Obstacle Avoidance Robot-Part 1

Session 29



Image: Market and Mar

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Topics covered

- The **Obstacle Avoidance Robot** is an autonomous robot that can be used to detect obstacles and avoid them by turning in different directions to prevent collisions.
- Almost all mobile robot navigation systems can benefit from obstacle avoidance robots. They can also be utilized in high-risk situations where human presence could be lethal. Coming to household applications, they can be used for a variety of tasks that can reduce workload, such as automatic vacuuming









Quarky As an Obstacle Avoidance Robot







Quarky As an Obstacle Avoidance Robot

Quarky senses the obstacle and makes the directional changes to avoid colliding with it. To make this happen we have to attach few electronic components to the Quarky. The required components that will aid us in the making of this robot are as follows:

- Quarky Robot 1.
- Ultrasonic Sensor (HC-SR04) 2.
- Servo Motor 3.
- Blue Plastic Parts B7, B4, and B2 4.
- Screw Driver. 5.















• Begin with *detaching* the Castor Wheel from the Robot using the Screw Driver.



Step 1





- Now, *fasten* the **B4 Plate** and the **Castor Wheel** using the same bolt.
- Snap the Servo Motor onto B4 Plate and connect it with the Quarky servo

Note: Make sure that the **white shaft** from the **Servo Motor** is pointing upwards and aligned with the cross marked on the **B4 Plate**



Positioning Servo with + mark on B4 Align Shaft head (+) with "+" mark on B4

Step 3



he same bolt. th the Quarky servo **/lotor** is pointing upwards and



- Push-fit the B2 Plate in the B4 Plate as shown. Make sure the parts are properly aligned with each Other.
- Then, snap the Ultrasonic Sensor into the B2 Plate.
- Now, place the above-mentioned sub-assembly on the Servo Motor's Shaft.



Step 4





Step 6



- The Servo motor should be connected to the Quarky Servo Connector, with two serv o ports available. Ensure that the brown wire is always on the left side.
- Optionally, you can put the **Paper Cut-out of the Tiger** on the above **Robot** to get make it attractive! Our assembly is complete.





Step 7







Logic







Now we will connect the Ultrasonic Sensor to the Robot. The sensor and the robot have the following pins:

1.Ultrasonic Sensor Pins:

1. **VCC**

2.GND

3.Trig

4.Echo

2.Quarky Pins:

1.GND

2.V

3.D1

4.D2

Board Pins

Ground -Power V D1,D2 Digital Pins





We will start with connecting the ultrasonic sensor with Quarky using the 4 set wire provided in the kit. But, first, make the connection in the following way: 1. First, connect the VCC of the ultrasonic sensor with the V pin on the Quarky. 2.Connect the **GND** of the ultrasonic sensor with the **Ground pin** on the Quarky. 3.Connect **Trig** of the ultrasonic sensor with **D1** pin on the Quarky. 4. Finally, connect the **Echo** of the ultrasonic sensor with the **D2** pin on the Quarky.









flowchart







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- Let's figure out precisely how the robot works? \bullet
- Quarky detects an obstacle first, then checks left and right, turning in that \bullet direction if the distance is larger than 30 cm. Let's take a closer look at how it works.









Go forward if there is no obstacle. \bullet

 \bullet







If an obstacle comes at a defined distance. The ultrasonic sensor will detect the obstacle and stop.





- Next, using the servo motor the robot • \bullet will scan the environment. But first, it will turn the servo to 45 and check for free area obstacles.
- degrees.







If there is no obstacle in a range of 30 cm at the 45-degrees angle. Quarky will take a right turn by 45



- If an obstacle is detected on the right \bullet side at the 45-degrees angle. Change the angle to 135 degrees.
- degrees.

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If there is no obstacle in a range of 30 cm at the 135-degrees angle. Quarky will take a left turn by 45

- If an obstacle is detected on the right \bullet side at the 135-degrees angle. Change the angle to 0 degrees.
- degrees.







If there is no obstacle in a range of 30 cm at the 0-degrees angle. Quarky will take a right turn by 90





- If an obstacle is detected on the right \bullet side at the 0-degrees angle. Change the angle to 180 degrees.
- degrees.







If there is no obstacle in a range of 30 cm at the 180-degrees angle. Quarky will take a left turn by 90





• If an obstacle is detected on the right side at a 180-degrees angle, then take the reverse.







Flow Chart













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