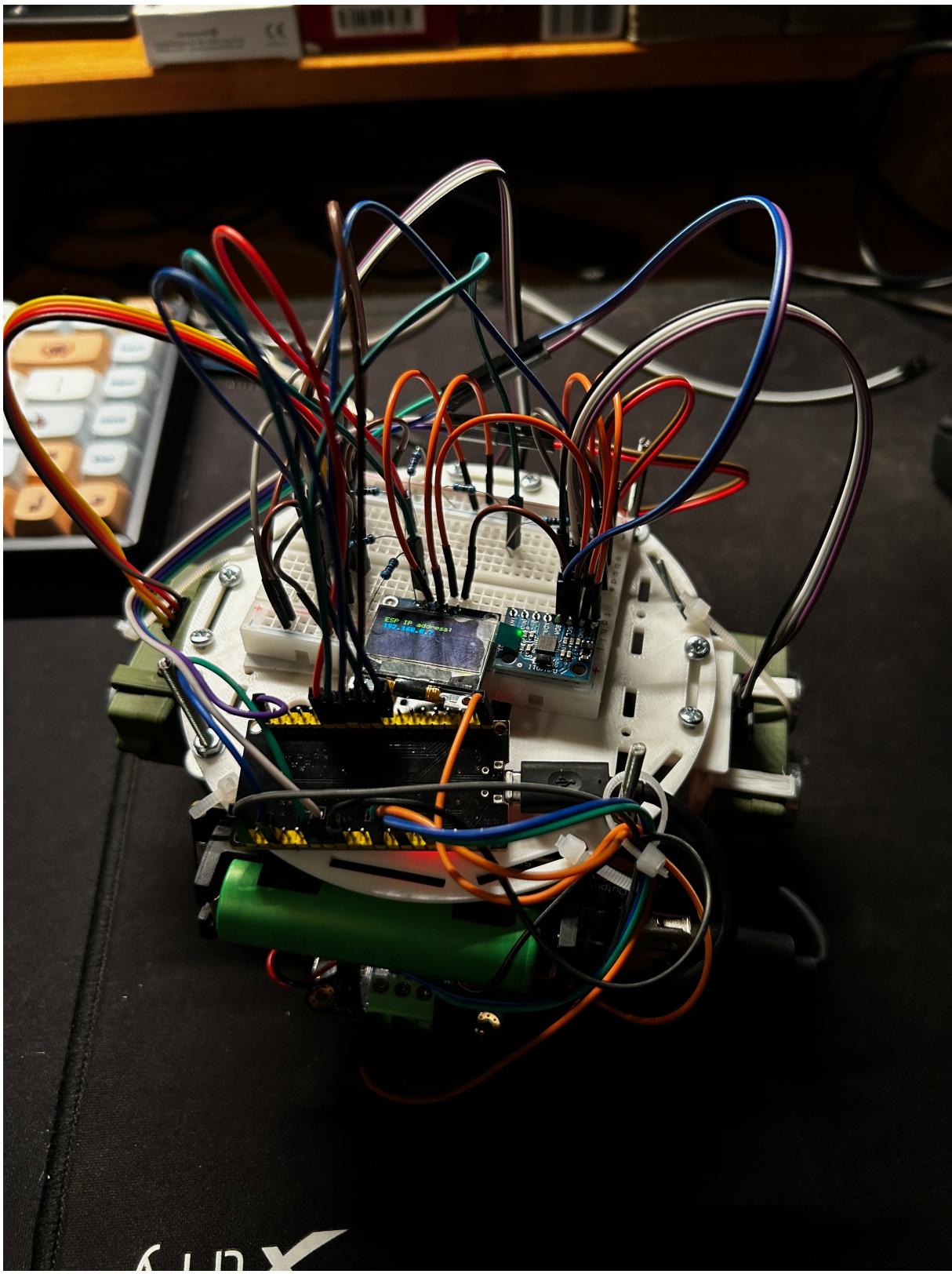
Step 8: Attach the ultrasonic sensor to the top plate

