

## Assembly and programming instructions

### 1. Assembly

Print the 3D files provided in GitHub (<https://github.com/mcatalanuach/Automatic-feeder>).

Upload the provided code titled “Feeder\_Code” in the ESP32 Board using Arduino IDE software ([Upload a sketch in Arduino IDE – Arduino Help Center](#))

Wire the components according to the provided wiring diagram (Image 1), ensuring correct pin connections as follows:

- **Power supply:**

+5V from power Supply (Red Wire): Vin of ESP32 and VCC of Servos

Ground Wire from Power supply (Black Wire): GND of ESP32 and GND of Servos

- **Servo motor:**

Gate 1 Servo (Yellow wire): GPIO 26 of ESP32

Gate 2 Servo (Yellow wire): GPIO 27 of ESP32

VCC (Red Wire): +5V

Ground (Black Wire): Ground of power supply

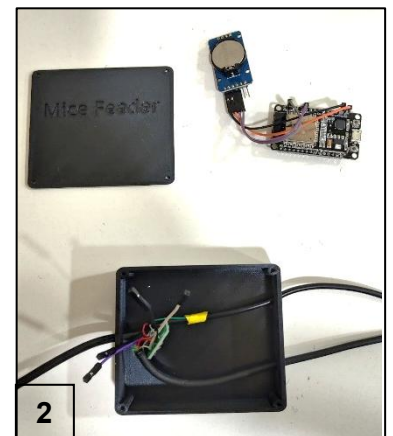
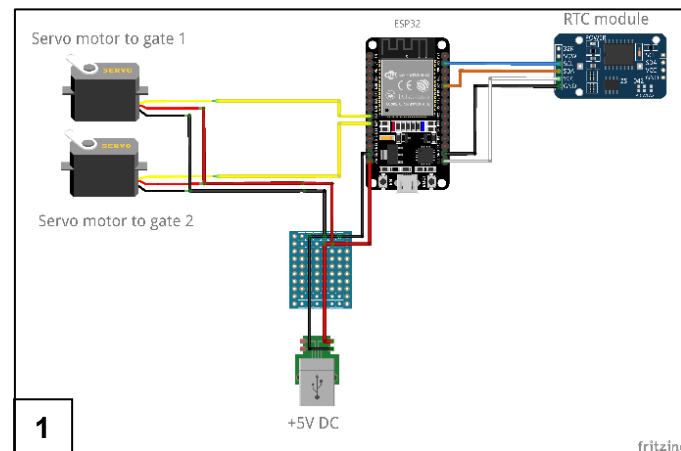
- **RTC Module (DS3231):**

SDA (Orange wire): GPIO 21 of ESP32

SCL (Blue Wire): GPIO 22 of ESP32

VCC (White Wire): 3v3 pin of ESP32

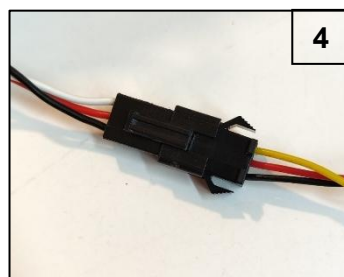
GND (Black Wire): GND of ESP32



Start by soldering the perfboard to connect the ESP32, +5V power supply, and servos (Image 2). Ensure that the servo control wires (yellow wire in the diagram 1) are properly routed to the output terminals. A USB-A – Micro USB charging cable was used to establish the connections.

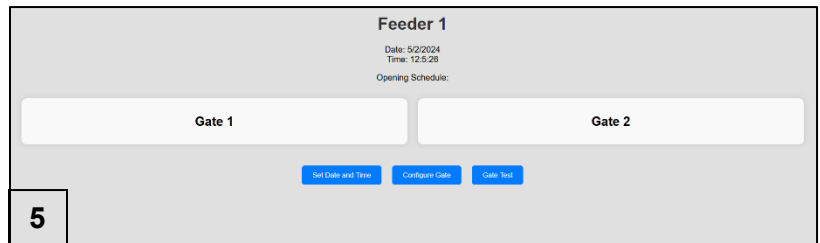
Carefully connect the ESP32 board and the RTC module, then place them inside the enclosure. The RTC module operates with a CR2032 battery, which must be inserted before use (Image 3).

Ensure the servo motor cables are long enough to reach from the enclosure to the mice cages. Use Dupont connectors for easy connection and disconnection when handling the cage. (Image 4).



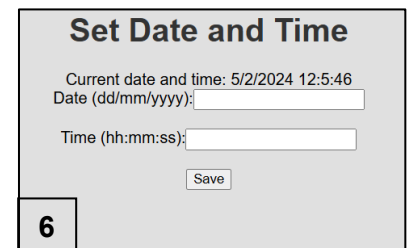
## 2. Connecting to the device via Wi-Fi

- Once powered on, the device will automatically create a Wi-Fi network.
- On your smartphone or laptop, search for available networks and connect to **"Feeder1"** using the password **"123456789"**.
- Disconnect any other active internet connections on your device such as mobile data.
- Open a web browser and enter the following IP address in the address bar: **192.168.4.1**. The main menu should now appear (Image 5)



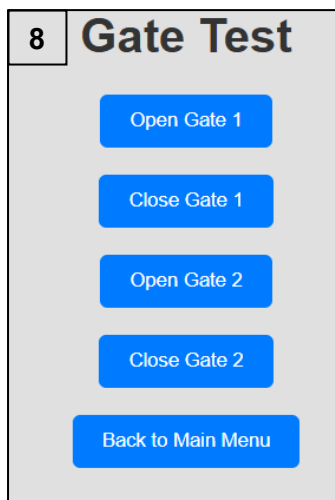
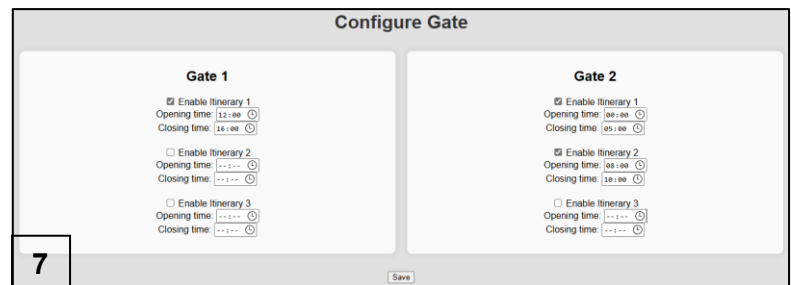
## 3. Setting Date and Time:

- In the main menu click on "Set Date and Time".
- Enter the current date and time in the following format: dd/mm/yyyy hh:mm:ss (25/10/2023 14:30:00) (Image 6).
- Click "Save" to update the settings. A confirmation message "Date and time updated" will appear.



## 4. Configuring the Gate Schedules:

- In the main menu, click on "Configure Gate" to independently set up one or more schedules for each gate by clicking "Enable itinerary" (Image 7).
- Example configurations:  
Gate 1: One active schedule:  
Open from 12:00 to 16:00.  
Gate 2: Two active schedules:  
Open from 00:00 to 05:00, then close.  
Open again from 08:00 to 10:00, then close.
- Click 'Save' to update the settings, a confirmation message will appear. These schedules repeat daily until modified.

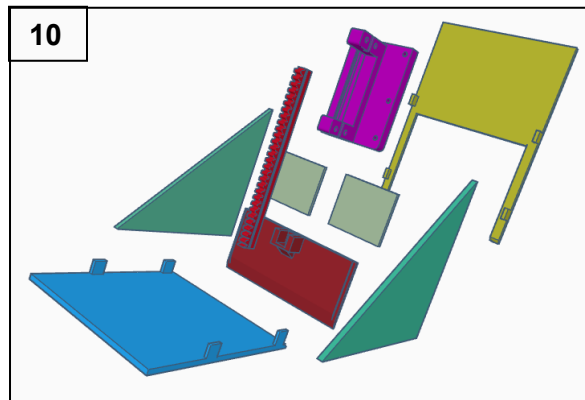


## 5. Testing the Gate Mechanism:

- In the main menu, select "Gate Test".
- Use the corresponding buttons to open and close the gates and ensure proper operation (Image 8).

## 6. Feeder assembly

- Once all 3D parts are printed, assemble the feeder, Refer to Image 10 for assembly instructions. An additional assembly model titled 'Assembly feeder' is also provided in the '3D\_Files' archive.
- When you are joining the parts, position the feeder inside the cage and attach them using hot silicone according to your cage configuration. We have used the feeder in two different types of cages with different angles (Figure 1 of publication and image 9). Alternatively, you can modify the 3D files to suit your specific needs.



## 7. Recommendations

- Mice tend to chew on wires. To prevent device failure, position the feeder cables out of their reach.
- If multiple devices are used, rename the Wi-Fi network and password in the code (lines 28 and 29 respectively) before uploading it via Arduino IDE. Also, update the feeder name (e.g., "Feeder 1" to "Feeder X") by modifying line 164 in the code.
- If multiple cages require the same gate-opening schedule, additional servos and feeders can be wired in parallel configuration. However, ensure the +5V power supply can handle the extra load.
- A UPS (Uninterruptible Power Supply) is highly recommended to prevent device resets during power outages.