

Designing Control System for a Robot Similar to TurtleBot



By Mojahed Nour– July 27, 2020



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Control System for a Robot Similar to TurtleBot

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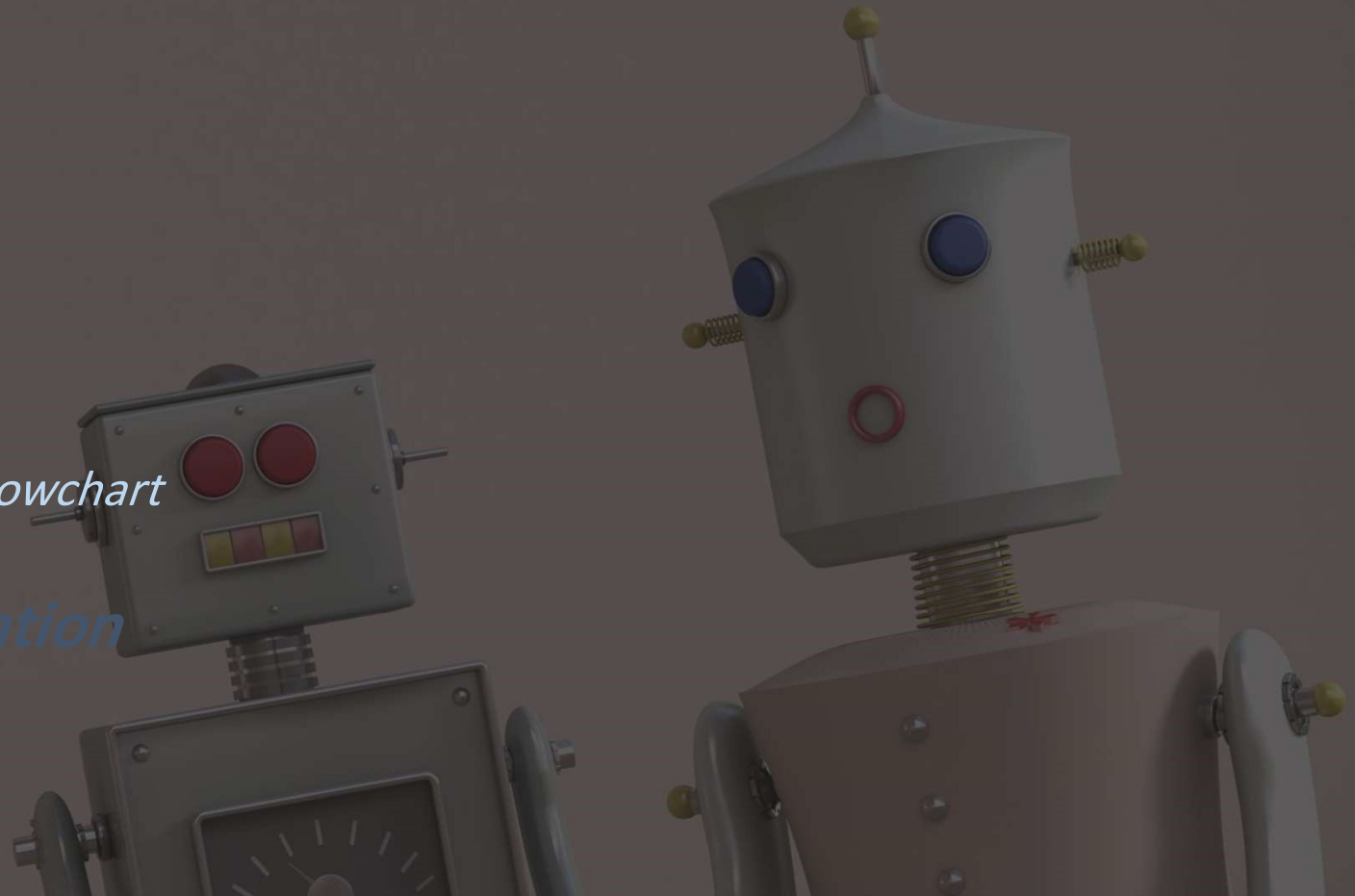
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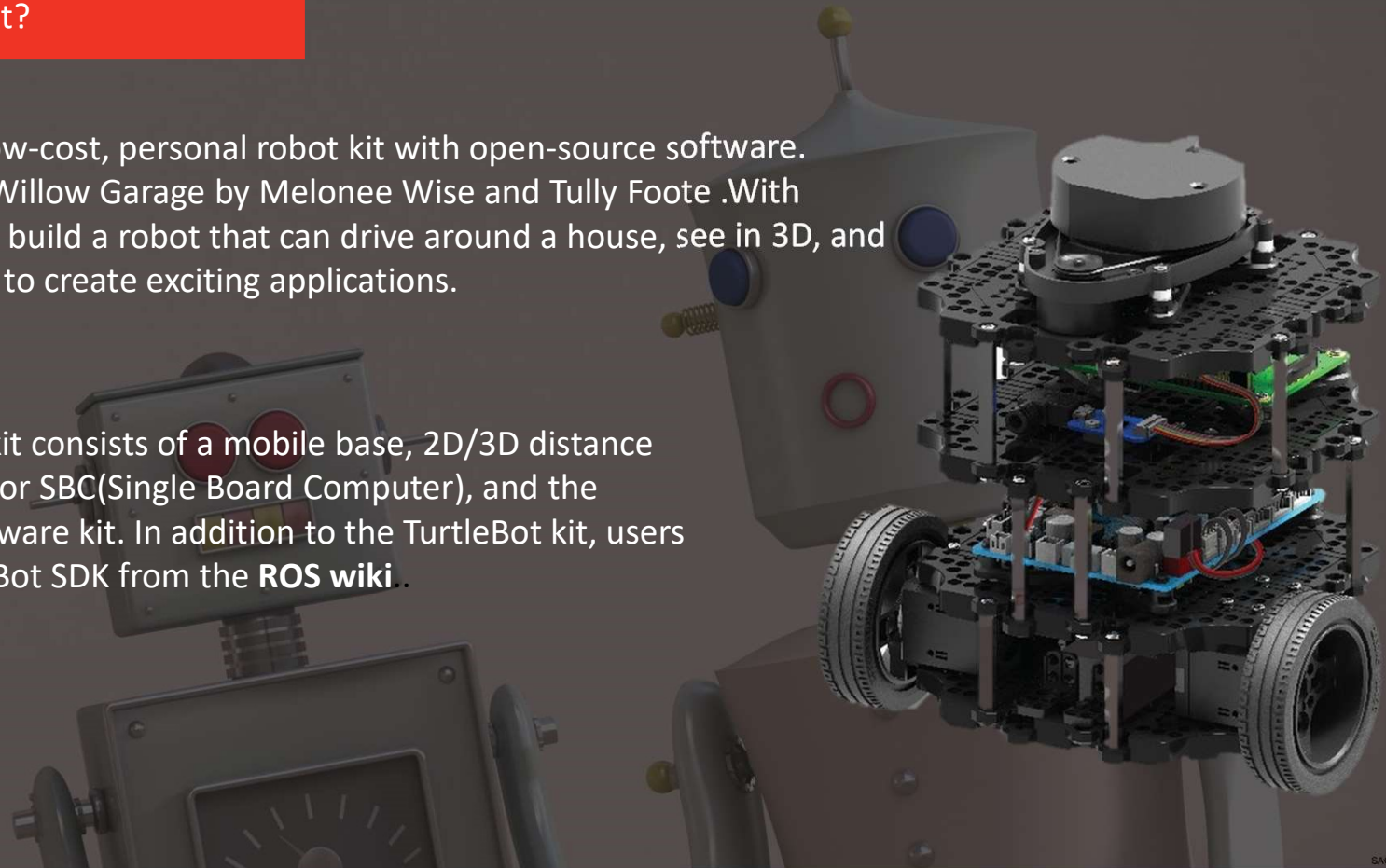
01