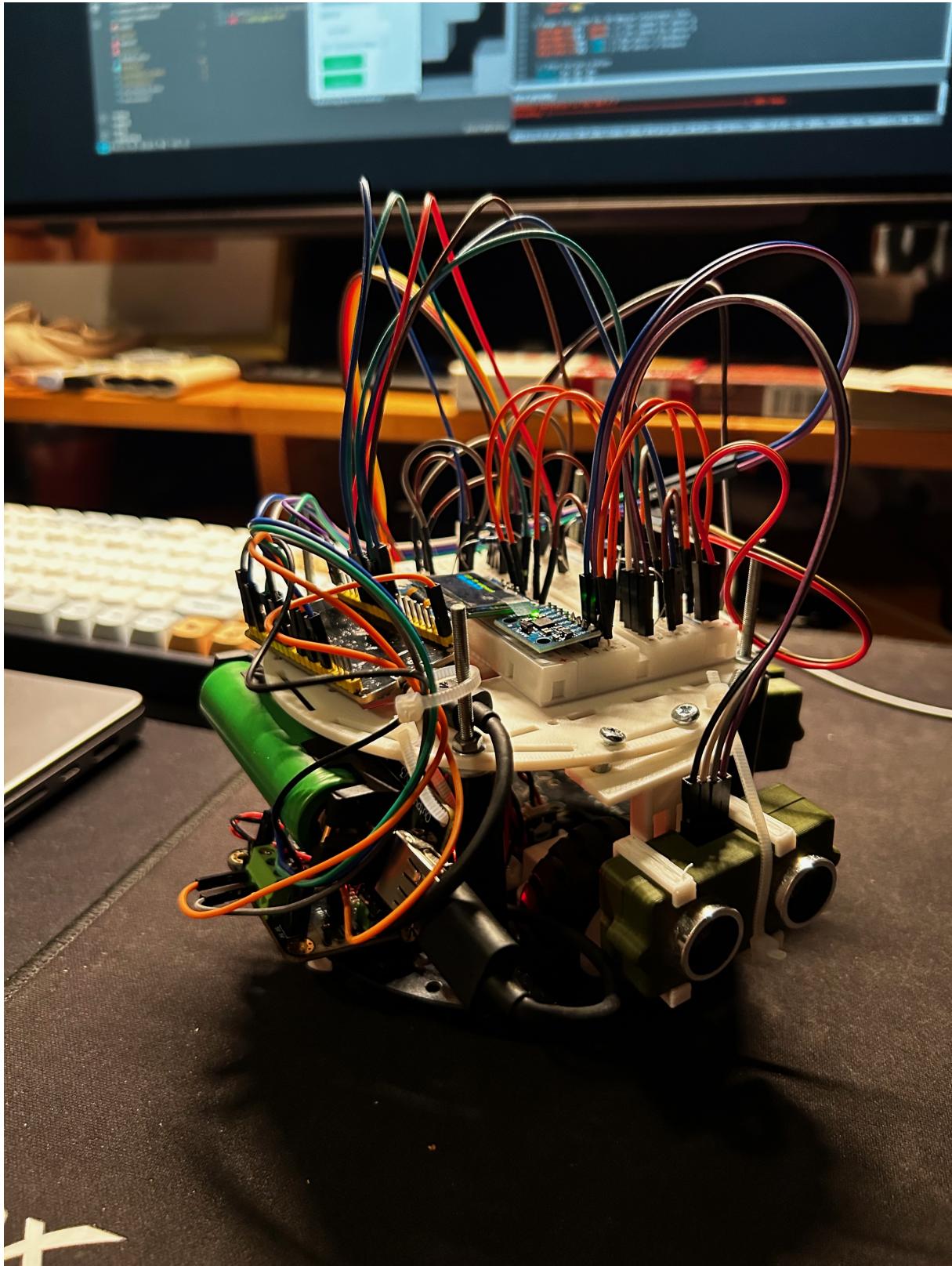


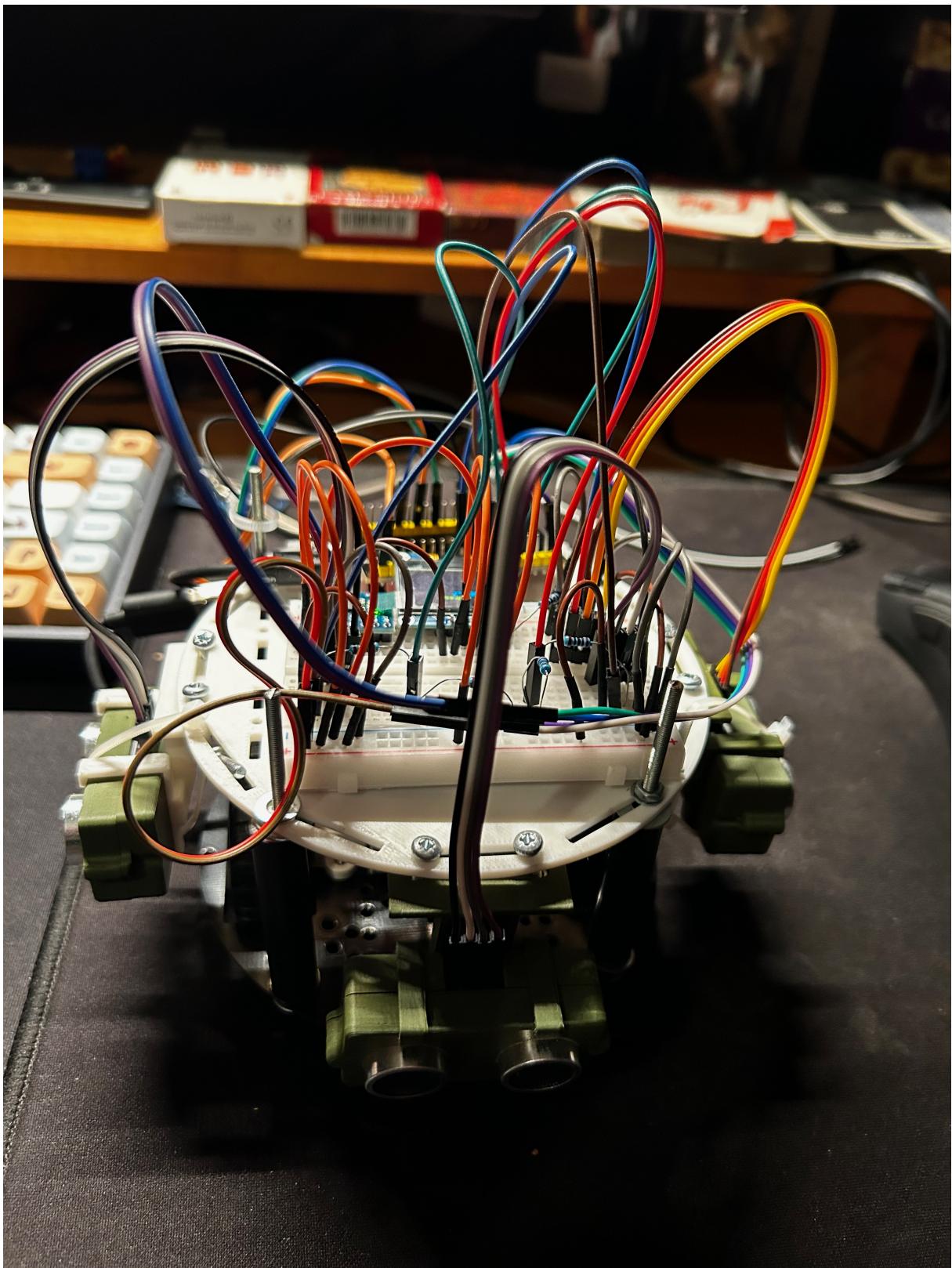


Step 9: place the esp32 on the top plate togheter with a mini breadboard for the sensor wires

As you can see the battery for the esp is attached to the top plate with zip ties.

