A REVIEW ON AUTOMATIC ROBOT VACUUM CLEANER USING IOT

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Abstract:

Recently, households are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. Domestic robots are entering our home and people's daily lives, but it is yet a relatively new and immature markets. However, a growth is predicted and the adoption of domestic robots is evolving. Several robotic vacuum cleaners are available on the market but only few ones implements wet cleaning of floors. In this technology, robotics has made the mankind life very easy and comfortable. In this robot makes floor cleaning process easy and fast utilizing a wireless robotics cleaning system. The main objective of this project is to design and implement a vacuum robot prototype by using Ardunio UNO, Ultrasonic sensor, node MCU and DC – Motor. Hence, the vacuum robot are user-friendly to achieve several criteria in regular life.

Keywords:

IoT devices , Ultrasonic sensor, Microcontroller, NodeMCU , Vacuum pump.
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INTRODUCTION

In the modern era, the Automatic Floor Cleaner is required. Thus, the cleaner is designed in such a way that it is capable of cleaning the area reducing the human effort just by starting the cleaning unit. In the paper, main focus is to build and program it in such a way, that it can move around freely and clean a specific area by the vacuuming process. Brushes are attached at its side in order to collect the dust while moving. It uses Ultrasonic sensors to detect the obstacles and hence change its direction while moving and also preventing the cleaner to fall from height.

LITERATURE SURVEY

- (Bobba, Silvia,10,nov2012); shows the Pro-Endurance indicators are applicable to

investigate the durability of products in several different scenarios and they are robust and flexible since the assessment based on a large number of parameters and different scenarios. These indicators can be used to assess product at the design stage or to support policy measures to promote more durable products.

- (Prathmesh Joshi , 8, August 2013).This project report is based on the "Manually Driven Platform Cleaning Machine" which provide the basic needs of cleaning ground floors.

- (Manreet Kaur & Preeti Abrol,19,July 2014): 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 any of two modes i.e. "Automatic and Manual".

- (Karthick.T, Ravikumar.A, 5,May2015) has discussed the idea to develop an autonomous ROBOT that can be move itself without continuous human guidance. The autonomous cleaner ROBOT system which can be consumes very less power on comparing with existing system. The existing system consumes very high power of 500W for suction whereas "Automatic and manual vacuum cleaning robot" required 10W for suction

- (Naman Aggrawal, Piyusha Chaudhari, Anshul Mishrain,5 May 2016) 'Review paper based on cleaning ROBOT'. This paper a human friendly cleaning ROBOT system for the domestic over all environment through conventional automatic cleaning ROBOTs already exist. A prototype of the rotating brush device is made manually to ensure the cleaning effect of the proposed system. From this all research paper we conclude that the drawback of this research is the robot can be work automatically as well manually from that now us going to implement the robot which can be work without human effort

- (Manya Jain, Pankaj Singh Rawat,4 April 2017) An automatic floor cleaner robot has brushes attached to its sides to collect the dust. This robot uses ultrasonic sensors to avoid obstacles and change its direction and it has a suction unit that sucks in the dust while moving around the room freely. But the drawback of this robot is that it cannot clean the wet floor

METHOD

EXISITING METHOD

The manual vacuum cleaner was a type of non-electric vacuum cleaer,using suction to remove dirt from carpets,being powered by human muscle,similar in use to a manual lawn mower A robotic vacuum cleaner ,often called a robovac or robovac,is an

autonomous robotic vacuum cleaner which has intelligent programming and a limited vacuum floor cleaning system.

PROPOSED METHOD

The proposed model "Design and Implementation of Smart Floor Cleaning Robot using Android App" shows fig 1 for better understanding of the proposed work. This block diagram consists of 12v DC motor, L293D IC, WIFI module, cleaning mechanism and Arduino UNO. The power supply is given to the Arduino UNO as well as to relay. The robotic arm used here consists of two dc motors where one dc motor is used for moving robotic arm up and down, second dc motor is used to close and open the teeth of robotic arm and last dc motor is used to rotate arm completely. Here we use L239D drivers for driving dc motors to move in forward and backward direction. WIFI module is used to control the robot using mobile phone application within a range.

