Floor Cleaning Robot

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Abstract: Households of today are becoming smarter and more automated. In modern days interior decoration are becoming an important role in our life. Cleaning of floor is a very important one for our health and reduces the man power requirement. For this purpose we have design and fabricate a automatic floor cleaning robot. The aim of this project work is to develop and modernized process for cleaning the floor with wet; hence it is widely used in house, hospitals, shops, office, etc. This system is designed by using microcontroller, Bluetooth module for wireless communication and IR sensor for obstacle detection and avoidance.

Keywords- Android applications, Bluetooth model, IR sensor, LM293D

1 Introduction

Robot is an electromechanical machine and used for various purpose in industrial and domestic applications. Cleaning an indoor is a practical problem whose solution involves all the basic research areas in robotics and lots of common sense.

In this research work a floor cleaning robot based on AT89C52 has been developed. This robot is an electric home appliance, which works in two modes as per the user convenience “Automatic and Manual”. Unlike other floor cleaning robot this is not a vacuum cleaner robot; it performs sweeping and mopping operation. It works on 12V supply.

In automatic mode, robot performs all operations itself. Firstly robot starts it moves forward and perform cleaning action. For obstacle detection and to avoid hurdle IR sensors have been used. If hurdle any detected then robot change the lane automatically, does not stop and start cleaning action.

Manual mode is performed with the help of a Bluetooth module, which gives 50m to 100m range and android phone. Motor driver circuit have been used to drive the motors. Two motors have been used to perform respected operations like to move the robot in four direction. LM293D IC has been used to drive wheel motor. Relays have been used to drive the water pump and cleaner motor.

In the manual mode, user itself operates the robot. Bluetooth module have been used to transmit and receive the signal to operate the robot through android phone. In the manual mode, if any hurdle detected. We can change the direction of robot accordingly using the android application. Fig.1 shows the interfacing of Bluetooth model with AT89C52.

2 Block Diagram

The block diagram of our project work “Floor Cleaning Robot” is shown in fig.2 for understanding of this work.

Fig.1: Shows Bluetooth and AT89C52 interfacing

Fig.2. Block Diagram

The floor cleaning robot is a integration of power(12V), microcontroller AT89C52, Bluetooth module(HC-05), two motors, motor driver LM293D. AT89C52 is main part of this system which controls all operations. Bluetooth module is used for wireless communication between android phone and robot and its operating range 100m. IR sensors used for obstacle detection. Two motors are used in this system to drive the wheel.
All the signals controlled by the microcontroller which requires 12V power to work. Bluetooth module is used to transmit and receive the signal. If any hurdle detected the robot can change its direction automatically or by using the android application. Android application BT Simple terminal is freely available in Google play store. Here we are using the application to control the robot.

3 Overview of the system

Our system aims to achieve the target to design a system that can provide following functionality-

a. Develop a robot which will be helpful for travelling and cleaning.

b. Here the focus is on the latest technology of android and robot. An android Smartphone and the technology of android is vast and can be used to interact with embedded system. Mobile, robot and Bluetooth are the on-going technologies which can be used for the benefit of mankind.

The system will consist of following four parts:

a. Bluetooth technology
b. Android smart phone
c. Microcontroller
d. DC motor.

Android smart phone will act as the remote of the system, Bluetooth will act as the connection link between robot and android Smartphone, microcontroller will act as the brain of the robot and DC motor will help us to move the robot. This report describes about the real time android technology that can be used as an interaction between embedded system.

4 Functionality provided by the system

Robot control design a smart phone is the direct usage of a simple device that is as simple as our easy to carry, the mobile phones to drive a robot which is considered quiet complex when comparisons are made to the mobile phones. Here in this system the mobile phone will carry out the controlling of robot with the help of a smart phone application.

The smart phone application wil communicate to the robot with the help of Bluetooth module which is fitted on the Robot. The robot that is the skateboard is mechanically modified in order to fit the Bluetooth module and microcontroller. The microcontroller will read the instructions from smart phone application with the help of Bluetooth and gradually will control the robot with the help of DC motor.

5 System interfaces, Inputs and Outputs

The system interface consists of following entities - Smart phone device, Android Application, Robot, Microcontroller and Dc Motor. The Smart phone device acts as the base hardware on which the Android Application plays the role of an interface. The input is given to the skateboard through the application which is fed to the skateboard through Bluetooth module which transfers the instruction passed by the smart phone application to the skateboard. The DC motor is also in synchronization with the microcontroller which makes the robot perform the required kinds of motion.

6 Robot design process

There are following phases which need to be considered while designing a robot.

6.1 Problem Description

The first things in designing a robot is identification of the purpose for which it has to be built along with specifying requirements.

With the aim of keeping our robot as simple as possible, while able to perform the initial goals, i.e. an autonomous floor cleaner robot able to randomly navigate through a room or a house with the minimum human assistance.

6.2 Robot Programming

Following the fabrication stage, it is required to program the microcontroller in Assembly language.

6.3 Control Logic

The main function of microcontroller is to control the movement of robot in all direction.

For making it to move in a particular direction, the '10 and 01’ logic will be given to wheels.

6.4 Cleaning Operation

To achieve this, we are developing the floor cleaning robot that sweeps and mops the floor using dusting and mopping clothes.

7 Advantages

1. Effective cost.
2. Saving energy.
3. Reduces human effort.
4. It can be used in domestic and industrial cleaning.
5. Small size and low weight.
6. Easy to use
8 Conclusion

The project proposed here is floor cleaning robot. The system can work in two modes like automatic mode and manual mode.

In manual mode, Bluetooth module and android application can be used to control the robot forward, left, right or back. In automatic mode, root can change its direction automatically. IR sensors are used for obstacle detection.

9 References


