

SMART CLEANING SOLUTION

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Abstract: Manual work is taken over the robot technology and many of the related robot appliances are being used extensively also. Here represents the technology that proposed the working of robot for Floor cleaning. This floor cleaner robot can work in Manual mode. All hardware and software operations are controlled by Remote. This Machine can perform sweeping, mopping and drying task. Wired remote have been used for communication between remote and machine. This robot is incorporated with air blower and automatic water sprayer pump. Three motors are used, one for cleaning, two for wheels. Switches are used to drive the motors one for water pump and another for cleaner. In previous work, there was no automatic water sprayer used and works only in manual mode. In the automatic mode robot control all the operations itself and change the lane in case of hurdle detection and moves back. The moving circuitry is connected with a dc supply through a cleaning motor is supplied by a 12V battery.

1. **Keyword – Microcontroller, Bluetooth Module, D C Motor, Robotic Wheels, Air Blower, Mopping Cloth, Wooden Base, A C Adopter, Smartphone.**

I. INTRODUCTION

Robot is an electromechanical machine and used for various purposes in industrial and domestic applications. Robot appliances are entering in the consumer market, since the introduction of robots. Many related appliances from various companies have been followed. Initially the main focus was on having a cleaning device. As the time pass on many improvements were made and more efficient appliances were developed. In early, 2010 a new automatic floor cleaner robot “Mint” was developed by Jen Steffen. Detachable clothes were attached for sweeping and mopping purposes. For tracking mint used the GPS-like indoor localization system. In this research work a floor cleaner robot based on ATMEGA8 have been developed. This cleaner robot is an electric home appliance, which works in two modes as per the user convenience “Automatic and manual”. Unlike other floor cleaner robots this is not a vacuum cleaner robot; it performs sweeping and mopping operation. Detachable mop is used for mopping. It works on 12V supply. In the 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 any hurdle detected then robot change the lane automatically, had made the burden of house core light and but the operational labor of a vacuum cleaner had been so severe. In this paper the RFID tags are used to sense the obstacle and propose the new disposition algorithm to have RFID tags installed on the floor and objects indoor. It needs to also have an intelligent interaction function for the human-friendly communication. RFID tags are installed to detect the obstacle which is costly and complex. This paper presents a floor cleaning robot equipped with Swedish wheels. It can be used in crowded places such as houses, train station, airport etc. The robot can perform its work in autonomous mode. Moreover the robot can pivot around without turning, can avoid obstacles and is provided with automatic power management ability and meanwhile, the kinematics for its control and controlling methods are studied and demonstrated. This new structure, smooth locomotion capability and high working efficiency are verified by experimentation. Vacuum cleaning can be done by this robot and ultrasonic detections sensors are used for obstacle detection.

Most cleaning machines use a vacuum as the principle cleaning device, but in our case, the cleaning device has been adapted from a commercially available electric broom, because the aim of our project is to focus on the cleaning of surface. Depending on the surface type, the roller brush can be very effective because it cleans by friction and the rotation itself also generates a suction airflow that avoids dust generation. Moreover, its design is very simple and cheap, having only two parts: a rotating brush and moving circuitry. Therefore, the proposed design includes the original cleaning elements. This demonstration prototype was built in aluminum for rapid prototyping but plastic materials are planned for more advanced prototypes. Finally, the cleaning brush can be changed manually removing the brush.

OBJECTIVE

The objective of the project is to design a mobile controlled robot that has working range as large as the area of coverage of service provider. For seeing the obstacles in the pat and a physical aspect of the real world, a wireless camera is mounted on the robot that will transmit the audio and video signals to the output screen.

