Sensorous

Problem Statement

The objective is to engineer a semi- autonomous robot that will follow a track comprising of straight lines, curves, angles of different degree, crossovers. It can detect wall and should have LED or alarm system attached with it. After detection of a wall, it should turn on LED or alarm so that participant sitting in another room will get a clue to take turn and reach the end point.

How to approach

The task can be accomplished by the following steps:

1. A differential drive mechanism so that the robot can traverse the arena.

2. An obstacle detection mechanism to find the path by avoiding the walls.

Mechanisms

The robot will consist of mainly two mechanisms:

1. Differential drive.

2. Obstacle detection using SONAR.

Materials required

1. Components of a simple differential drive i.e. motor, wheels etc.

2. Micro Processor/Micro Controller. Eg. ATmega/Arduino.

   This is the brain of the BOT. All the inputs we receive from the sensors are sent to the micro controller. Micro Controller processes the data and gives the required output to the motors or indicators. All the commands are given in the form of a code to the micro controller estimating all the possibilities. Detailed description of Micro Controller is explained in Microcontroller tutorial.
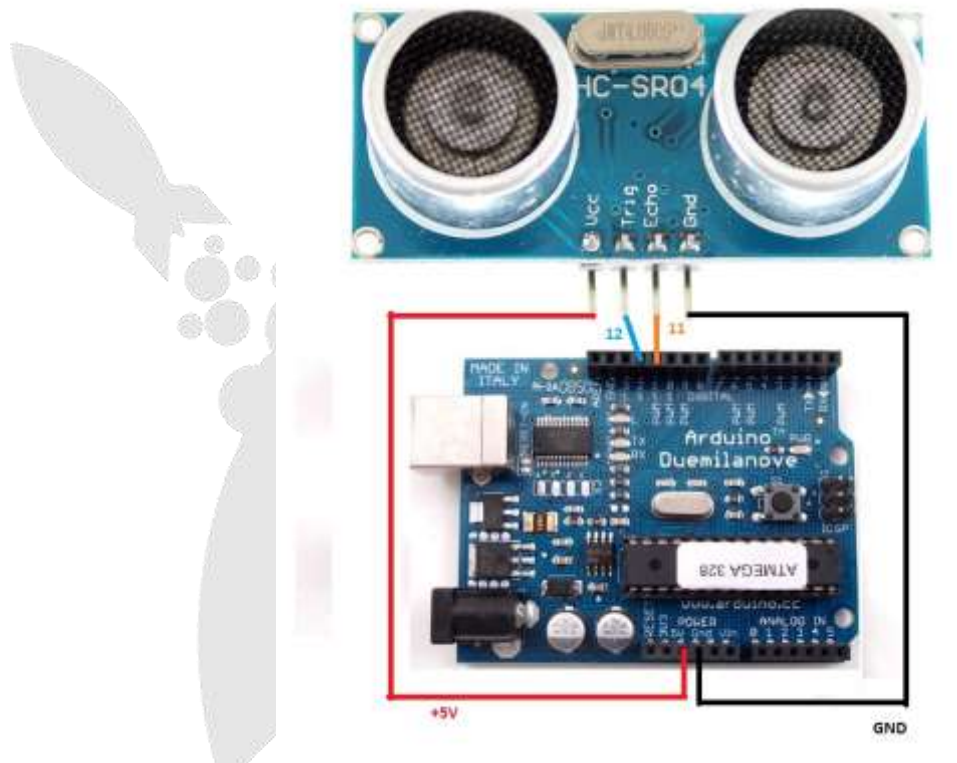
3. A SONAR module which has to be mounted on the robot.

SONAR:

The SONAR module is a device which is an ultrasonic transceiver. It sends sound pulses and receives the reflected ones from the obstacles. By calculating the time

between sent and received signals one can calculate the distance between the obstacle and the device.

CIRCUIT DIAGRAM

Working:

Trigger: the microcontroller triggers the SONAR module by sending a ten microsecond high at the trigger pin following which the SONAR module transmits 8 sound pulses.

Echo: the echo pin is set high as soon as the 8 pulses are sent till it receives back the reflected pulses. The time for which the echo pin was set high is calculated by the microcontroller and hence the distance between the obstacle and the sound transceiver is calculated.

In some SONAR modules the purpose of the echo and trigger are served by the same pin.

The threshold distance between obstacles and bot has to be set according to the dimensions and radius of turns the bot is able to take.

Basic Idea

There should be an indication (Light OR Sound) when an obstacle is detected by the SONAR. The controller should move the bot until the obstacle (or wall) is avoided and find the path accordingly.

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