Project 3: Line Tracking Robot Car

Objectives:

1. The student will be able to attach the sensors onto the chassis of the car.
2. The student will be able to wire the sensors for power and data transfer.
3. The student will be able to download code.
4. The student will be able to adjust the sensitivity of the tracking sensors using the potentiometer.
5. The student will be able to make their car follow a line on the floor.

Time:

2 hours

Introduction:

In this project, the students will attach 5 sensors to the front of the chassis that will allow the car to detect a black line. The car will then stay within given parameters and follow the path of the line for movement. Students will learn to adjust the sensors and the track. Each of the sensors has a potentiometer that will need calibrated. The students will also have to lay the track so that the sensors can detect curves.

Project 3: Line Tracking Robot Car

In this lesson, you will need to create a track for the car to follow. This can easily be done with a white or light colored floor and black electrical tape.

Remove the bolts from the copper pillars (stand offs) that connect the upper and lower chassis together so that your car is easier to work with.

Part 1:   Installing Sensors

A. Locate the five tracking sensor modules in the sensor bin, two of the one male to five female jumper wires, and the M2.5 pillars, screws, and nuts.
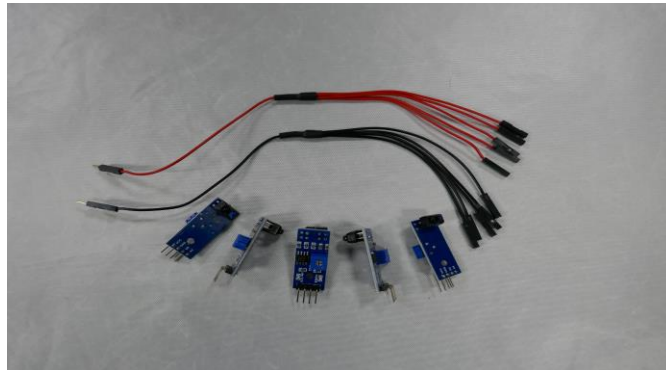
B. Attach the 5 tracking sensor modules into the empty holes at the front of the lower chassis.
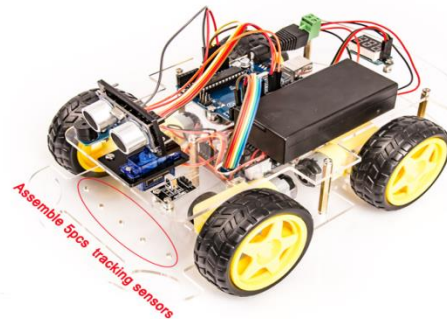
C. Make sure every sensor head is over the gap at the front of the lower chassis so that the sensor will be able to detect a black line on a white background.
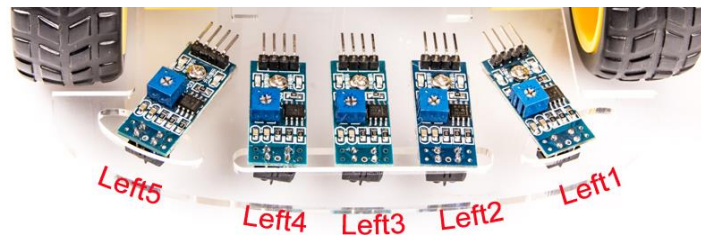
Part 2: Wiring

Tracking Sensors	Wire Color	Uno Board
VCC	Red	5V
GND	Black	GND
Left 1 D0	Green	A0
Left 2 D0	Blue	A1
Left 3 D0	Purple	A2
Left 4 D0	Gray	A3
Left 5 D0	White	A4