2 BLOCK DIAGRAM DESCRIPTION

In this chapter, the block diagram of mobile controlled robot is discussed as shown in Fig 2.1

2.1 Block Diagram

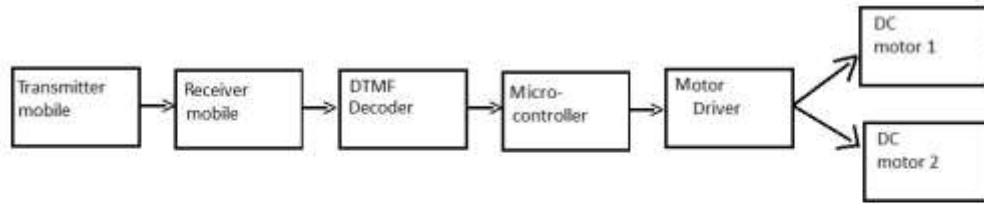


Fig:-First phase operation

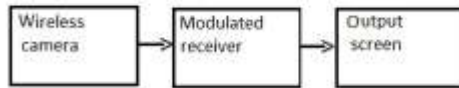


Fig:-Second phase Operation

Fig 2.1 Block diagram of mobile controlled robot

. Mobile controlled robot consists of transmitter mobile, receiver mobile, DTMF decoder IC, microcontroller, motor driver IC, dc motor, wireless camera, modulated receiver and output screen as shown in fig 2.1. This system requires +5V and +12V power supply. When a key is pressed on the transmitter mobile, then DTMF tone is transmitted to the receiver mobile. DTMF decoder will convert the tone frequencies into binary equivalent digital form and passes it to microcontroller which runs the dc motor in clockwise and anticlockwise direction to achieve forward, backward, right and left motion. Wireless camera will transmit the audio and video signals to the output screen through modulated receiver.

2.2 Transmitter Mobile

It is used to make a call to the receiver mobile. User can give the direction of movement to the robot by using Transmitter mobile.

2.3 Receiver Mobile

It takes the input from the transmitter mobile and transmits the message to the DTMF decoder IC.

2.4 DTMF Decoder

In this project, DTMF decoder HT9170B is used which converts the DTMF tone received from the Receiver mobile into binary equivalent digital form and latches it into microcontroller.

2.5 Microcontroller

In this project, AT89S52 microcontroller is used which has been programmed to rotate the dc motor in Clockwise and anti-clockwise direction.

2.6 Motor Driver

In this project, L293D motor driver is used which is used to amplify the current received from microcontroller and thus runs the DC motor.

2.7 DC Motor

It is used to achieve the forward, backward, rightward and leftward movement of the robot

2.8 Wireless Camera

It is used to transmit the audio and video signals to the modulated receiver.

2.9 Modulated Receiver

It receives the signal from the wireless camera and transfers it to output screen.

2.10 Output Screen

It is used to see the video and audio output on the screen such as T.V.

System Explanation:

Here at this robot I have used a Bluetooth module to control the robot via 2 BO motors at 300RPM apex the robot is control by an android phone application Microcontroller used is AT89S51 from 8051 family to work in a serial communication UART mode the communication is configured on 9800bps to communicate it with the Bluetooth module. The Bluetooth module used is a HC-05 in sum package which works on a 3.3v and have a serial communication with any device connected to it the communication speed can be configured on various speed via AT Command. The BT module is a SPP supported profile so it can be connected easily to any module or phone. In this profile the data can be sent and receive to module. The BT module is connected to the RX pin of microcontroller. The L293D is a motor driver IC to operate the motors in any direction required dependent on the logic applied to the logic pins. A readymade compact size chassis I have used to avoid the chassis assembly the chassis contains 2 decks the lower is used for BO motors fitting the upper is used as a battery stack .on top the plate the board is mounted by screw fitting. A smart phone Android operated robot. Now here is a simple to control your robot/robot car using Bluetooth module HC-06 and 89c2051 microcontroller with your android Smartphone device. The controlling devices of the whole system are a microcontroller. Bluetooth module, DC motors are interfaced to the microcontroller. The data receive by the Bluetooth module from android smart phone is fed as

input to the controller. The controller acts accordingly on the DC motor of the robot. The robot in the project can be made to move in all the four directions using the android phone. The direction of the robot is indicators using LED indicators of the Robot system. In achieving the task the controller is loaded with program written using Embedded 'C' Languages. Android smart phone controller Bluetooth robot using microcontroller is shown in figure.