Control System for a Robot Similar to TurtleBot

What Is TurtleBot?

TurtleBot is a low-cost, personal robot kit with open-source software. TurtleBot was created at Willow Garage by Melonee Wise and Tully Foote. With TurtleBot, we'll be able to build a robot that can drive around a house, see in 3D, and have enough horsepower to create exciting applications.

The TurtleBot kit consists of a mobile base, 2D/3D distance sensor, laptop computer or SBC(Single Board Computer), and the TurtleBot mounting hardware kit. In addition to the TurtleBot kit, users can download the TurtleBot SDK from the **ROS wiki**.

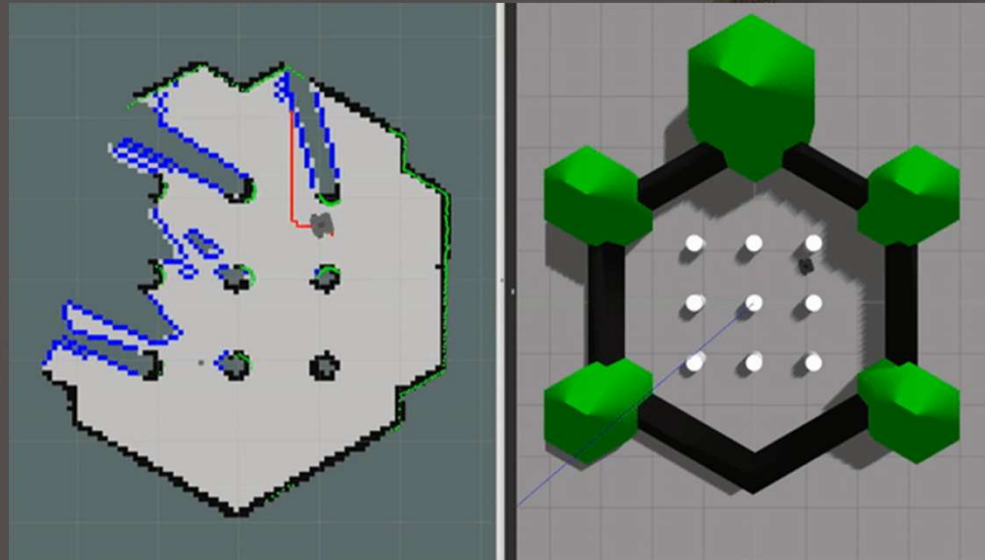


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THE AIM

What is the purpose of this task ?

Designing a Robot control system that operates and works Similar to TurtleBot when detecting an obstacle to move R\L .

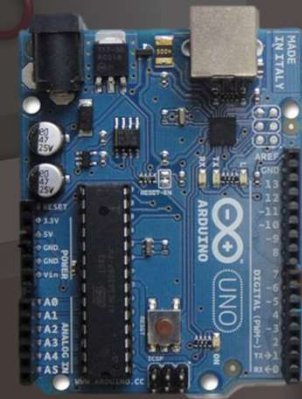


03

The technique

The components that will be used :

To perform this task , a simulation software should be used to design and program the circuit of the control system. In the circuit, Arduino might be used as a microcontroller and two DC motors linked by the Arduino to reflect the wheels of the robot & **Ultrasonic sensor** to measure the distance .



03

The technique

The mechanism of the control system :

Setting Up

all components should be connected to the microcontroller (Arduino) and programmed to build a control system similar to the TurtleBot control system.

Ultrasonic Sensors

Ultrasonic sensor should be used to determine obstacles in front of the robot by measuring the time between the emission & receipt.

Sending Signals

Ultrasonic Sensors will send out a signal to the microcontroller after identifying the obstacles.
To avoid hitting the objects, the microcontroller must then give an output signal to the DC motors to rotate in various directions.

Outlines

Arduino programming language should be used to evaluate the set value (the desired distance before reaching an object) .
Therefore, the microcontroller compares the signal from the ultrasonic sensor (measured value) to the fixed value by correlation, the microcontroller sends a signal to DC motors to rotate differently or not. The system must work in a loop until it is switched off.

Counting Numbers of revolutions

DC motors with encoders can be used to figure out RPM to calculate the number of revolutions per minute similar to the device in TurtleBot.