A. Attach the female end of the red jumper cable to the VCC on each tracking sensor. Attach the male jumper end to the 5V on the Uno board (This will be in the section marked power).
B. Attach the female end of the black jumper cable to the GND on each tracking sensor. Attach the male jumper end to the GND on the Uno board (This will be in the section marked power).
C. You will now attach a female to male wire to each tracking sensor and the Uno board. Use the chart and/or pictures to find the correct pin placement. Be sure to feed the wires up through the hole in the chassis.
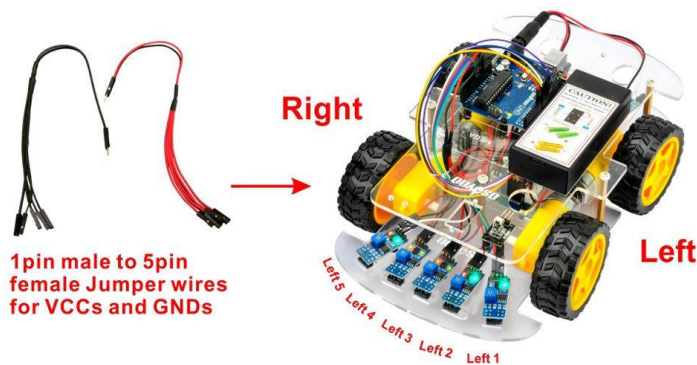
Tracking Modules	VCC(s)	GND(s)	D0 (left 1)	D0 (left 2)	D0 (left 3)	D0 (left 4)	D0 (left 8)
OSOYOO Uno R3 Board	5V	GND	A0	A1	A2	A3	A4
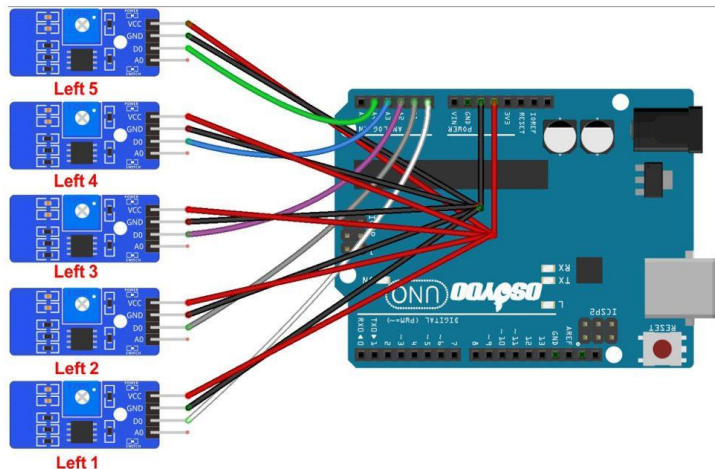
## Part 3: Reattach your upper and lower chassis

    A. Reconnect your upper and lower chassis using the copper pillars (stand offs).

Part 4: Loading the Code

A. Download the code for this project from Arduino.nacase.org.
   a. Click on the file link to begin the download and save to your computer
   b. Once the download is complete, unzip the file or right click—Open With—UnRAR Metro. This will extract the file and save it to your computer.
B. Connect Uno board to PC with USB cord.
C. Upload the code to Arduino IDE
   a. Open Arduino IDE, select File, Open, then select the downloaded code.
D. Verify your code with the checkmark.
E. Upload your code using the arrow next to the check mark. You will see "Done uploading" when complete. Disconnect the USB cord.

Part 5: Adjust the sensitivity of the tracking sensors.

A. There is a potentiometer on each sensor.
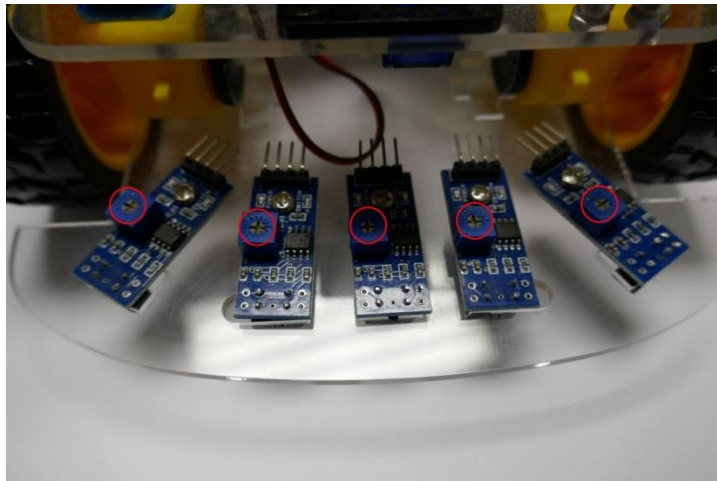
B. A potentiometer allows you to adjust the sensitivity of a sensor, in this case our tracking sensor.
   a. Put a line of electrical tape, about a foot long, in front of you on a white or light colored background. Turn on the care and hold it above the line.
   b. Adjust the potentiometer on each tracking sensor using a Phillips head screw driver. Only check one at a time. You are trying to make the green light on the sensor turn on when it is over the black line and turn off when it is over the rest of the floor.

   Tip: Only turn a small amount to adjust then check.

Part 6: Making your track

    A. Put a piece of black electrical tape on the floor to create a track for your car to follow. It will need to be between two and 3 centimeters wide. You can make it curve, but it cannot have any angles smaller than 90 degrees.

Part 7: Making your car follow the track

    A. Turn your car on and place it so that the middle of the tracking sensor in the center of the car is over your black track. The car should move along the track you set up.

Tip: If your car runs backwards or does not follow the black track, return to part 2 and check the order of the wiring.