Bluetooth module:



Fig 02: Bluetooth Module

HC Serial Bluetooth:

HC Serial Bluetooth product consists of Bluetooth serial interface module and Bluetooth adapter. Bluetooth serial module is used for converting serial port to Bluetooth.

This module has two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands. HC-06 Specifically includes: Master device: HC - 06 - M, M = Master Slaver device: HC-06-S, S = Slaver

The main function of Bluetooth serial module is replacing the serial port line, such as: One connects to Bluetooth master device while the other one connect to slaver device. Their connection can be built once the pair is made. This Bluetooth connection is equivalently liked to a serial port line connection including RXD, TXD signals. And they can communicate with each other.

1. When MCU has Bluetooth salve module, it can communicate with Bluetooth adapter of computer and smart phones.
2. The Bluetooth devices in the market mostly are salve devices, such as Bluetooth printer, Bluetooth GPS. So, we can use master module to make pair and communicate with them.
3. Bluetooth serial module's operation doesn't need drive, and can communicate with the other Bluetooth device. But communication between two Bluetooth modules require at two conditions:

- i) The communication must be between master and slave.
- ii) The password must be correct.

Here are the main factory parameter of HC-05 and HC-06.

Pay attention to the difference:

HC-05	HC-06
Master and Slave mode can be Switched	Master and Slave mode can't be Switched
Bluetooth Name: HC-05	Bluetooth Name: HC-06
Password: 1234	Password: 1234

Table 1: Distinguish Between HC-05 & HC-06

HC-05 HC-06

Master and Slave mode can be switched Master and Slave mode can't be switched Bluetooth

Name: HC-05 Bluetooth Name: HC-06

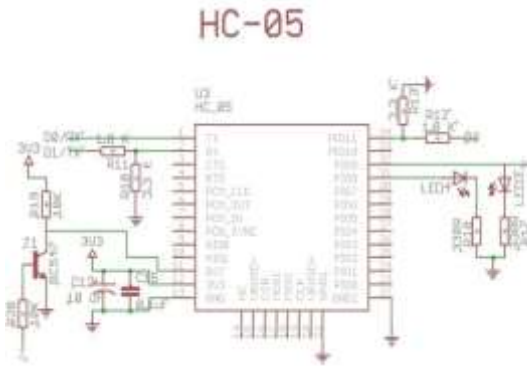


Fig 03: HC-05

Motor driver circuit:

The pin 8 of IC should be connected to the 9v battery or 12v. This pin8 is internally connected to the driver circuit inside the IC which helps the motor to get the good supply which also helps the smooth functioning of motors.

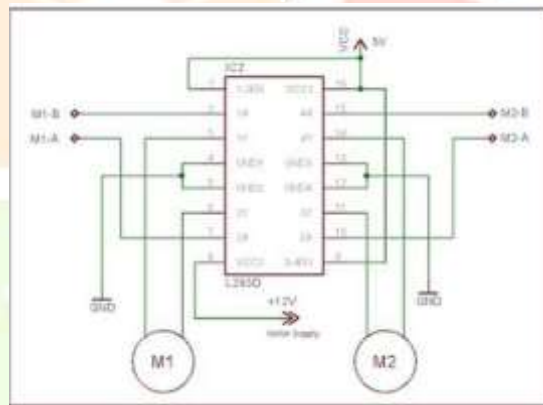


Fig 04: Motor Driver Circuit

DC MOTOR:

Almost every mechanical movement that we see around us is accomplished by an electric motor. Electric machines are means of converting energy. Motors take electrical energy and produce mechanical energy. Electric motor is used to power hundreds of devices we use in everyday life.

An example of small motor applications includes motors used in automobiles, robot, hand power tools and food blenders. Micro-machines are electric machines with parts the size of red blood cells and find many applications in medicine.

UART:

Universal asynchronous receiver/ transmitter are usually an individual integrated circuit used for serial communications over a computer or peripheral device serial port. UART are now commonly included in microcontrollers. A dual UART combines two UARTS into a single chip. Many modern ICs come with a UART that can also communicate synchronously; these devices are called UART.