COMPONENTS USED:

A. Arduino UNO

As shown in Fig.1, the Arduino Uno [6] is a microcontroller board which is based on the ATmega328 series controllers and has an IDE (Integrated Development Environment) for writing, compiling and uploading codes to the microcontroller. It has 14 digital input and output pins (of which 6 are PWM) and 6 analogue inputs for communication with the electronic components such as sensors,

switches, motors and so on. It also has 16 MHz ceramic resonators, a USB connection jack, an external power supply jack, an ICSP (in-circuit serial programmer) header, and a reset button. Its operating voltage is 5v, input voltage 7 to 12v (limit up to 20v) [6].
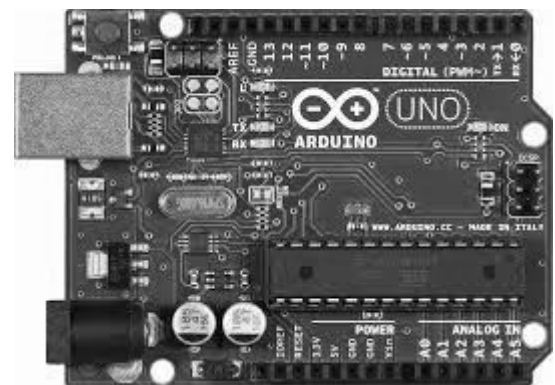

Fig. 1

Arduino UNO

B. Ultrasonic sensor

Here we are using 2 Ultrasonic sensors. It is a type of electronics component that uses ultrasonic transmitter and receiver pair to send and collect signals resulting in proper sense of obstacles. The more the resonant frequency the lesser will be the wavelength of transmitted radiation and it will provide good surrounding condition. The more directional the sonic wave the more resolution in the measurement come. Sensitivity helps in decreasing signal to noise ratio. Here we used two transducers of 40khz.as shown below.

Fig. 2 ultrasonic sensor

C. DC MOTOR

DC motor is an electrical machine that utilizes electric power resulting in mechanical power output. Normally the motor output is a rotational motion of the shaft. The input may be direct current supply or alternating supply. But in case of DC motor direct current is used. The mechanism of dc motor is like a bar wound with wire is placed in between 2 magnets having North and South Pole. When it is provided with electric supply the wire becomes energized resulting in rotational motion which leads to rotational output. Here we are using two 100 rpm dc motors for wheel driving and one 300 rpm dc motor for rotating the mop.

D. WIFI Module

ESP8266 is a system on chip low-cost WiFi module with inbuilt TCP/IP stack. By ESP8266 we can send or receive information remotely by authenticates the user. The ESP8266 help the device or sensors for connecting to internet . Wi-Fi(Used ESP8266 due to very low cost Wi-Fi microchip) is also used to send or receive the information to or from the server or control room, so that lights can be also controlled from server [11]. This module has a great sufficient on-board dispensation and storage ability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip addition allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it holds a self-calibrated RF allowing it to work under all working conditions, and involves no external RF parts.

Fig. 2 DC Motor

Fig: 4 WIFI Module

E. Arduino IDE

The **Arduino Integrated Development Environment**(**IDE**) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor expansion boards. The Arduino IDE maintenances the languages C and C++ . The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output act*ons.*

F L293D Driver Motor

The project designed around L293D IC. The L293D device is quadruple high-current half-H driver. The 293D is designed to provide bidirectional drive current up to 600mA a voltage from 5V to 36V. L293D Adapter Board can be used as dual DC motor driver or bipolar stepper motor driver. Useful in robotics application, bidirectional DC motor controller and stepper motor driver. Separate logic supply to reduce dissipation. L293D includes the output clamping diodes for protections.
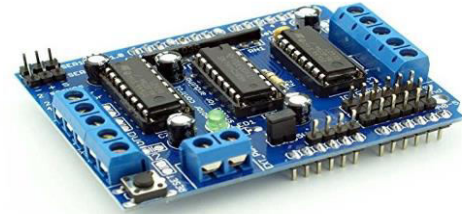

Fig: 5 L293D Motor Driver

G Micro Servo Motor S90G

It is tiny and lightweight with high output power. This servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. It comes with a 3 horns (arms) and hardware.

Fig: 6 Micro Servo Motor S90g

CONCLUSION

This research paper presents that floor cleaning process can be done in an easier manner and more efficiently by robot utilizing wireless robotic system. This proposed robot reduces the time and cost of labour. In the previous research papers like robot vacuum cleaner and automatic floor cleaner, robot had some drawbacks like colliding with objects in front of it and this vacuum cleaner couldn't reach to small areas and left those areas unclean and the automatic floor cleaner robot collects the dust but the drawback over here is that it doesn't clean the wet floor. These two drawbacks have been over came in this research paper. So it will be easy to handle it also saves time and will work automatically for cleaning purpose at homes and offices.

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