

Obstacle Avoidance Robot V1.0 Design

Design Document



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   1. **Description**

The project is consists of four-diving wheel robot, the robot avoid any object in front.

* 1. **Hardware**

1. Atmega32
2. Four motors
3. One button to change default direction of rotation
4. Keypad button 1 to start
5. Keypad button 2 to stop
6. One Ultrasonic sensor
7. LCD
   1. **Software implementation**
8. The car starts initially from 0 speed
9. The default rotation direction is to the right
10. Press (Keypad Btn 1), (Keypad Btn 2) to start or stop the robot respectively
11. After Pressing Start:
12. The LCD will display a centered message in line 1 “Set Def. Rot.”
13. The LCD will display the selected option in line 2 “Right”
14. The robot will wait for 5 seconds to choose between Right and Left

* When PBUTTON0 is pressed once, the default rotation will be Left and the LCD line 2 will be updated
* When PBUTTON0 is pressed again, the default rotation will be Right and the LCD line 2 will be updated
* For each press the default rotation will changed and the LCD line 2 is updated
* After the 5 seconds the default value of rotation is set.

1. For No obstacles or object is far than 70 centimeters:
2. The robot will move forward with 30% speed for 5 seconds
3. After 5 seconds it will move with 50% speed as long as there was no object or objects are located at more than 70 centimeters distance.
4. The LCD will display the speed and moving direction in line 1: “Speed: 0% Dir: F/B/R/S”, F: forward, B: Backwards, R: Rotating, and S: Stopped.
5. The LCD will display Object distance in line 2 “Dist.: 000 Cm”.
6. For Obstacles located between 30 and 70 centimeters.
7. The robot will decrease its speed to 30%
8. LCD data is updated.
9. For Obstacles located between 20 and 30 centimeters
10. The robot will stop and rotates 90 degrees to right/left according to the chosen configuration.
11. The LCD data is updated.
12. For Obstacles located less than 20 centimeters
13. The robot will stop, move backwards with 30% speed until distance is greater than 20 and less than 30.
14. The LCD data is updated.
15. Then preform point 8.

|  |  |  |
| --- | --- | --- |
| Service | .Lib | APP |
| ECU |
|
| MCAL |
| Microcontroller |

1. **Layered architecture**

|  |  |  |
| --- | --- | --- |
| Pwm    icu | Std   memmap | APP |
| Button  Keypad Motor  ultraSound |
|
| Dio  ex\_Interrupt Timer |
| Microcontroller |

1. **Modules**