EXPLANATION:

A smart phone Android operated robot. Now here is a simple to control your robot/robo car using Bluetooth module HC-06 and 89c2051 microcontroller with your android Smartphone device. The controlling devices of the whole system are a microcontroller. Bluetooth module, DC motors are interfaced to the microcontroller. The data receive by the Bluetooth module from android smart phone is fed as input to the controller. The controller acts accordingly on the DC motor of the robot. The robot in the project can be made to move in all the four directions using the android phone. The direction of the robot is indicators using LED indicators of the Robot system. In achieving the task the controller is loaded with program written using Embedded 'C' Languages. Android smart phone controller Bluetooth robot using microcontroller is shown in figure. Block diagram of android smart phone

controller Bluetooth robot using 89s51 microcontroller 4. Application Instructions 4.1 First makes sure your HC-06 Bluetooth module is paired with your mobile. The default password for pairing is "1234" or "0000". Check the manual of Bluetooth module.

The Bluetooth module: The Bluetooth module used is a HC-05 based on SPP support Features:

1. Wireless serial Bluetooth port.
2. With free power adapter bottom board come with well power regulator. User can connect 3.3 to 5VDC and connect TX and RX to your control IO (general 3.3 to 5V digital input output of MCU or IO is ok, or general TLL IO)
3. Easy to connect this module with PC, just search and key "1234" pass code.
4. I- Connect the wiring, power up, while the device is not connected, the Bluetooth module broad has a white LED flashing.
II- at PC side, search Bluetooth device.
III- Found name called "HC-05" device

First make sure your HC-06 Bluetooth module is paired with your mobile. The default password for pairing is "1234" or "0000". Check the manual of Bluetooth module. 4.2 Click on "SELECT DEVICE" icon to select paired Bluetooth module. 4.3 When press "up arrow" it sends the data "A" to Bluetooth module connected with the circuit. When microcontroller detects "A" the robot/robot car moves FORWARD. 4.4 When press "DOWN ARROW" it sends the data "B" to Bluetooth module connected with the circuit. When microcontroller detects "B" the robot/robot car moves REVERSE. 4.5 When press "LEFT ARROW" it sends the data "C" to Bluetooth module connected with the circuit. When microcontroller defects "C" the robot/robot car turns LEFT. 4.6 When press "RIGHT ARROW" it sends the data "D" to Bluetooth module connected with the circuit. When microcontroller defects "D" the robot/robot car turns RIGHT. 4.7 When press "STOP" button which is in the centre of remote it sends the data "E" to the Bluetooth module connected with the circuit. When microcontroller defects "E" the robot/robot car gets stopped 4.8 Click on "DISCONNECT" icon to disconnect paired Bluetooth module.

Design:

The Android app is generally developed using JAVA language but this Android app can also be build without knowing the Java language. This app was developed in "App Inventor" developed by MIT [8]. This app inventor is designed specifically for Non – Computer Science students those who don't know the JAVA language. The figure shown below is the block diagram back- hand design for the application. The app shown below has 5 buttons and all the buttons gives 5 different bytes in the output that has to be fed to the Microcontroller to process [9]. For eg. if we press forward button ,the Bluetooth Module will give 1 byte at its output as shown in the figure. The app consists of the option in the main screen whether to use the accelerometer of the phone or to use the buttons to control the Robot. This app inventor brings out the revolution in the Embedded Systems & Robotics. The app invented by this searches for the Bluetooth devices along with their MAC addresses. The user just has to select the particular MAC Address. When a particular MAC is selected, the status shown on the screen is "Connected". Now al the buttons are active and the app is now connected with the robot and mobile phone can control the robot.

CONCLUSION

The aim of the project, "Mobile Controlled Robot" is to develop a real time wireless robot through which user can monitor what is happening in its surrounding. The working range of mobile controlled robot is as large as the area of service provider coverage. So, robot can be operated up to larger distance. It can be used in various applications ranging from the mining industry to the defense purpose.

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