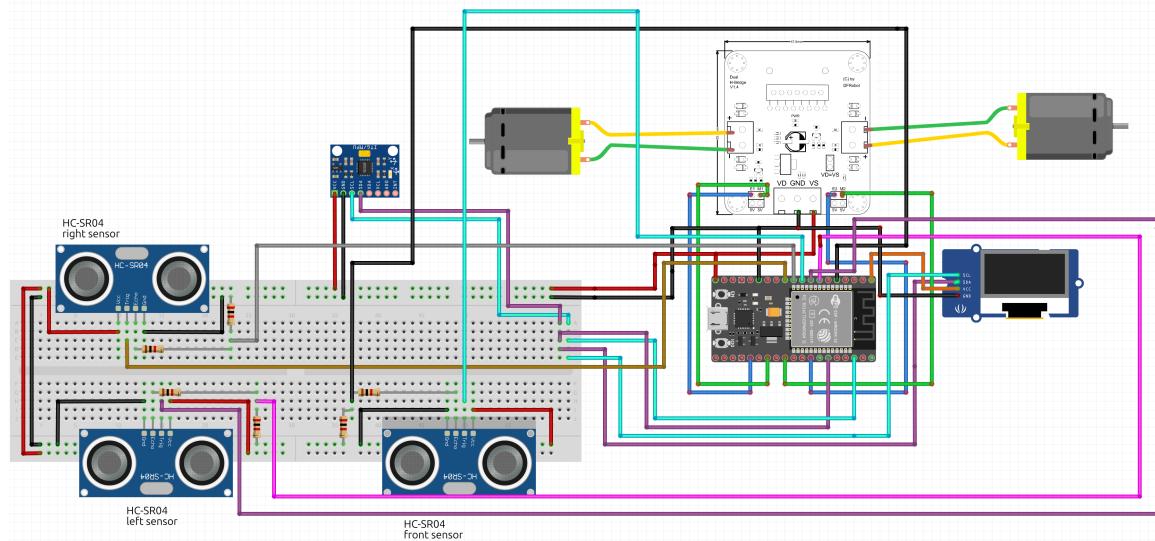






Wiring Guide

ESP32 Wiring



fritzing

The above diagram shows the wiring connections for the ESP32-WROOM-32 module. The motors are connected to the motor driver LN298N.

esp32 pins Since the schematic is not very clear (sorry for this), here is a list of the pins used on the ESP32:

```
int E1 = 2; //PWM motor 1
int M1 = 17; //GPIO motor 1
int E2 = 19; //PWM motor 2
int M2 = 4; //GPIO motor 2

int sensor0Trig = 27; //GPIO right sensor
int sensor0Echo = 26; //GPIO right sensor

int sensor1Trig = 33; //GPIO left sensor
int sensor1Echo = 32; //GPIO left sensor

int sensor2Trig = 25; //GPIO front sensor
int sensor2Echo = 35; //GPIO front sensor
```

```
// OLED display pins
#define SDA_PIN 21 // this is the default sda pin on the esp32
#define SCL_PIN 22 // this is the default scl pin on the esp32
```