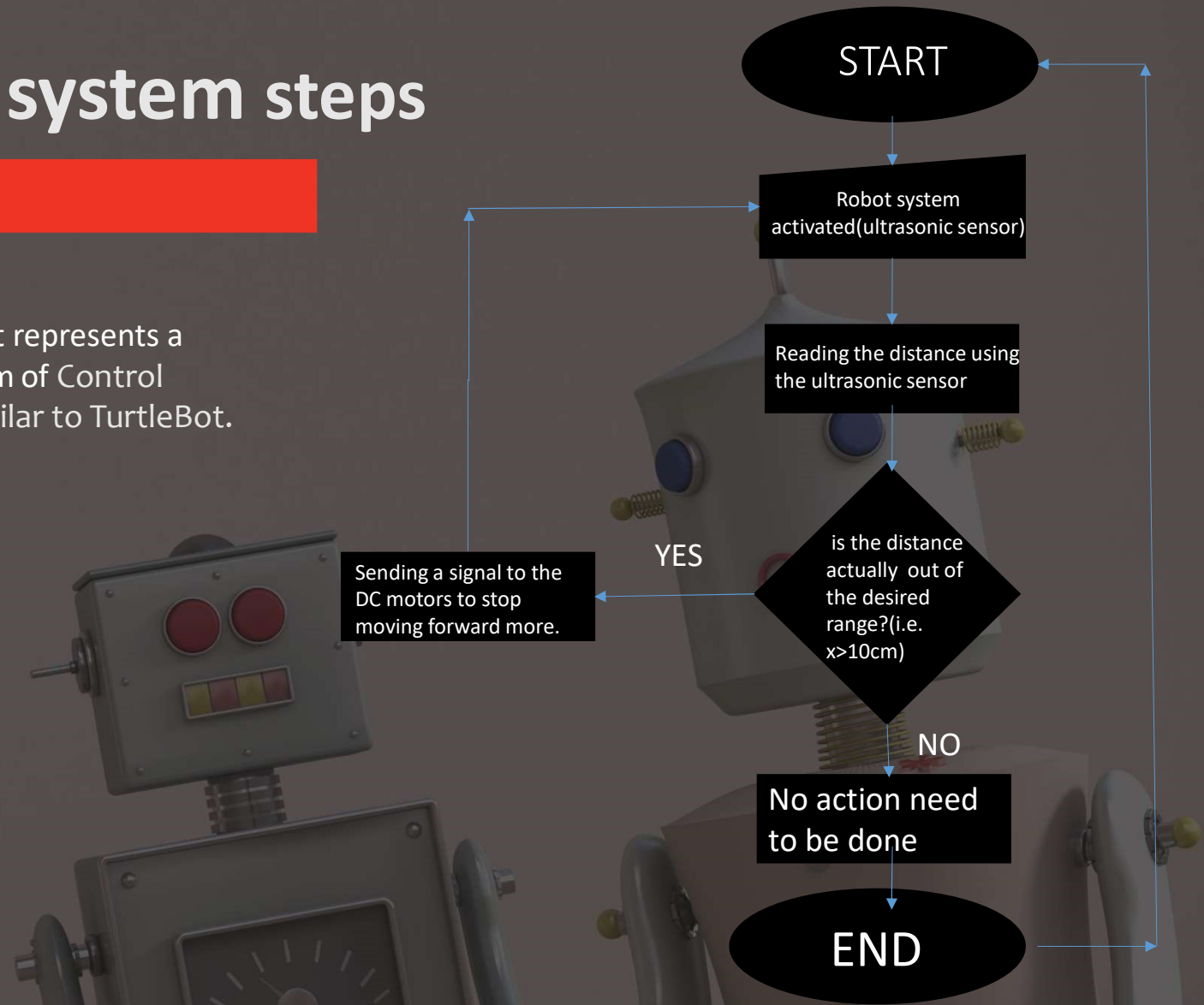
The flowchart & code will clarify this technique further..

03

Control system steps

Flowchart:

A diagram that represents a workflow or an algorithm of Control System for a Robot Similar to TurtleBot.



04

Control System for a Robot Similar to TurtleBot

The code :

```
#define outputA (6, 12)
#define outputB (7, 13)
int present, past, counter = 0;
const int disPin = 2;
```

```
void setup()
{
  pinMode ((6, 12), INPUT_PULLUP);
  pinMode ((7, 13), INPUT_PULLUP);

  Serial.begin (9600);

  past = digitalRead(outputB);
}
```

```
void loop() {
  long duration, cm;
```

```
  pinMode(disPin, OUTPUT);
  digitalWrite(disPin, LOW);
  delayMicroseconds(2);
  digitalWrite(disPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(disPin, LOW);
```

```
  pinMode(disPin, INPUT);
  duration = pulseIn(disPin, HIGH);
```

```
  present = digitalRead(outputA);
  if (present != past){
```

```
    if (digitalRead(outputB) == present){
      counter ++;
    }
```

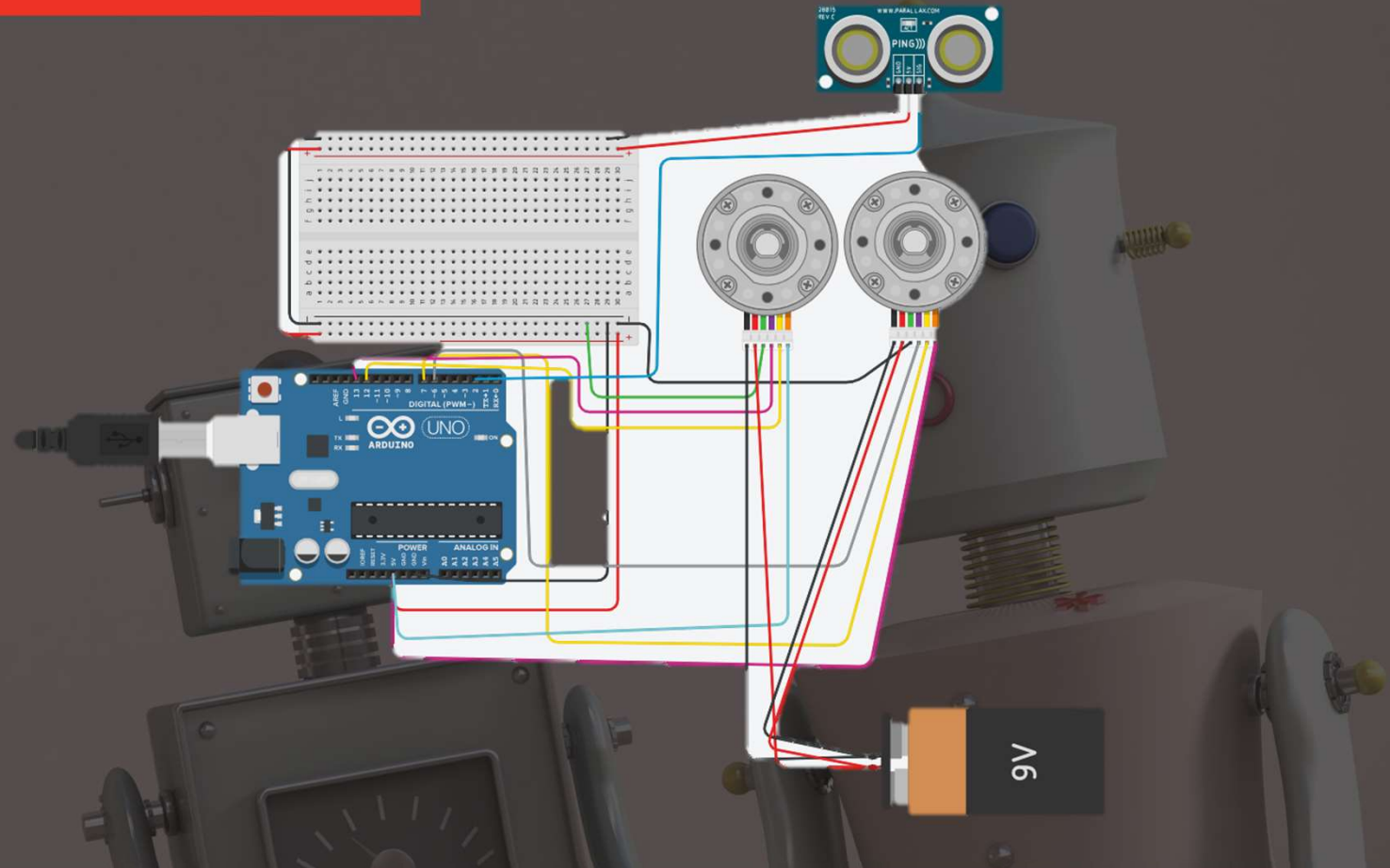
```
    Serial.print("N of rotations: ");
    Serial.println(counter);
    Serial.print("duration: ");
    Serial.println(duration);
```

```
  }
  past = present; }
```

```
}
```


04 Control system implementation

The circuit design :



THANK YOU



You are Welcome To Contact Me



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