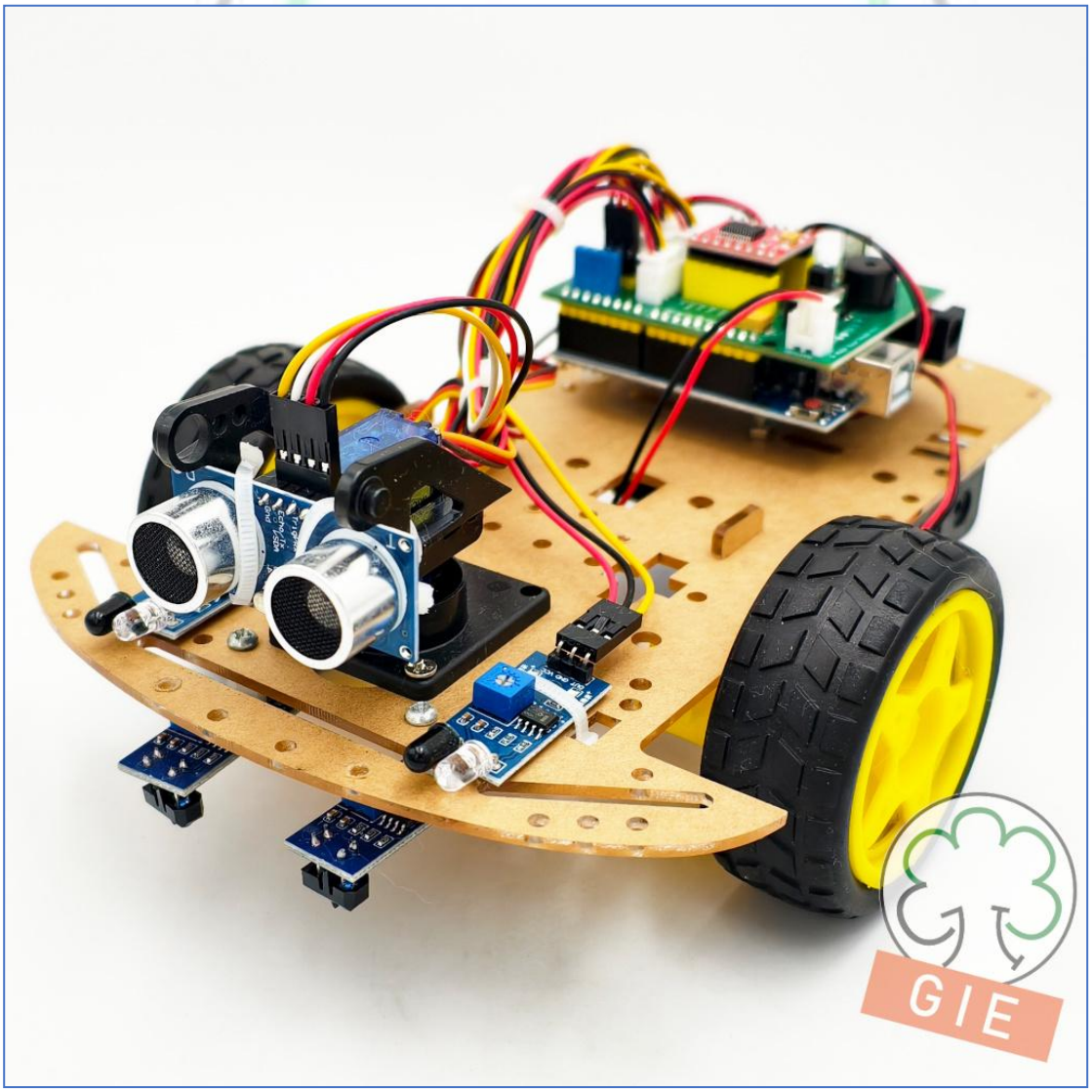
Arduino 2WD Robot Kit v3.0

User Manual



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Arduino 2WD Robot Kit v3.0

1. Description

This manual guides you through assembling, programming, and operating a line-following or/and obstacle-avoiding robot using the provided kit. For line following robot, it detects and follows a black line on a light surface using IR sensors, and stop while there is an obstacle in front of it by using IR obstacle sensors; for a obstacle-avoiding robot, it is an autonomous vehicle that navigates by moving forward until an ultrasonic detects an object, at which point it stops, scans for a clearer path, and changes direction; it's also include additional features like sound alerts and LED indications.

2. Components Overview

a) Arduino Uno: Microcontroller for programming and controlling the robot.
b) TB6612 Motor Driver: Controls the robot's motors for movement.
c) Two IR Line Tracking Sensors: Detects the black line and sends signals to the Arduino. (for full features package/Line following robot package)
d) Two IR Obstacle Detection Sensor: To detect the obstacle that in front of the robot. (for full features package/Line following robot package)
e) Motor Base Shield, it's including
   - Piezo Buzzer: Provides audible feedback (e.g., start or error alerts).
   - RGB LED: Indicates the robot's status with colour light (Red/Green/Blue)
   - Infrared Receiver: To receive command from the IR remote control.
f) Batteries AA/18650: Provide power to the robot.
g) Ultrasonic Sensor: it is used to emit sound waves and measure distances to obstacles, enabling the robot to "see". (for full features package/avoidance package)
h) Servo motor: it was attached ultrasonic sensor to pan (rotate) across a range (0 to 180 degrees). This provides a much wider understanding of the surrounding environment. (for full features package/avoidance package)

3. Packing List

- Common items ***(available for all the package)***
  a) Arduino Uno Compatible board (CH340) x 1pc
  b) USB Cable x 1pc
  c) Motor Base Shield with TB6612 Motor Driver Board x 1set
  d) TB6612 Motor Driver Board x 1pc
  e) DC Geared Motor x 2pcs
  f) Rubber Wheel x 2pcs
  g) Hammer Caster x 1pc
  h) Acrylic chassis x 1 pc
  i) IR Remote Control x 1pc
  j) Cable Tie x 8pcs
  k) Mounting standoff, screws and nuts x 1 set
  l) AAx4 Battery Box + 4pcs AA non-rechargeable Batteries (***Option: AA Battery***)

18650x2 Battery Box + 2pcs 18650 rechargeable Batteries + USB Charger (***Option: 18650 Battery***)

- Full features Package
  a) Common Items
  b) IR Line Tracking Sensor Module x 2pcs
  c) IR Obstacle Detection Sensor x 2pcs
  d) Mini Servo motor x 1pc
  e) Ultrasonic Sensor x 1pc
  f) FPV mini bracket x 1pc
  g) 3Pins JST to Female Jumper Cables x 4pcs
  h) 4Pins JST to Female Jumper Cables x 1pc

- Line Following Package
  a) Common Items
  b) IR Line Tracking Sensor Module x 2pcs
  c) IR Obstacle Detection Sensor x 2pcs
  d) 3Pins JST to Female Jumper Cables x 4pcs

- Avoidance Package
  a) Common Items
  b) Mini Servo motor x 1pc
  c) Ultrasonic Sensor x 1pc
  d) FPV mini bracket x 1pc
  e) 4Pins JST to Female Jumper Cables x 1pc

4. Required Tools

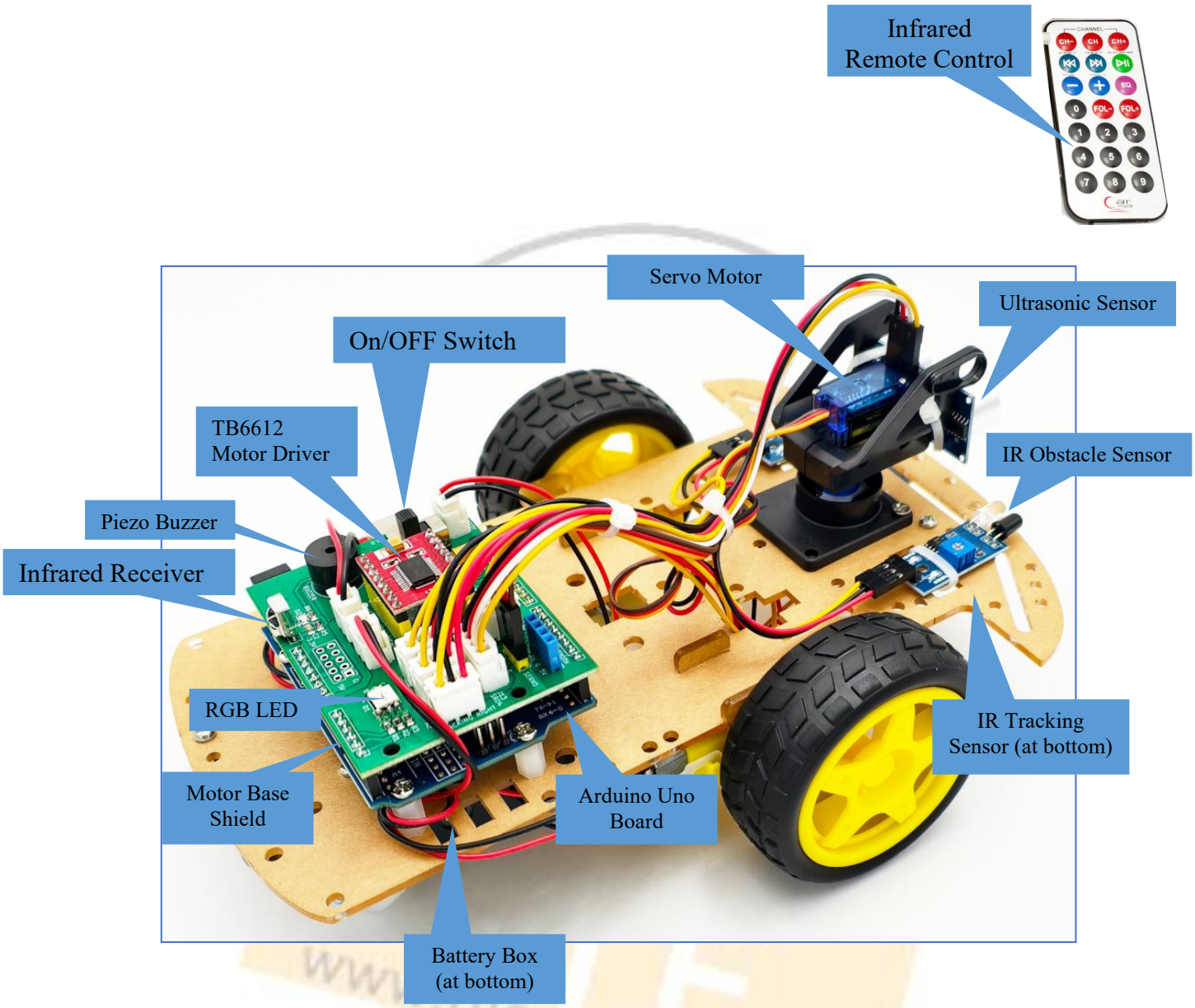
a) Mini Screw driver (cross) (included)



b) Wire cutter (not included)