Building the maze

final result

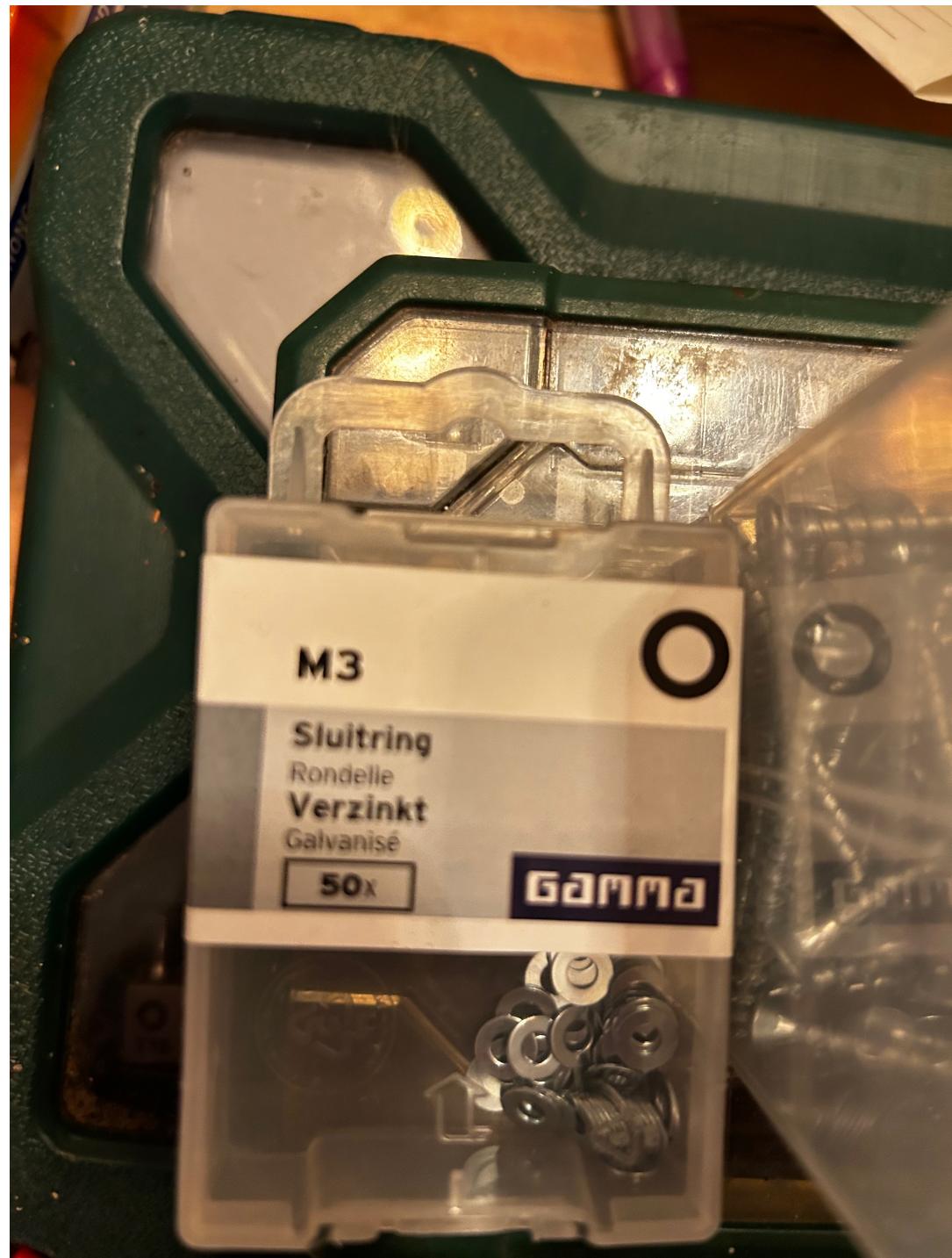


prerequisites

- screws used:



- Nuts used:



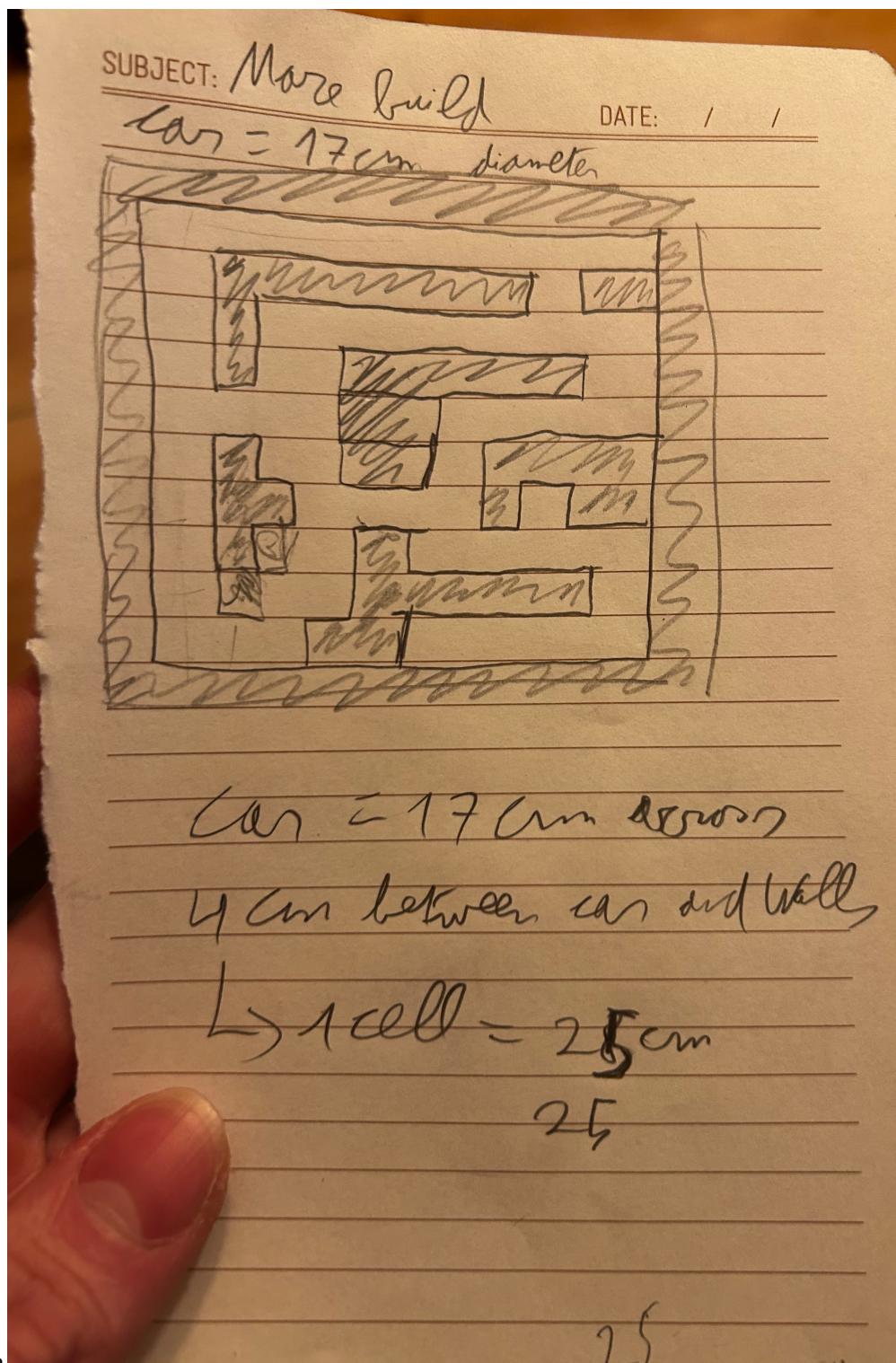
- Supports used:



- Wood used:
 - planks cut to 10cm width by 120cm length



Step 1: calculations



step 2: cut the wood

I let the store cut the wooden planks for me to the correct size, As you could see in the prerequisites.

step 3: screw the wood together



It should turn out like this, repeat this for all the blocks in the maze:

