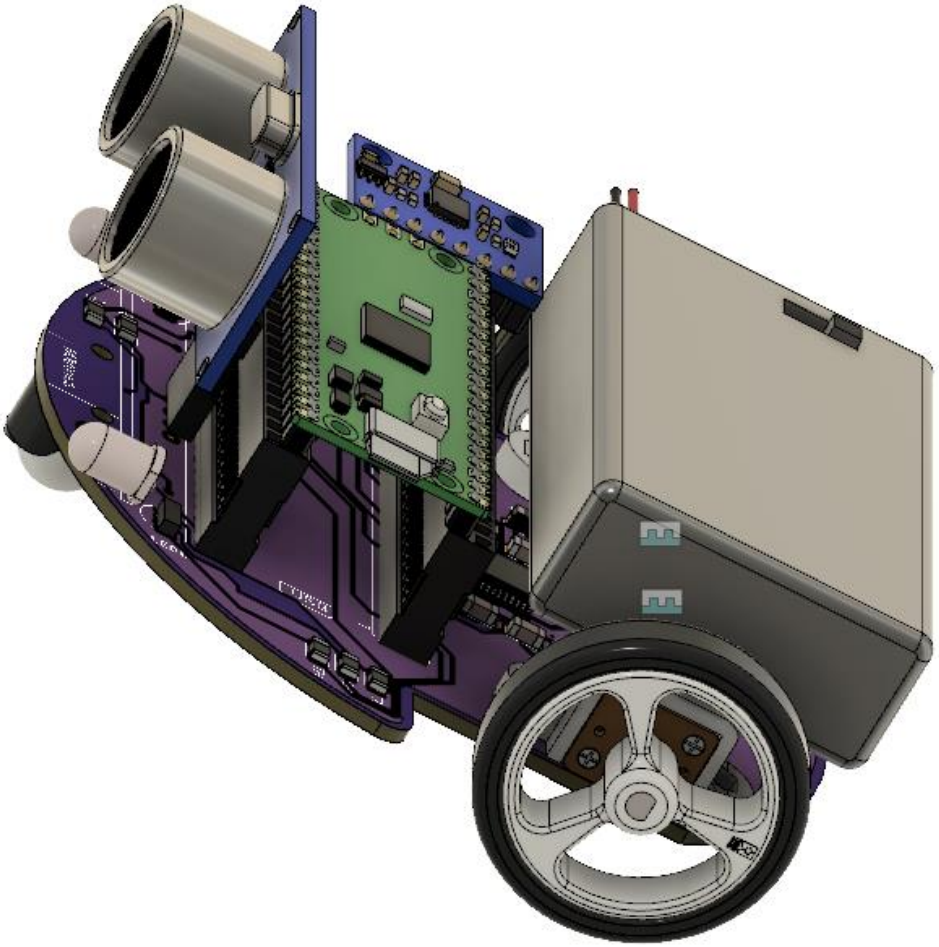
MJTRONIKS.COM

MJtroniks Mojobot Pico User Manual



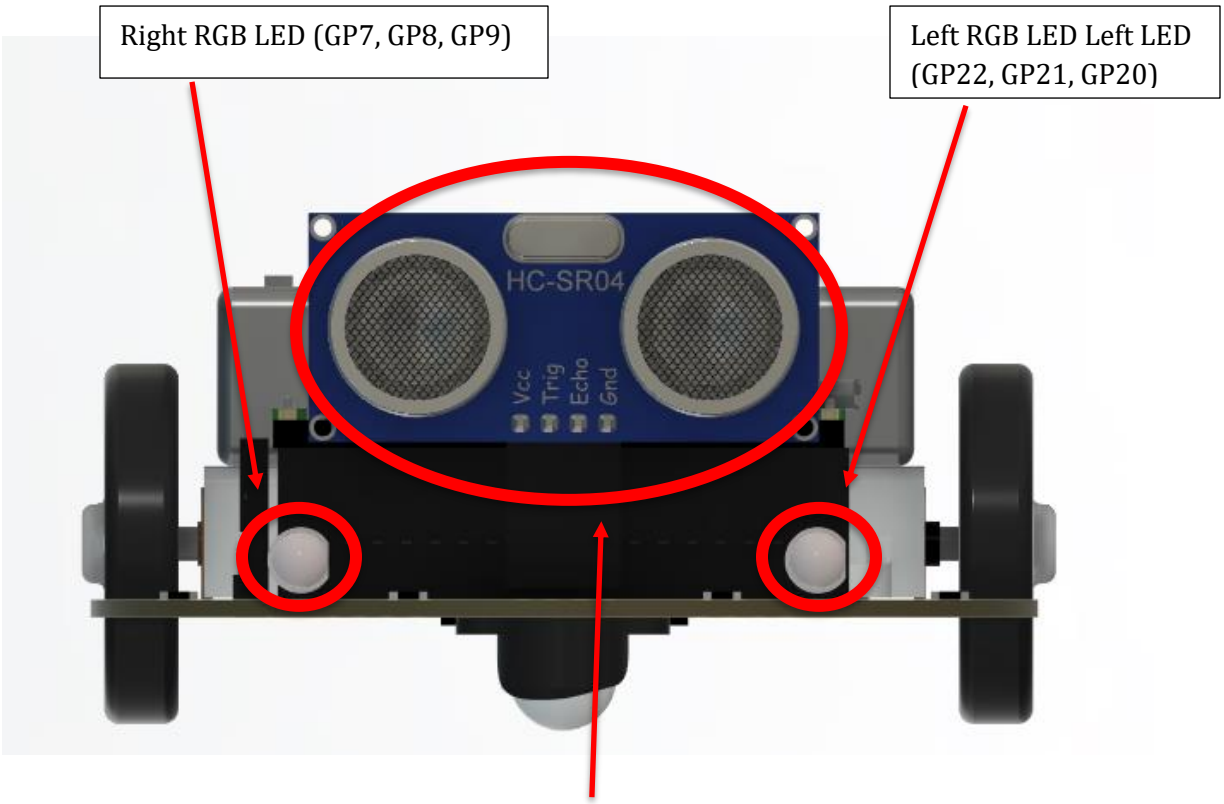
Contents

Introduction

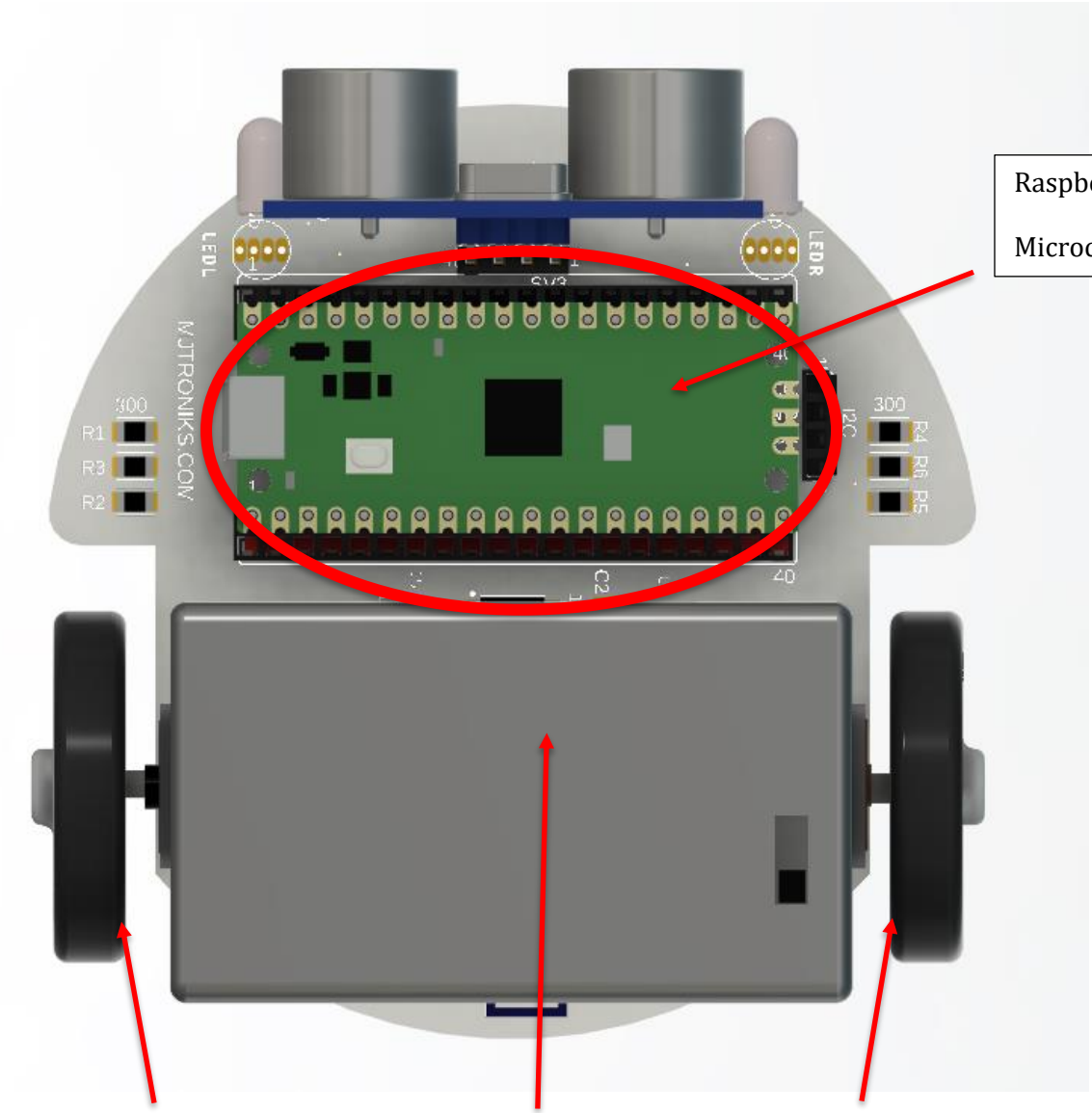
Mojobot by MJtronics is an educational and hobbyist robot, designed to facilitate learning in robotics, sensor integration, and programming.

Robot parts

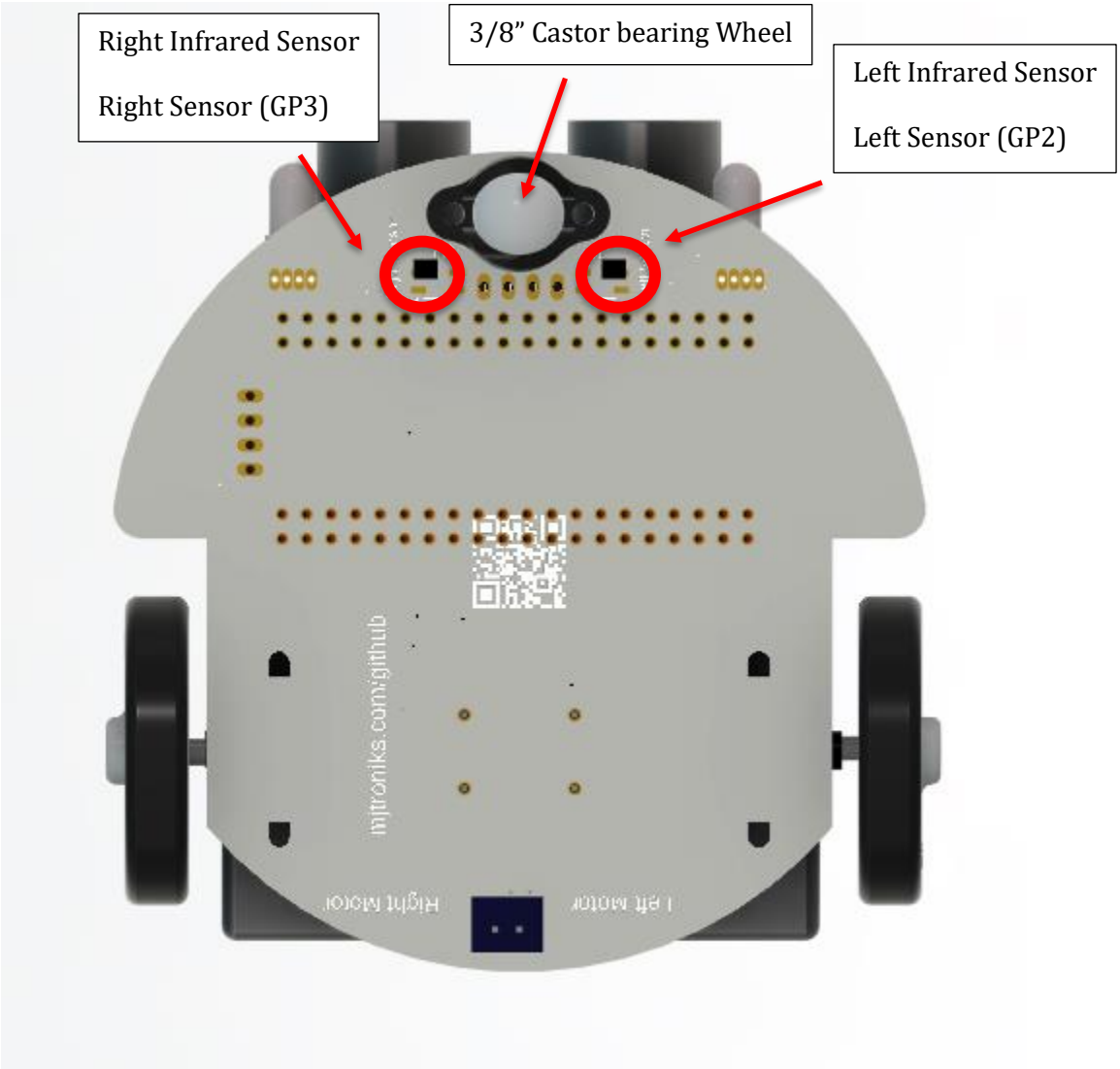
FRONT VIEW



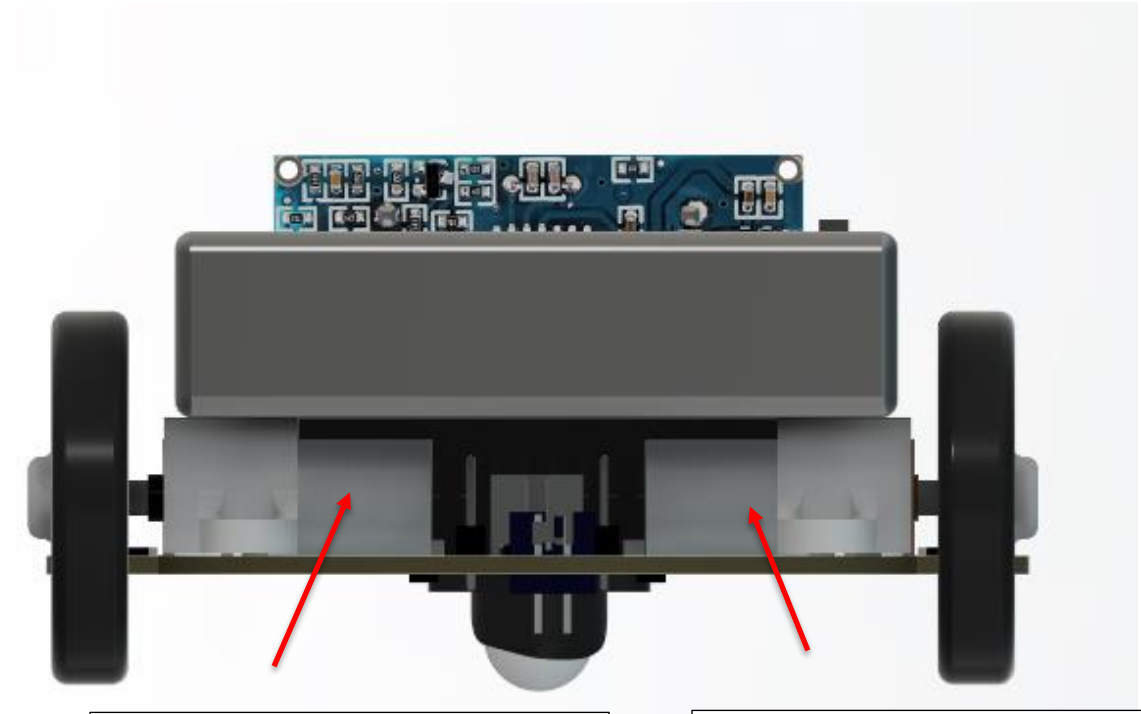
TOP VIEW


Raspberry Pico
Microcontroller
Left Wheel
3 X AAA Battery holder
Right Wheel

BOTTOM VIEW


Right Infrared Sensor
Right Sensor (GP3)
3/8” Castor bearing Wheel
Left Infrared Sensor
Left Sensor (GP2)
mjtroniks.com/github
Right Motor
Left Motor

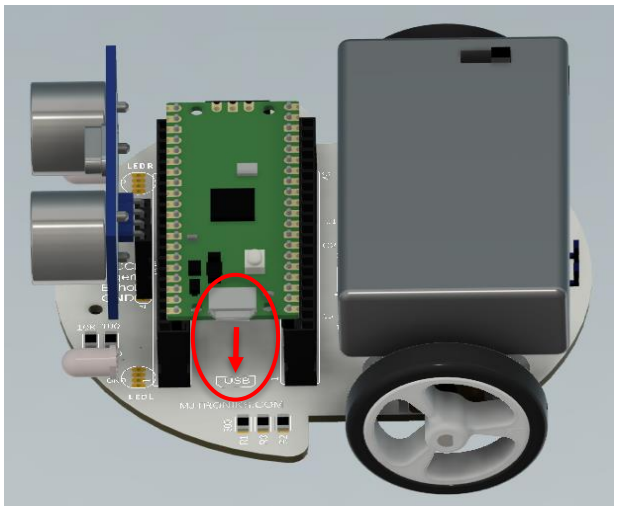
BACK VIEW



LEFT Motor M1	RIGHT Motor M2
Motor 1 PWM (GP10) (motor 1 speed)	Motor 2 PWM (GP11) (motor 2 speed)
Direction (GP12) Forward/Backward	Direction (GP13) Forward/Backward

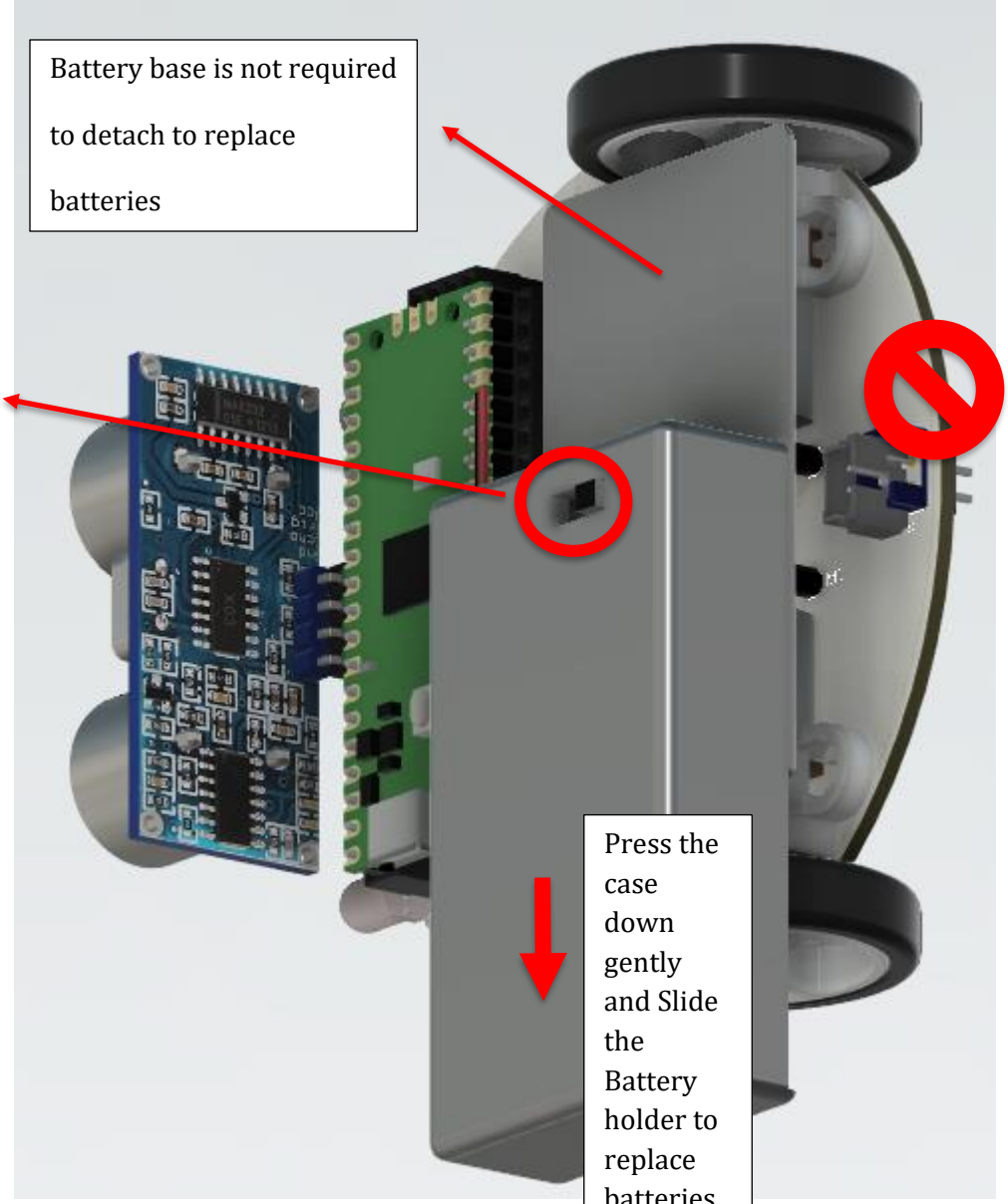
Handling Instructions

1. Microcontroller USB Alignment: Ensure the microcontroller USB matches the PCB board USB mark.

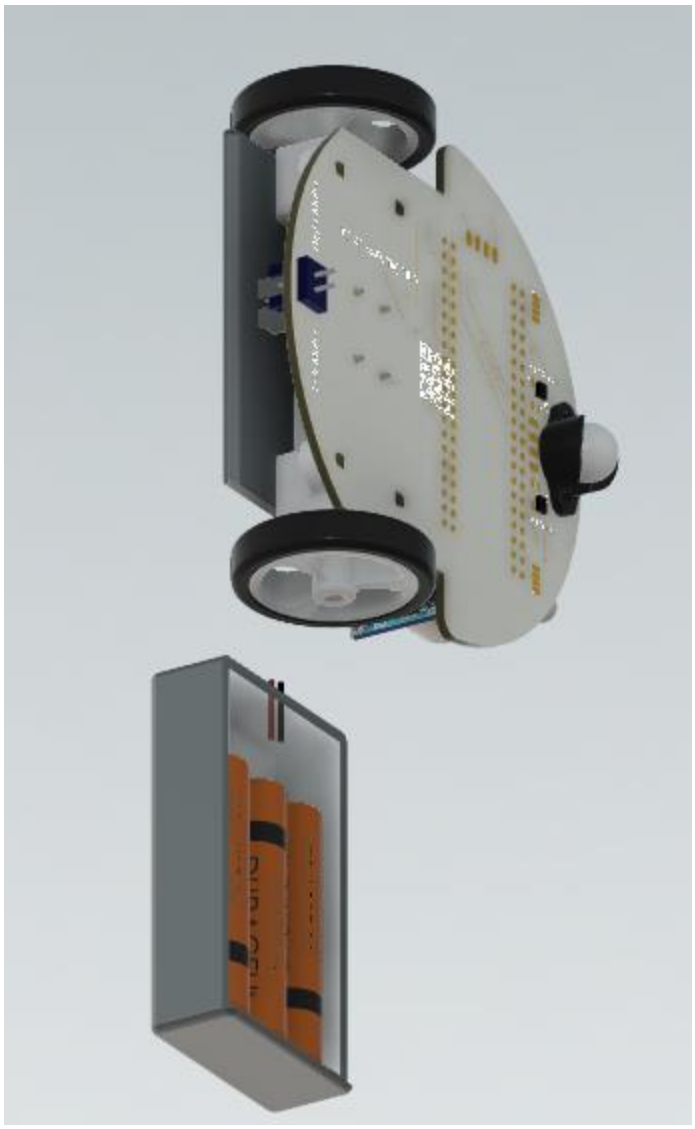


2. Battery Pack:

- Do not unplug the battery pack from the power connector.
- Remove batteries by sliding open the battery holder case.
- Use the battery holder case switch to turn the robot on and off.


Battery base is not required to detach to replace batteries
Robot on and off Switch
Do not Unplug The Power Cable
Press the case down gently and Slide the Battery holder to replace batteries

-

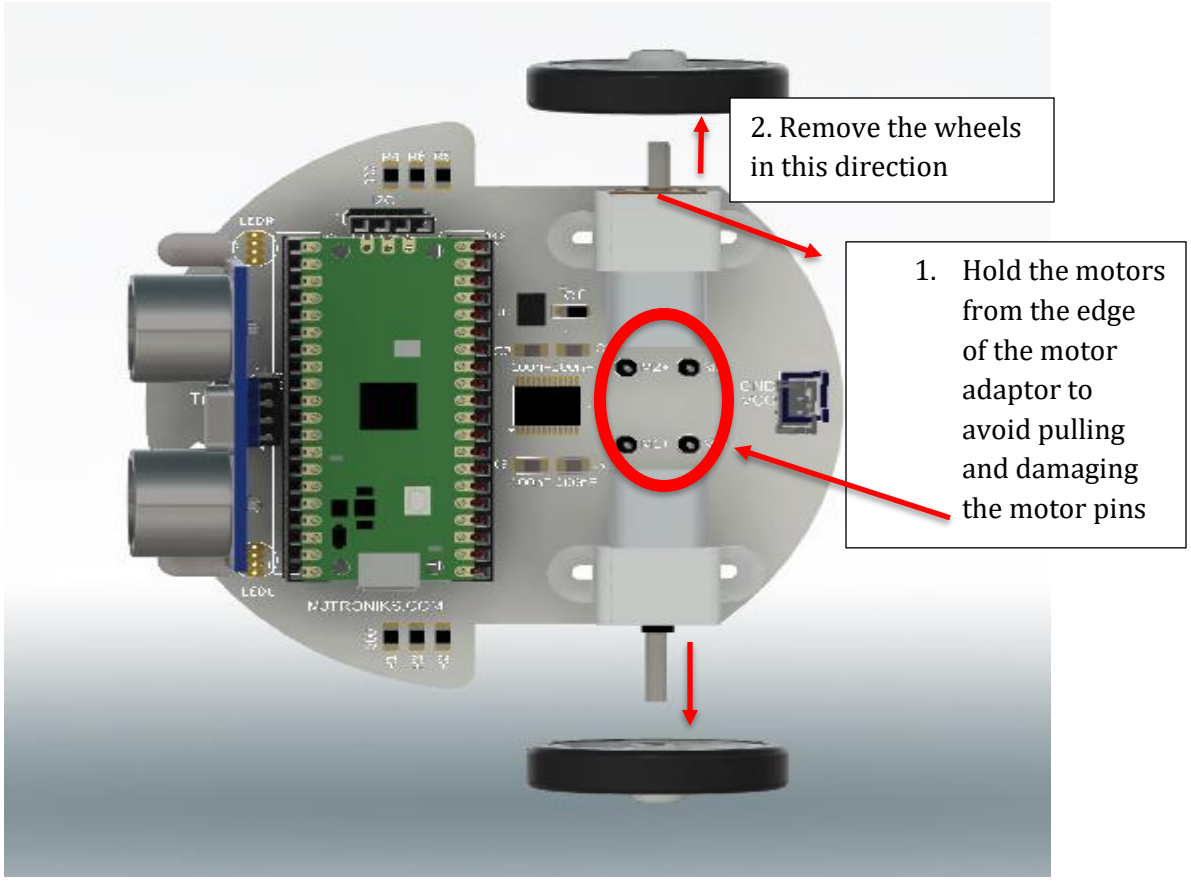


Battery replacement Procedure

Base remains attached to the car

Do not unplug the power cable

3. Wheel Removal: Remove the battery holder and the proceed to remove the wheels gently, holding the motors to avoid damaging motor pins.



Assembly and Components

- Components Included:

- 1 x Mojobot car
- 1 x Battery Holder
- 1 x HC-SR04 Ultrasonic Sensor
- 1 x Raspberry Pi Pico
- 1 x Robot stand
- 1 x Line following map

Pins description

- Motors:

- Motor 1 PWM (GP10) (motor 1 speed), Direction (GP12) Forward/Backward

- Motor 2 PWM (GP11) (motor 2 speed), Direction (GP13) Forward/Backward

- Ultrasonic Sensor:

- Trigger (GP14), Echo (GP15)

- RGB Headlights:

- Left LED (GP22, GP21, GP20)

- Right LED (GP7, GP8, GP9)

- Infrared Control:

- Left Sensor (GP2), Right Sensor (GP3)

- I2C:

- SCL (GP19), SDA (GP18)

Power Requirements

- Voltage: 3.5V to 4.5V

- Batteries: 3 X AAA batteries (ensure correct placement)

Software Setup Overview

Detailed setup instructions in https://github.com/mjtroniks/Mojobot/wiki

1. Micropython:

- Install Thonny IDE from thonny.org

- Download Micropython firmware from micropython.org/download/

- Follow the Thonny installation guide to flash the firmware onto the Raspberry Pi Pico.

- Write and execute your Micropython code within Thonny IDE.

2. MakeCode:

- Visit makecode.microbit.org

- Create a new project and select the device as Raspberry Pi Pico.

- Use the drag-and-drop blocks to create your program.

- Download the generated UF2 file and drag it to the Pico mounted as a USB drive.

3. C++:

- Install Visual Studio Code and CMake.

- Set up the Pico SDK and toolchain by following the official Raspberry Pi Pico C++ setup guide.

- Write your C++ code and use CMake to build the project.

- Flash the binary onto the Pico using Picoprobe or drag-and-drop method.

Programming Tutorials

Micropython Introduction and Blink (Click for detailed instructions)

To begin with Micropython, you'll need to install the necessary software and set up your environment. Here's a simple blink program to get you started:

```
import machine
import utime

led = machine.Pin(25, machine.Pin.OUT)

while True:
  led.value(1)
  utime.sleep(1)
  led.value(0)
  utime.sleep(1)
```

MakeCode Introduction and Blink (Click for detailed instructions)

MakeCode is a user-friendly platform for beginners. Here's how to create a blink program:

1. Go to makecode.microbit.org.

2. Create a new project.

3. Drag the `show leds` block and create a pattern.

4. Use `pause` to control the blinking interval.

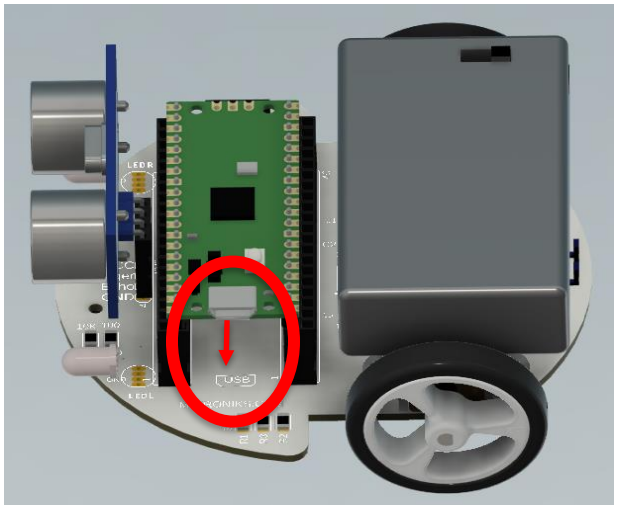
C++ Introduction and Blink (Click for detailed instructions)

For C++, set up your Arduino development environment and write your first program to blink an LED:

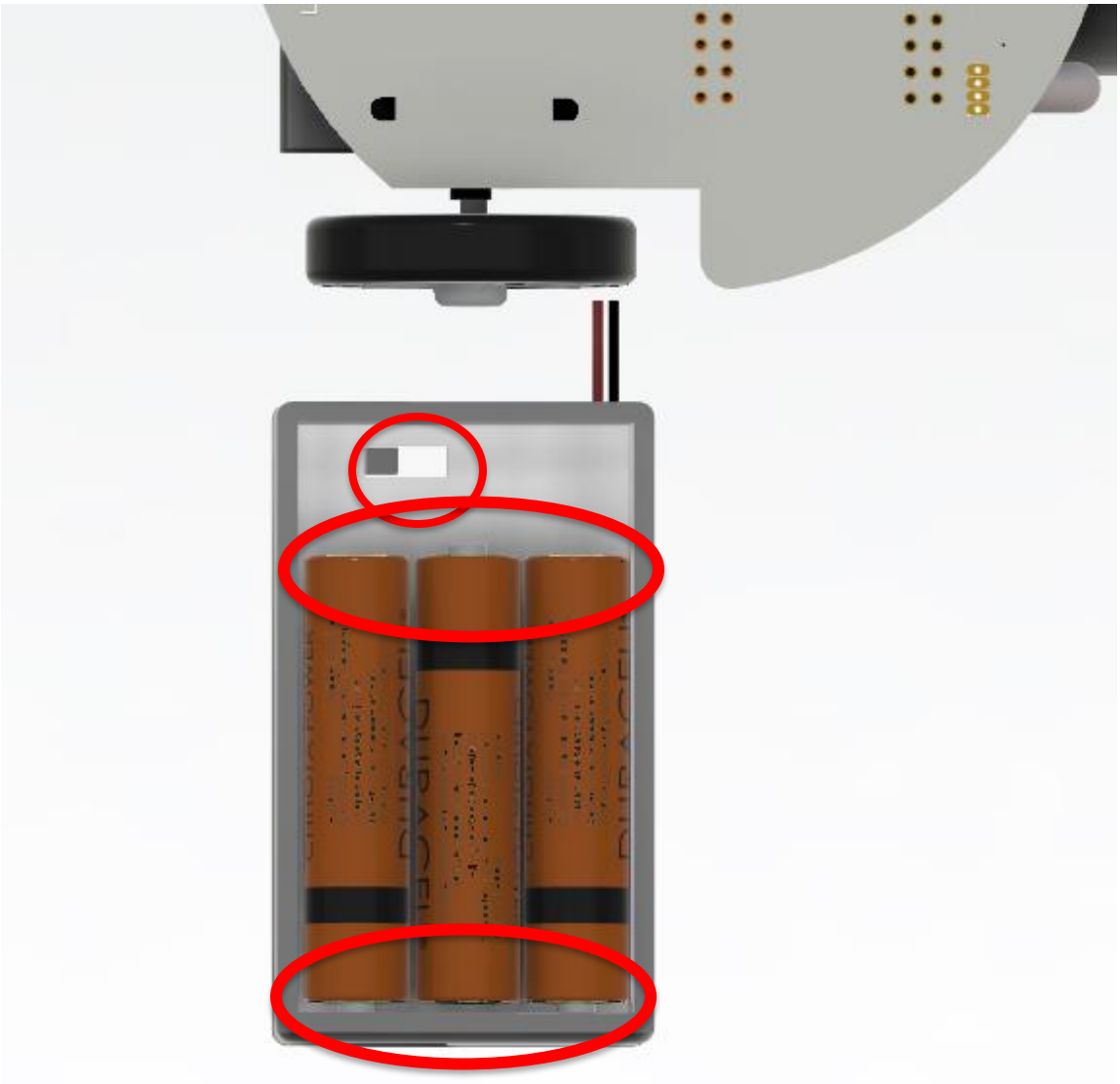
```
#include "pico/stdlib.h"

int main() {
  const uint LED_PIN = 25;
  gpio_init(LED_PIN);
  gpio_set_dir(LED_PIN, GPIO_OUT);

  while (true) {
    gpio_put(LED_PIN, 1);
    sleep_ms(1000);
    gpio_put(LED_PIN, 0);
    sleep_ms(1000);
  }
  return 0;
}
```

Troubleshooting

1. Microcontroller Placement: Check proper placement of the microcontroller, making sure the USB matches the USB mark on the board.



2. Battery Polarity: Ensure batteries are correctly placed with proper polarity.



3. When switching programming languages the UF2 image fails to upload, to resolve Re upload the image using Thony IDE as described in this tutorial section Steps to resolve

For further details and images, refer to the MJtronics Mojobot GitHub Repository (https://github.com/mjtroniks/Mojobot).