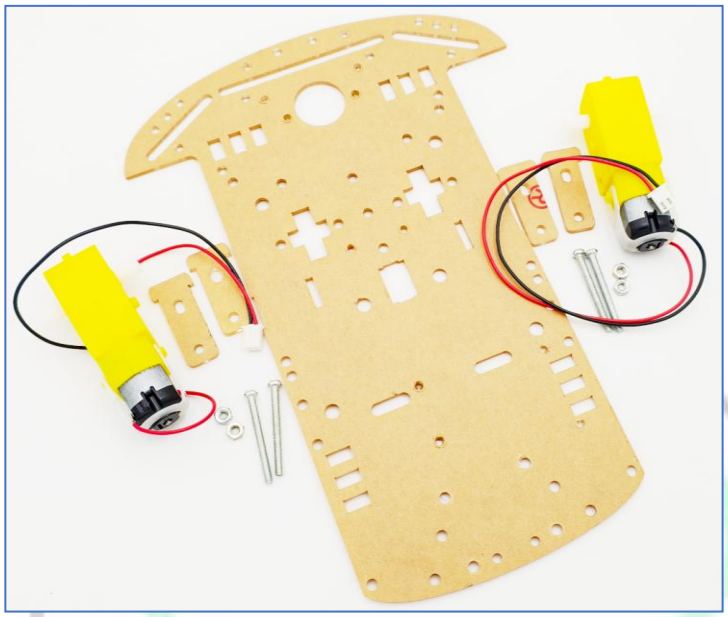


5. Components Introduction



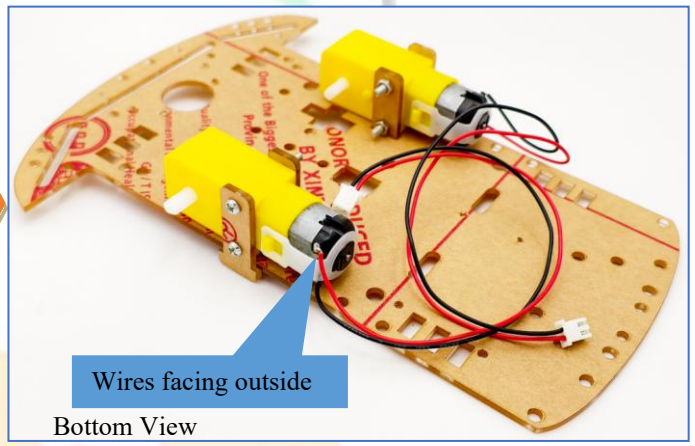
6. Assembly

Step 1 – Assemble DC gear motor

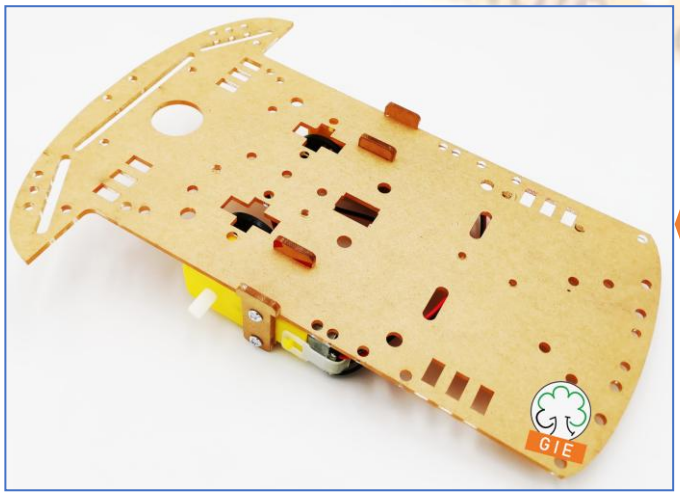


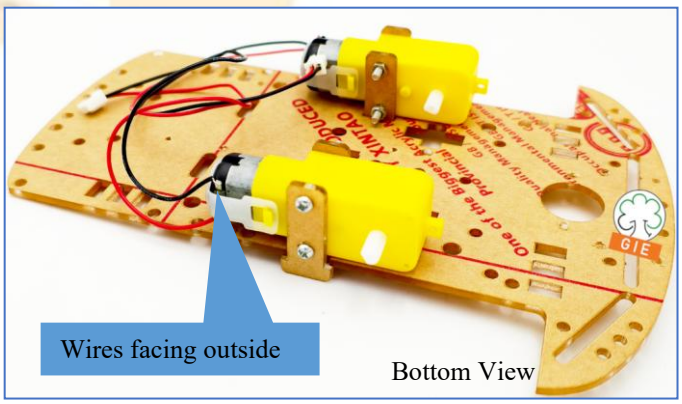


Bottom View



Bottom View

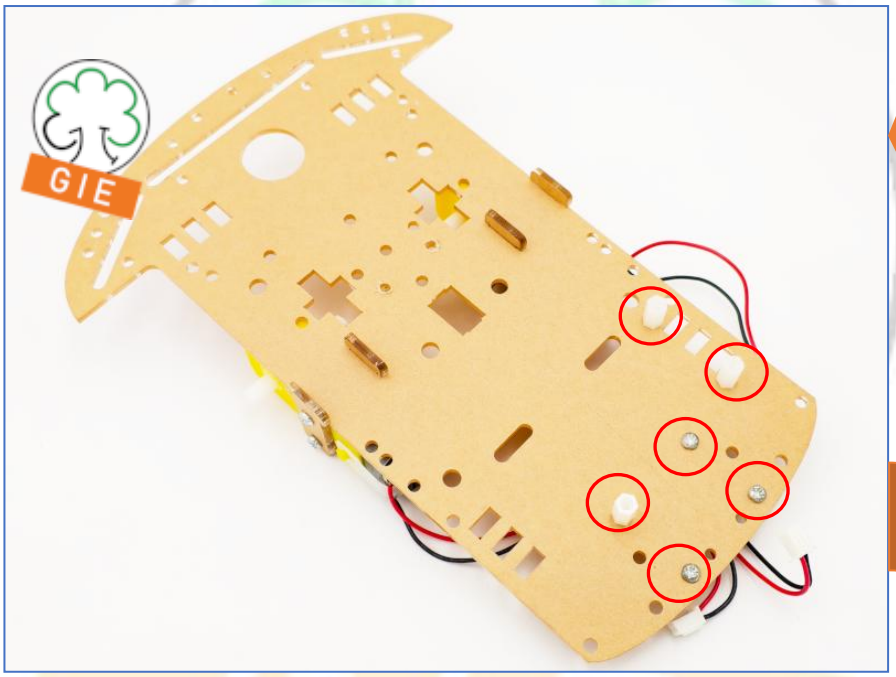


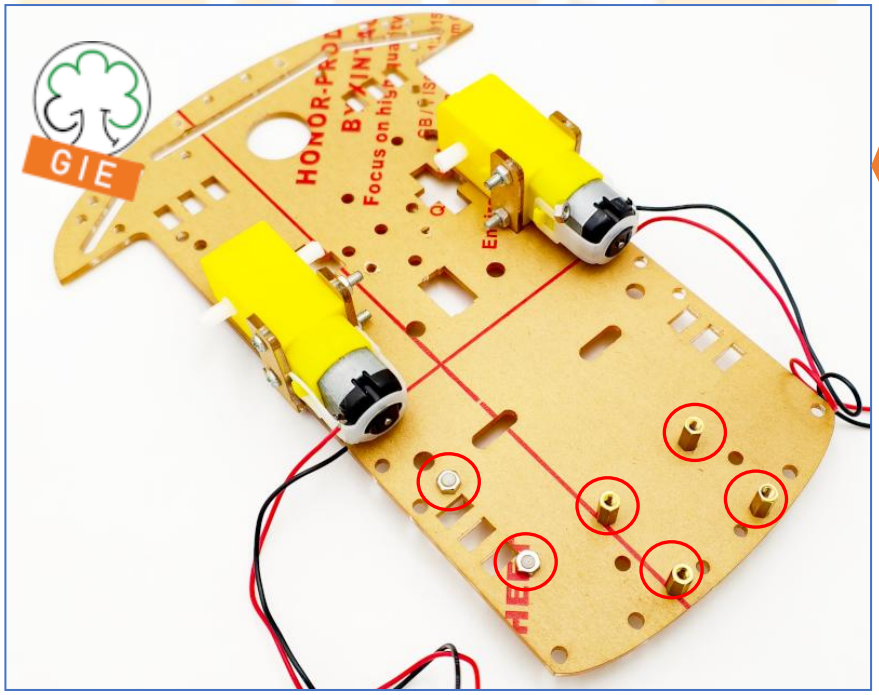


Bottom View

Step 2 – Assemble Stand-off for Caster and Arduino Uno Board

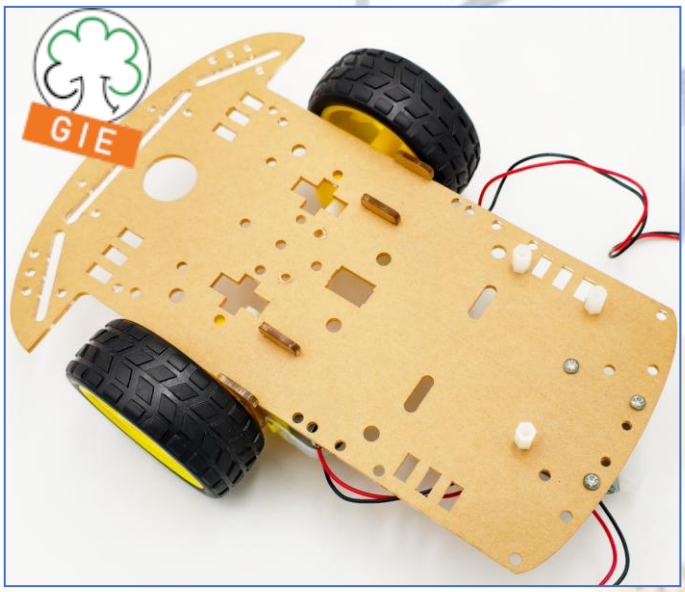


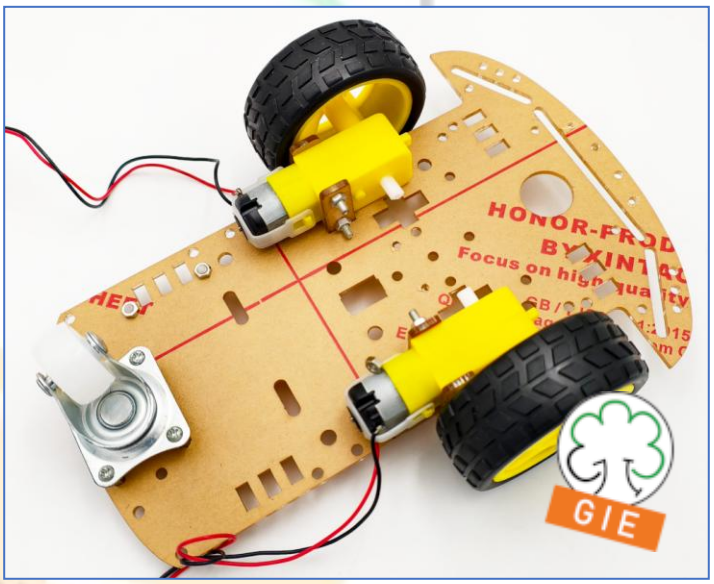




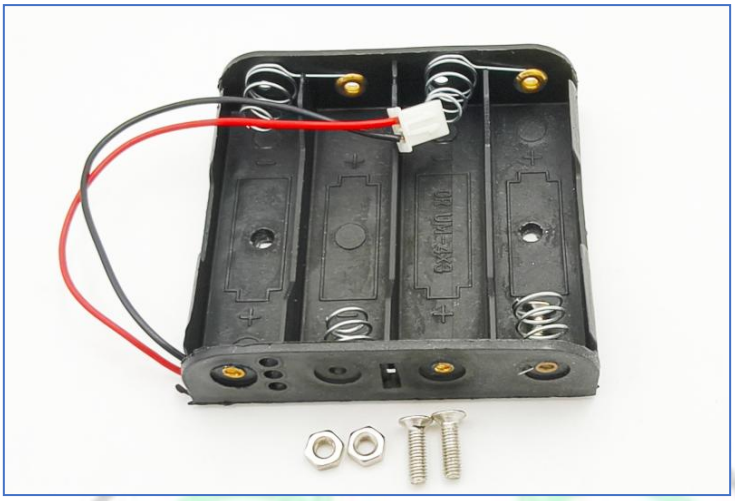
Step 3 – Assemble Wheels and Caster

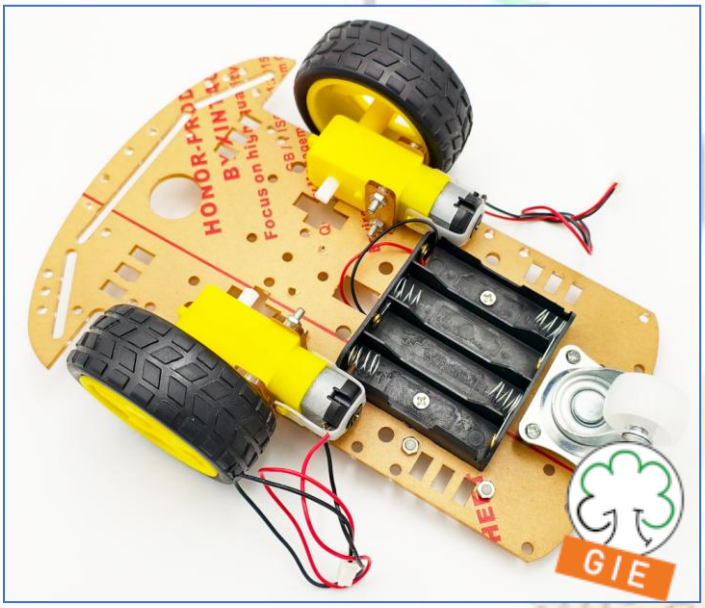


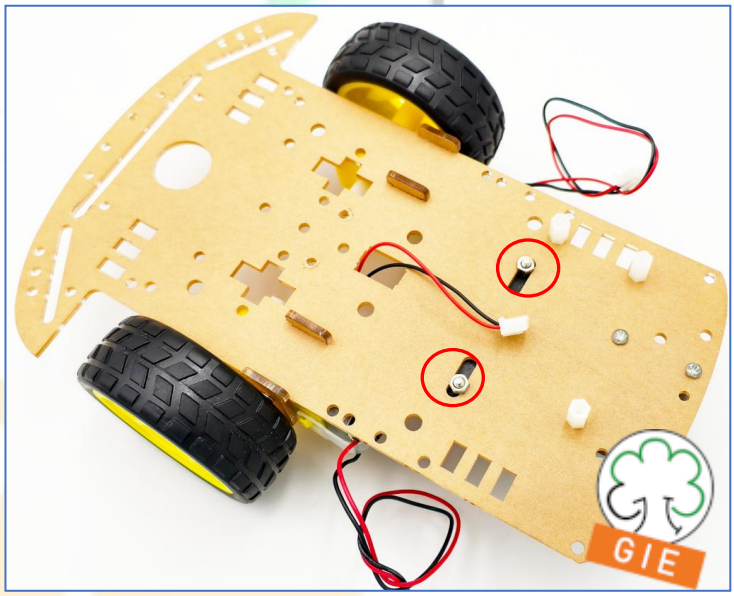




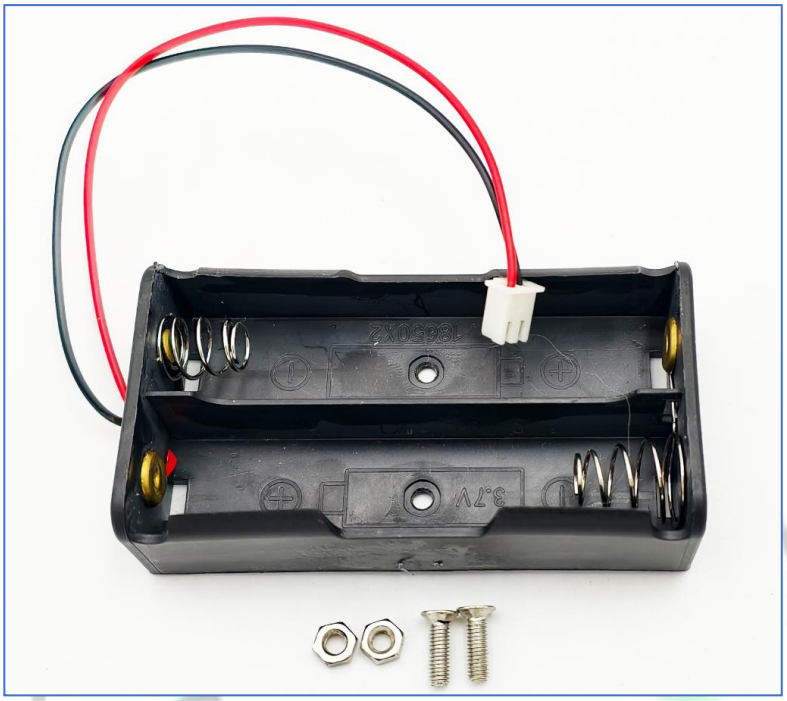
Step 4A – Assemble AA Battery Box *(skip this if using 18650 battery)*

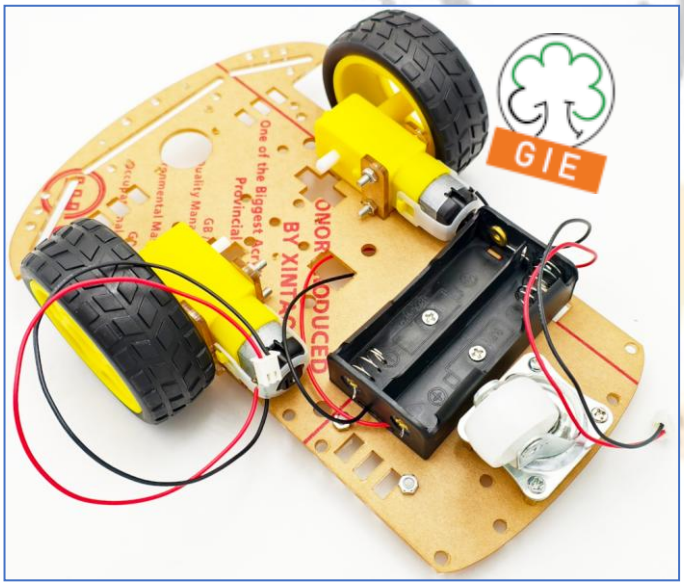


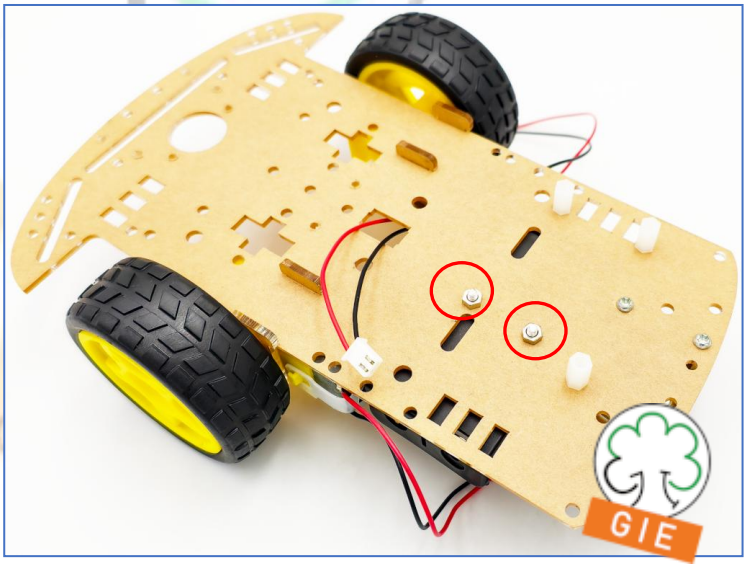




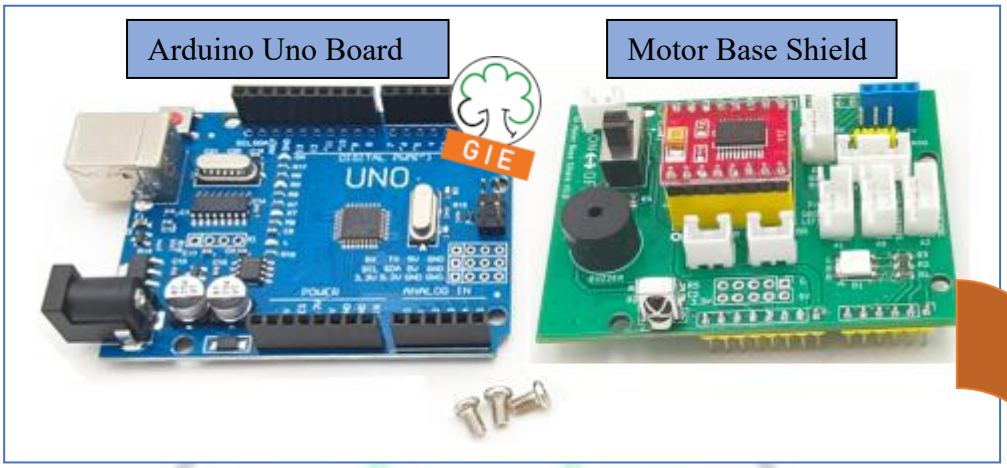
Step 4B – Assemble 18650 Battery Box *(skip this if using AA battery)*

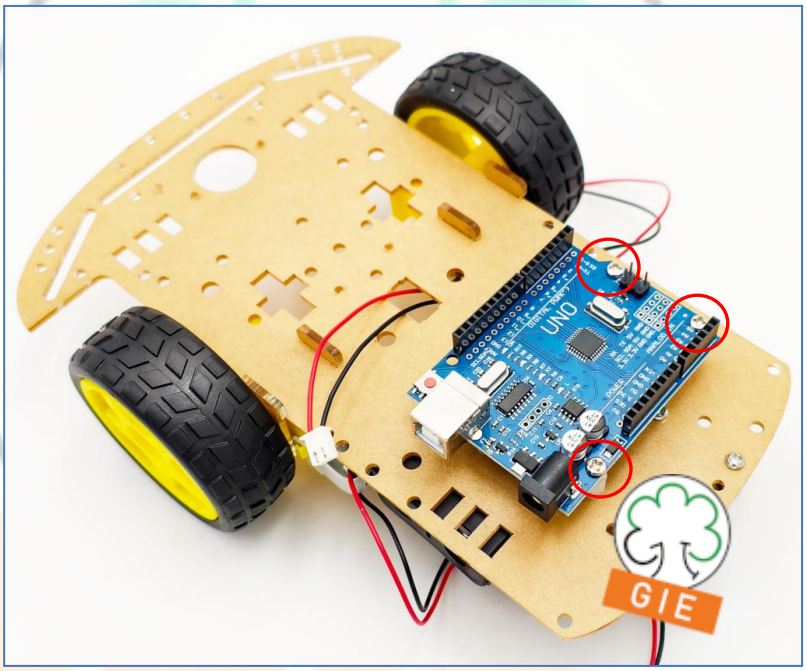


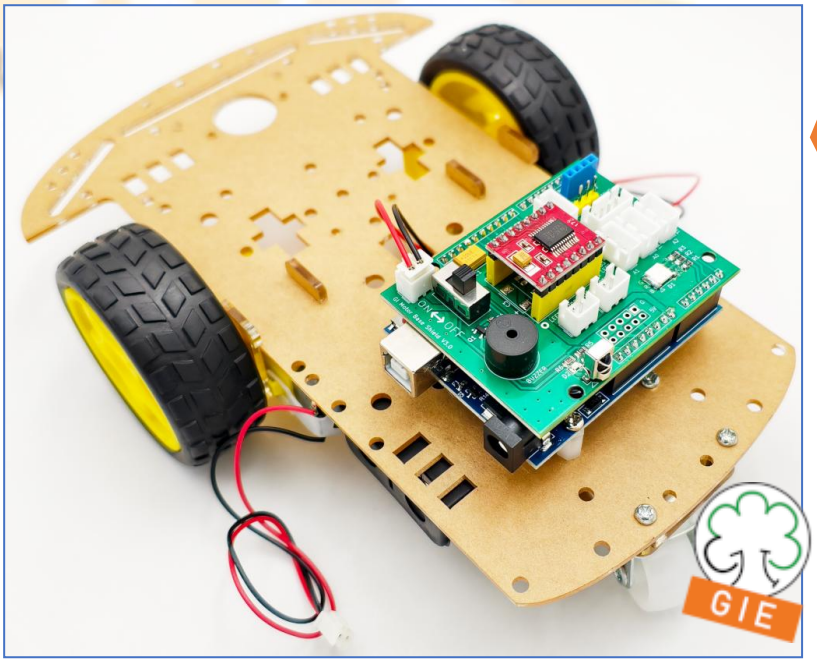




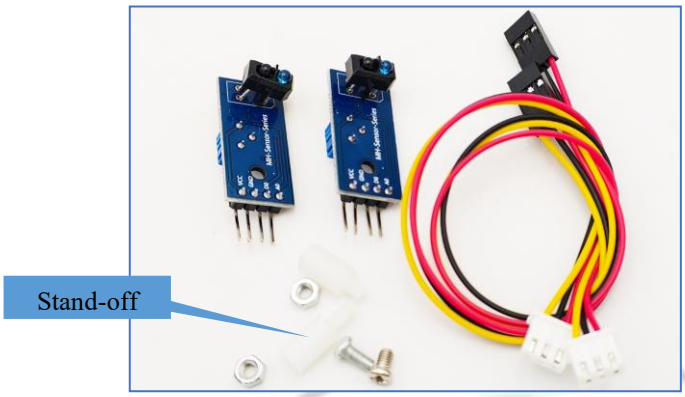
Step 5 – Assemble Uno Board and Motor Base Shield

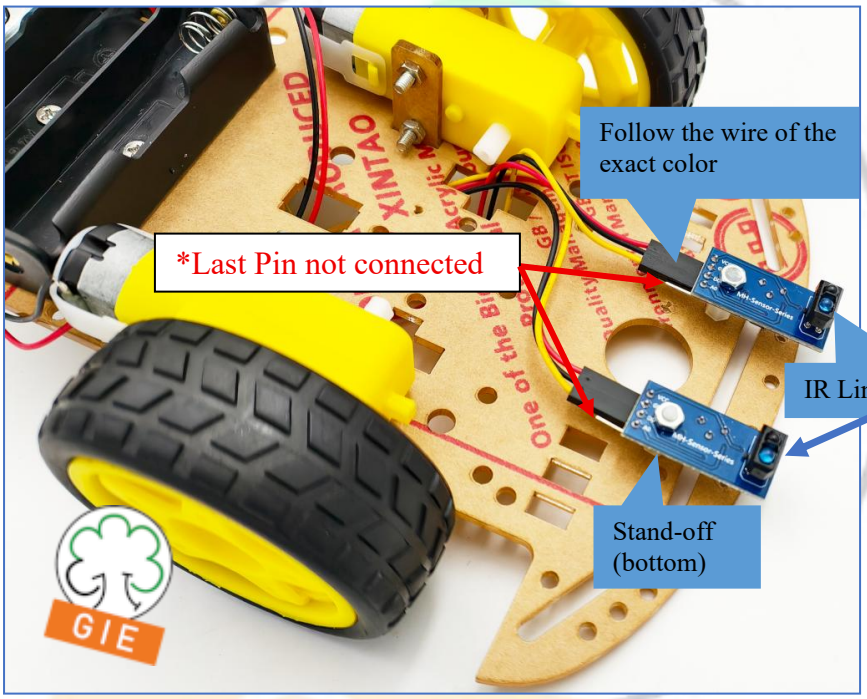


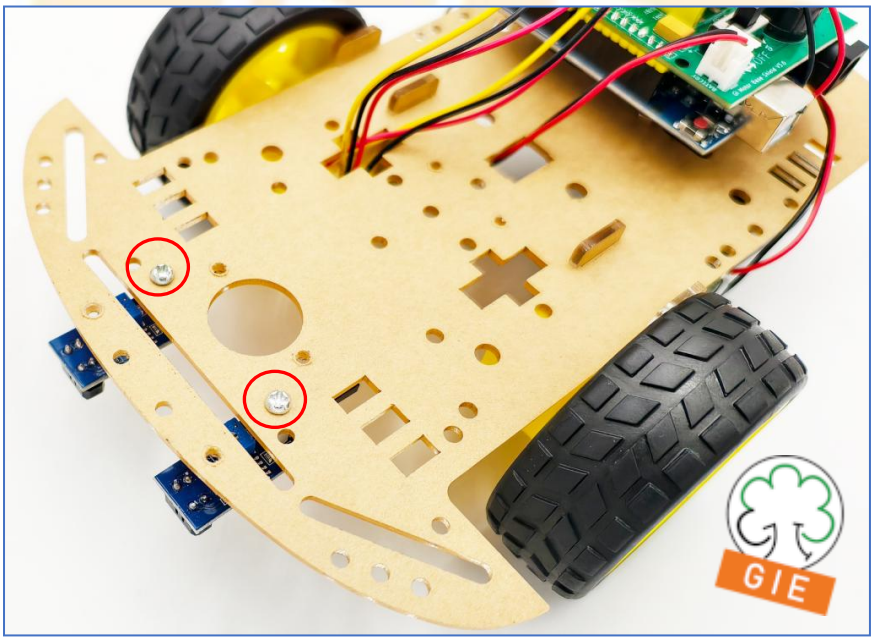


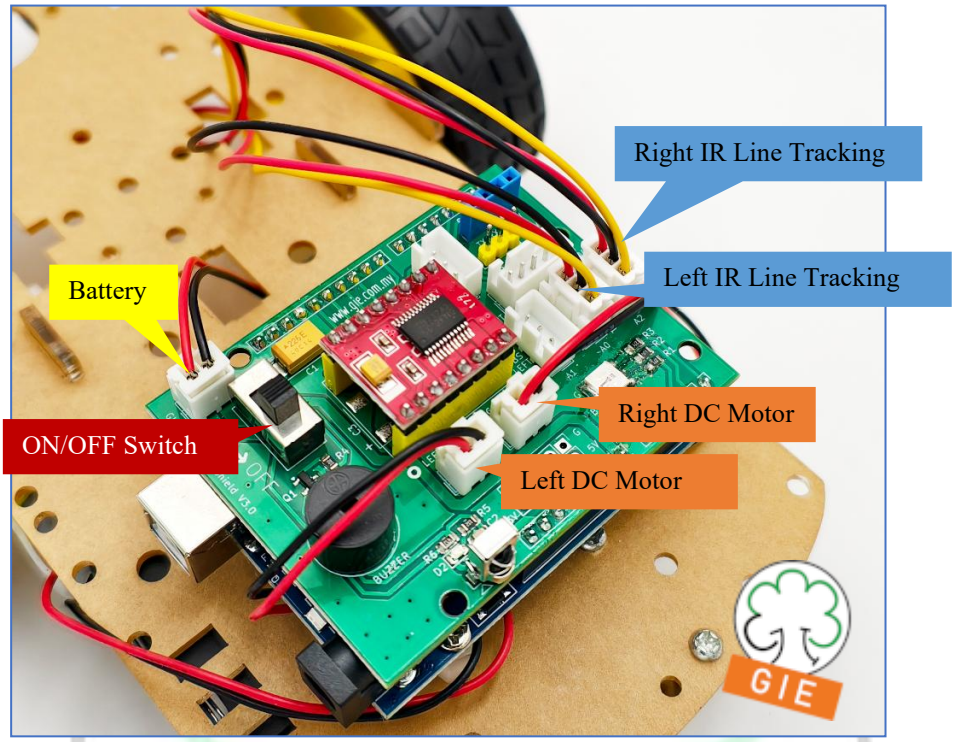


Step 6 – Assemble IR Line Tracking Sensors (*skip this if you don't have these*)

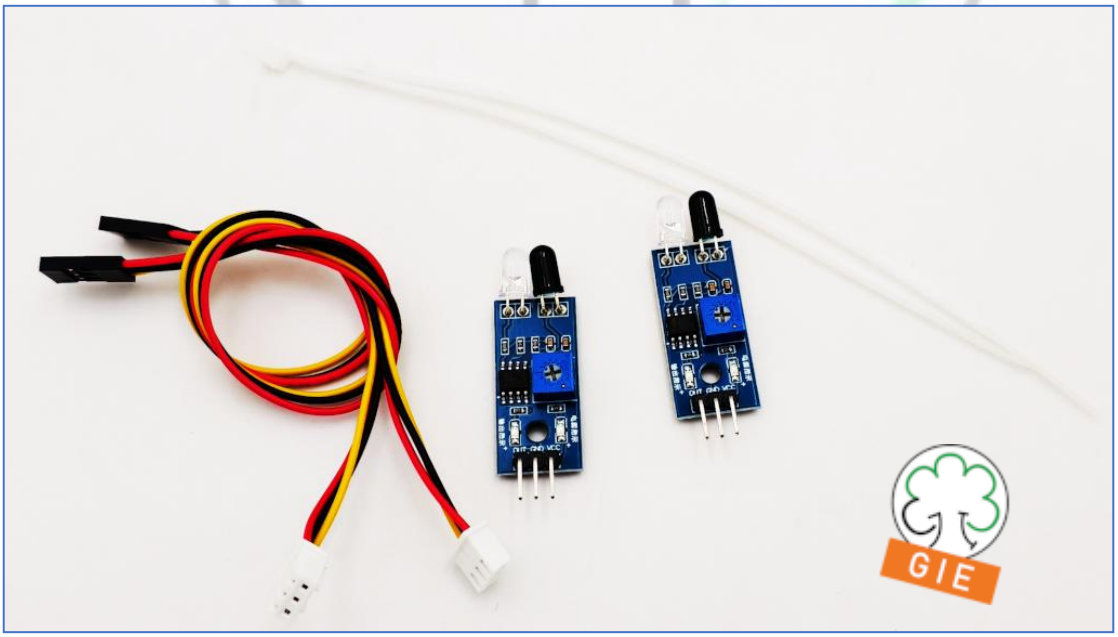


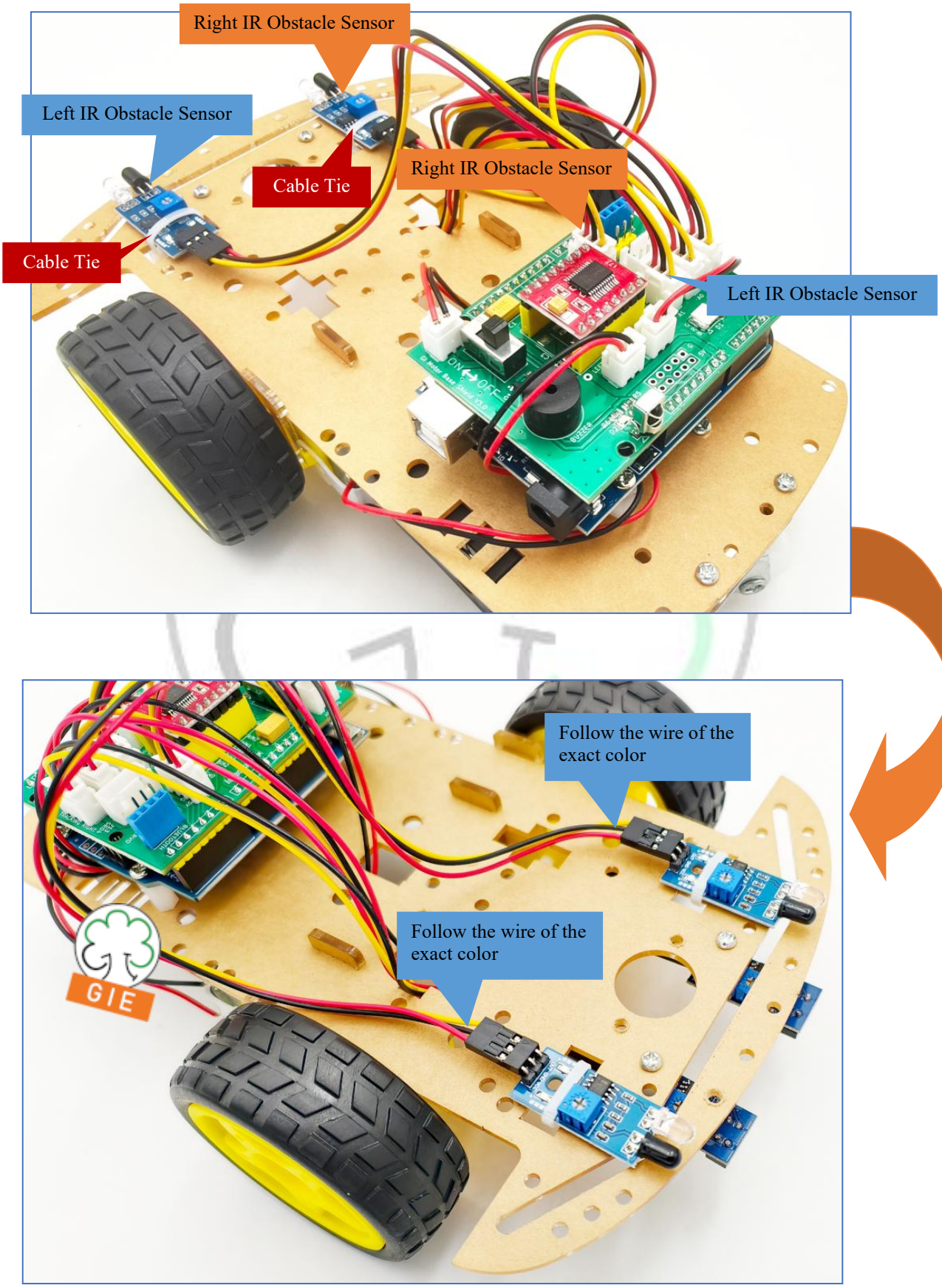






Step 7 – Assemble Two IR Obstacle Sensor




Right IR Obstacle Sensor
Left IR Obstacle Sensor
Cable Tie
Right IR Obstacle Sensor
Cable Tie
Left IR Obstacle Sensor
Follow the wire of the exact color
Follow the wire of the exact color
GIE

Step 8 – Assemble Ultrasonic Sensor and Servo



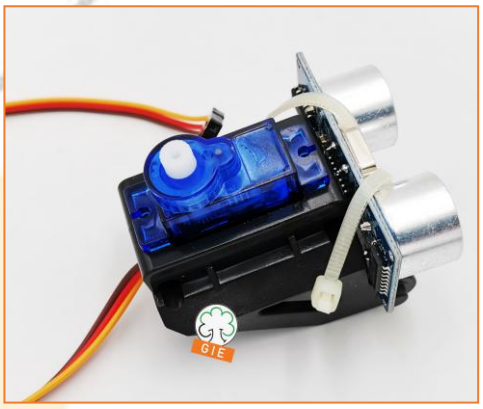




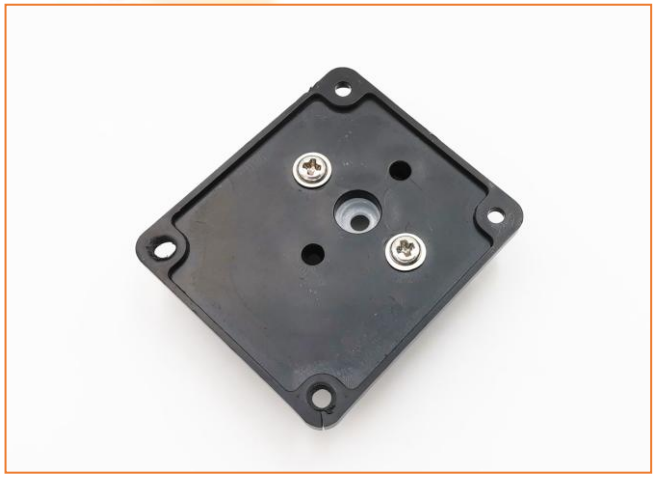






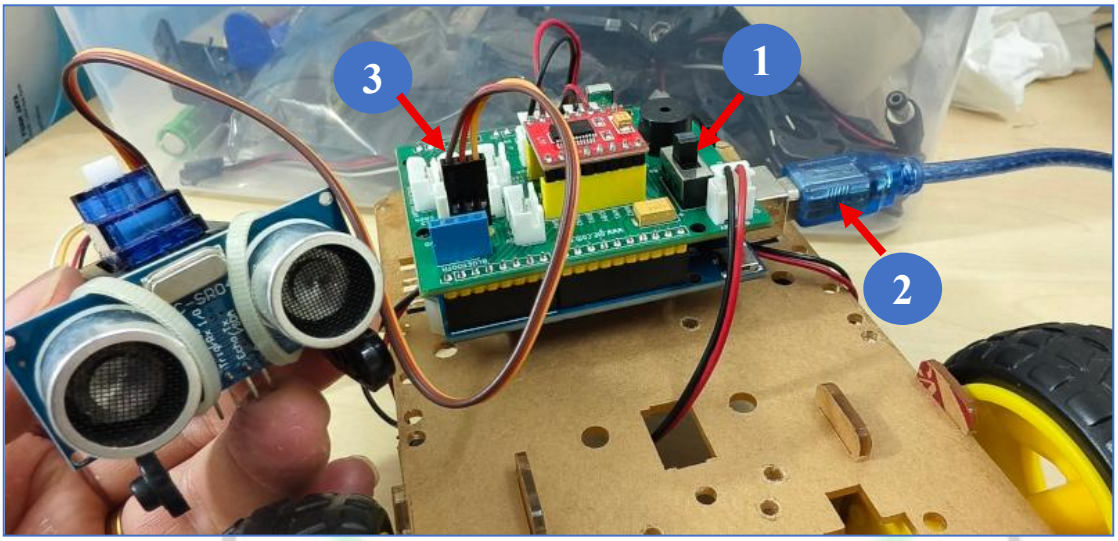






Set the servo motor to 90 degrees by follow below instruction:

a) Connection



Step 1: Set switch to Off
Step 2: Connect USB cable between Uno Board and PC
Step 3: Connect Servo to Motor Base Board as shown on figure above.

b) Upload coding below:

```
#include <Servo.h>

Servo myservo;  // create servo object to control a servo

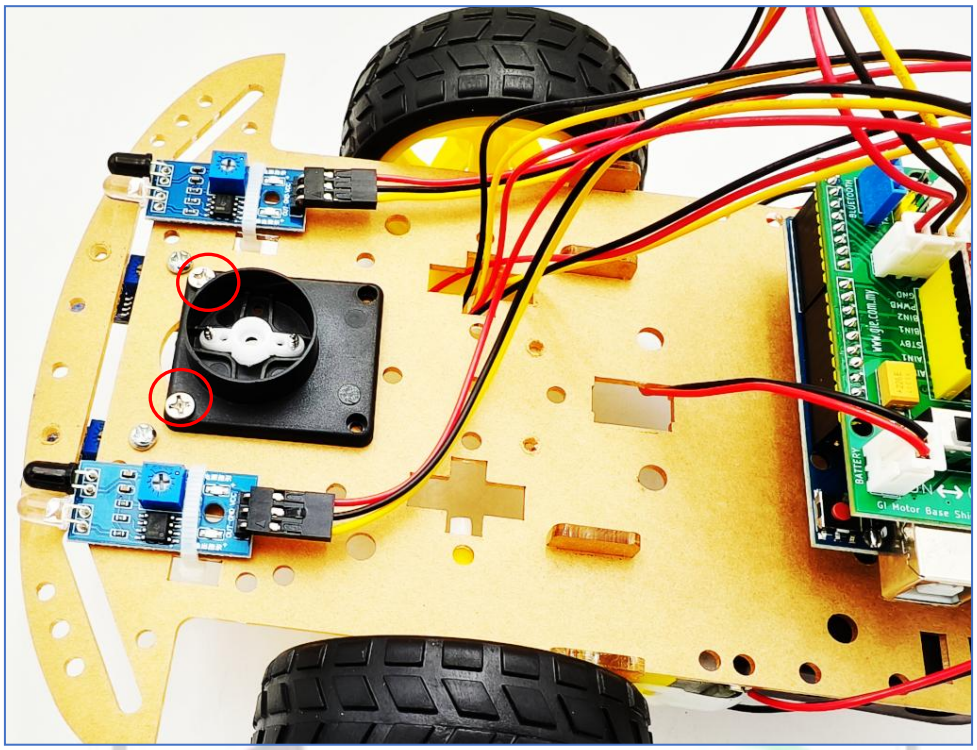

int pos = 90;    // variable to store the servo position

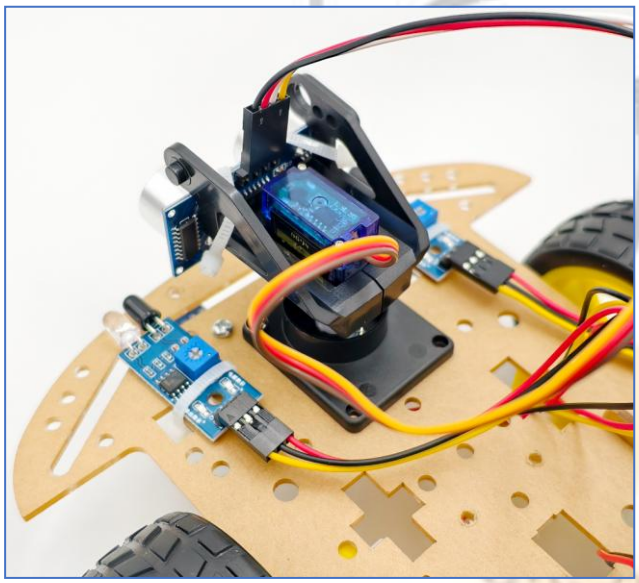
void setup() {
  myservo.attach(9);  // attaches the servo on pin 9 to the servo object
}

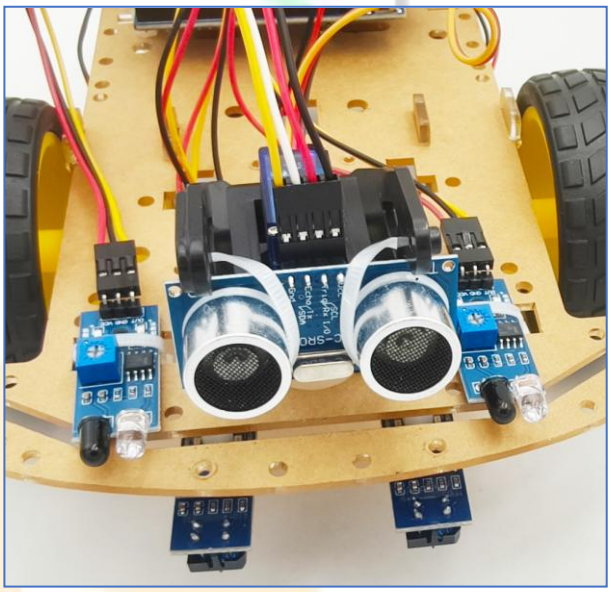
void loop() {

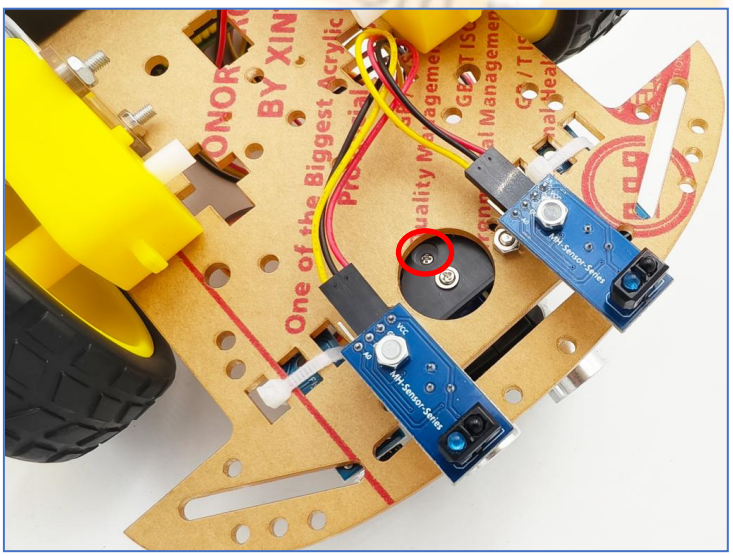
  myservo.write(pos);

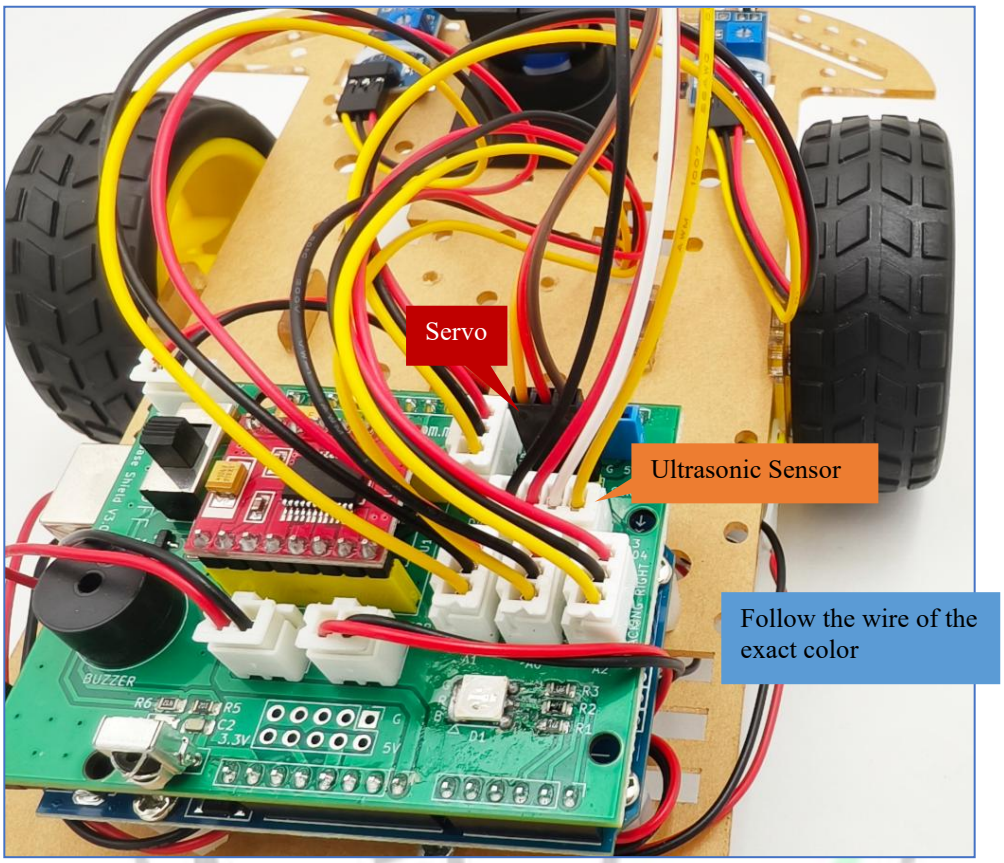
  while (1);
}
```



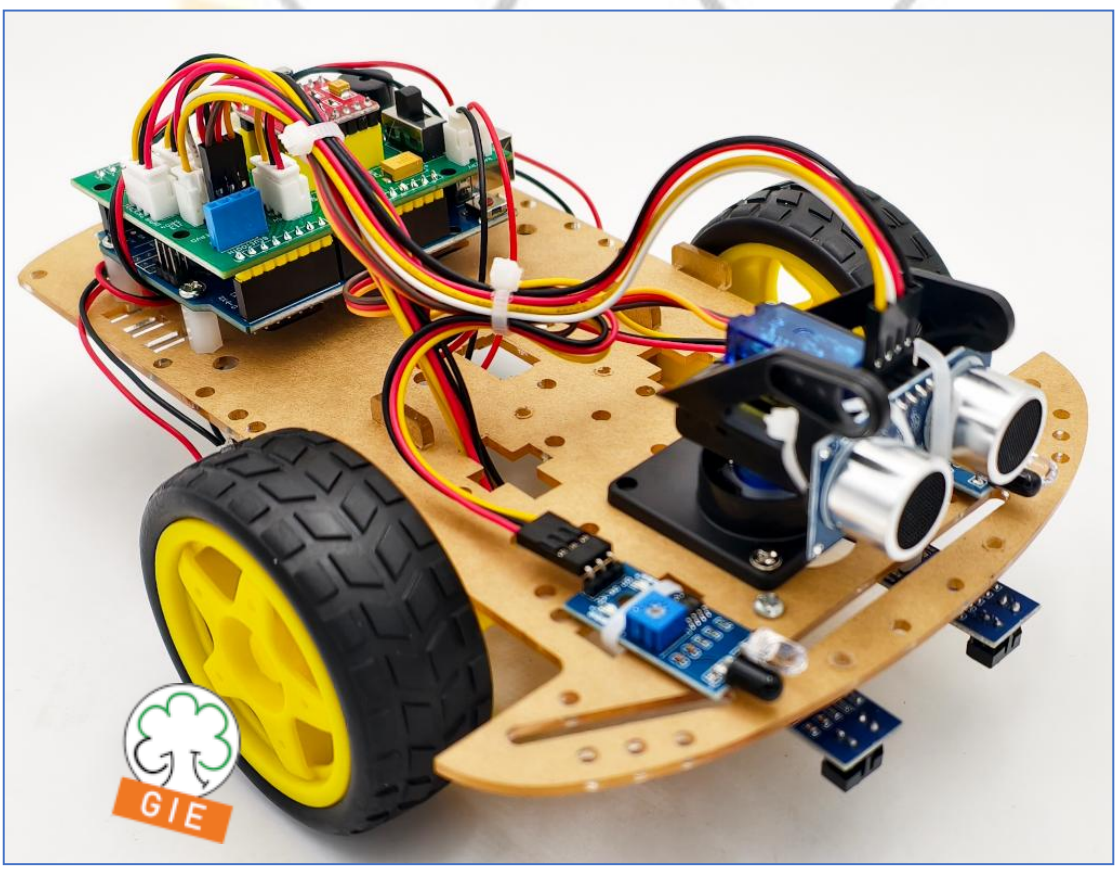








Step 9 – Tie up with cable tie.



Step 10 – Build your route

Recommend to use PVC WIRE TAPE 18MM X 5M (BLACK) to build your route.



Step 11 – Adjusting the IR Line Tracking Sensor

a) Power on the sensor

- Connect the IR sensor VCC to Arduino Uno board +5V.
- Connect the IR sensor GND to Arduino Uno board GND.

b) Place the Sensor over different surfaces

- Move the sensor above a white surface, then move it over the black line.
- Observe the LED indicator on the module.

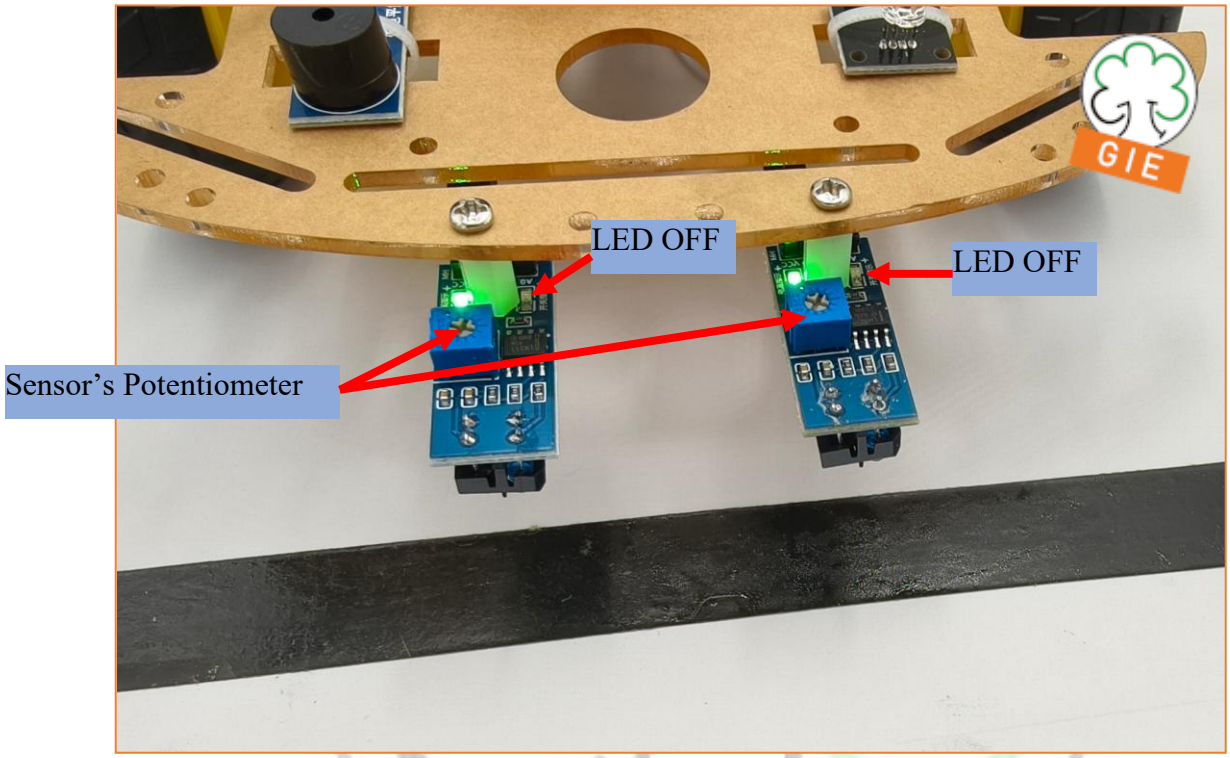
c) Adjust the Potentiometer

- Use a small screwdriver to turn it clockwise/counterclockwise.

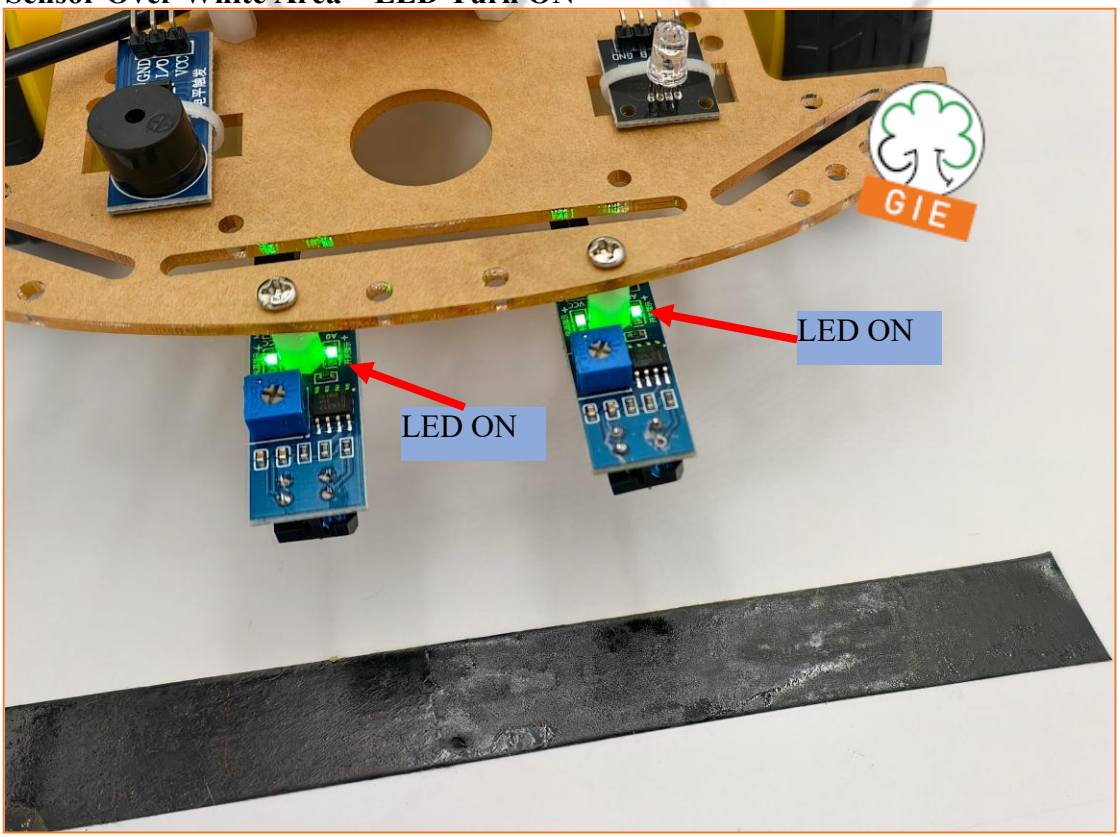
d) Observe LED and Output Behaviour:

- Turn the potentiometer until the LED turn OFF on the black line and turns ON when over the white line.

Sensor Over Black Line – LED turn OFF



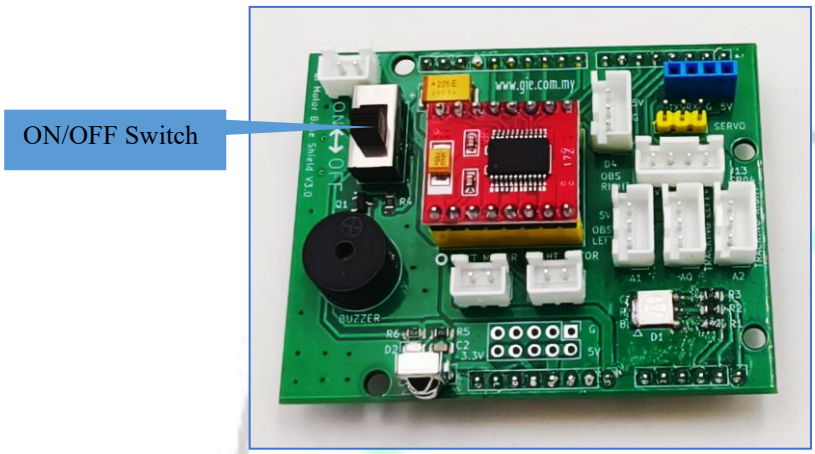
Sensor Over White Area – LED Turn ON



Step 12 – Adjusting the IR Obstacle Sensor

a) Power on the sensor

- Connect USB cable to Arduino Uno Board or switch on the ON/OFF Switch on Motor Base Shield



b) Place an Obstacle in front of sensor at about 20cm

- Place an obstacle in front of the sensor at about 20 cm, then remove the obstacle.
- Observe the LED indicator on the module.

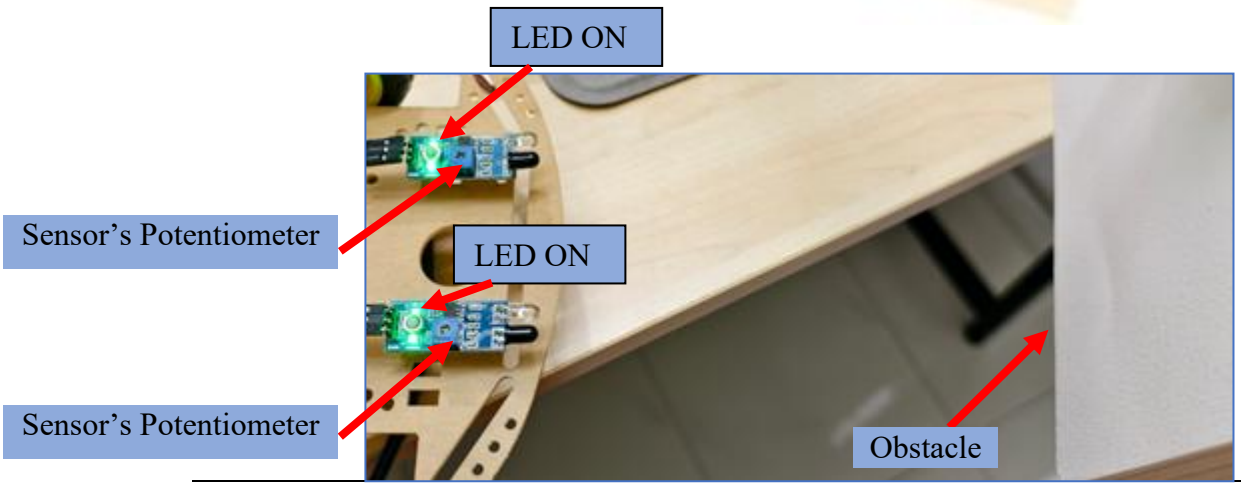
c) Adjust the Potentiometer

- Use a small screwdriver to turn it clockwise/counterclockwise.

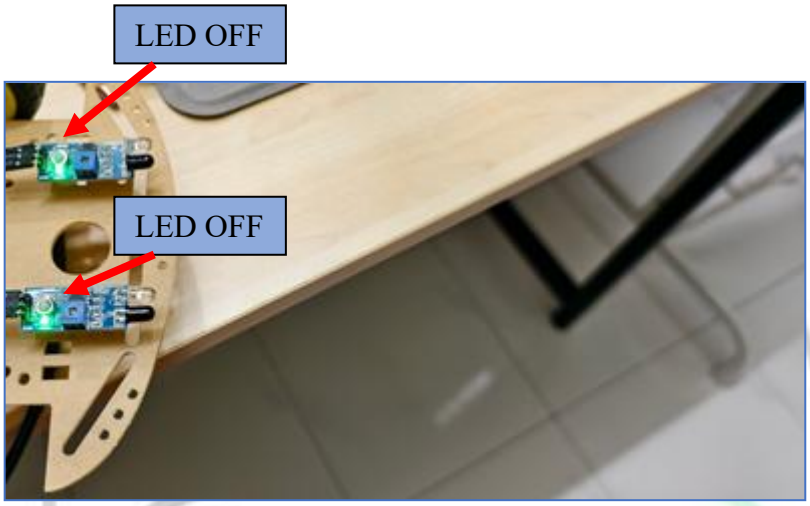
d) Observe LED and Output Behaviour:

- **Turn the potentiometer until the LED turn ON while there is obstacle in front of the sensor, and turns OFF when no obstacle in front of the sensor.**

<u>Obstacle in front of the IR Sensor – LED turn ON</u>



No obstacle in front of the IR Sensor – LED turn OFF



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7. Uploading Code to Arduino Uno with CH340

Step 1: Install CH340 Driver

1.1 Download the Driver

- For **Windows**, download the CH340 driver from the below source.
    - CH340 Driver Download (https://learn.sparkfun.com/tutorials/how-to-install-ch340-drivers/all)

1.2 Install the Driver
Windows Installation:

1. Extract the downloaded .zip file.
2. Run the CH341SER.EXE file.
3. Follow the on-screen instructions to install the driver.
4. After installation, connect the Arduino board and check if it's recognized under **Device Manager > Ports (COM & LPT)**.

Step 2: Install Arduino IDE

1. Download the latest **Arduino IDE** from the official website: https://www.arduino.cc/en/software
2. Install the IDE following the standard installation process for your OS.

Step 3: Connect the Arduino Uno Board

1. Plug your Arduino Uno (CH340-based) into your computer using a USB cable.
2. Open the Arduino IDE.
3. Go to **Tools > Port**, and select the COM port (e.g., COM3 on Windows or /dev/ttyUSB0 on Linux/Mac).

Step 4: Select the Correct Board

1. In the Arduino IDE, navigate to **Tools > Board > Arduino Uno**.
2. Ensure the correct board is selected before uploading the code.

Step 5: Upload Line Following Demo code

1. Go to File > Open > gi2wd_tb6612_tracking_full_ir_vxxx.ino from the Arduino IDE.
2. Click the **Upload** button (right arrow at the top).
3. Wait for the "Done Uploading" message.

Step 6: Troubleshooting
If the upload fails, try the following:

- **Check Driver Installation:** Ensure the CH340 driver is installed correctly by verifying in Device Manager (Windows) or using dmesg (Linux/Mac).
- **Change USB Cable/Port:** Faulty USB cables may cause issues.
- **Select the Correct Port:** Recheck **Tools > Port** and try different ports.
- **Reinstall the CH340 Driver:** If issues persist, uninstall and reinstall the driver.
- **Press the Reset Button:** Press the reset button on the board just before uploading.

8. Sample Code

Please contact GI Electronic.

After upload sample code, use remote control to control the robot

a) Press '2' to move forward
b) Press '8' to move backward
c) Press '4' to turn left
d) Press '6' to turn right
e) Press 'FOL-' to run as Line Following Robot (ONLY if you have this feature)
f) Press 'FOL+' to run as Obstacle Avoidance Robot (ONLY if you have this feature)

9. Remote Control Function

***Note: Take Note while using Remote Control**

- **Requires a direct line of sight to the Infrared Sensor on Motor Base Shield.**
- **Limited range, typically 10-20 meters.**
- **Signals can be blocked by obstacles like walls or people.**
- **Sensitive to interference from bright sunlight or heat sources.**

