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Wireless Mobile Control Robot Help to Fight in COVID-19

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Abstract: ***The aim of our project is to design Mobile Remote Control Robot for hospital. The working of this robot is based on Android OS, Arduino uno motor drivers, a Bluetooth module. Arduino is an publically available prototyping platform. This is a very simple remote control robot, with an Arduino and Bluetooth module. The idea is to first code the entire working using c++ programming. The code will then be imitate on software and later be interfaced with the hardware. The robot is controlled by the smart phone using bluetooth RC controller app which is installed in mobile. The robot is controlled by mobile by moving the robot upward, backward, left and right side by the android application like Arduino, Bluetooth. According to commands received from android the motion of the robot are often controlled. We chose this for our major project as robotics has become a major part of our everyday lifestyle and also have a great scope in the engineering field. We derived simple solutions to provide a framework for hospital robots with very low cost but with high computation and sensing capabilities. This robot perform many task like uv cleaning, floor cleaning, food or medicine delivery.***

Keywords: Arduino Uno, multifunctional, COVID-19, UV-disinfection, Bluetooth communication.

I. INTRODUCTION

As the industry is facing considerable pressure to enhance accessibility, efficiency and price structures while striving to sustain the standard of health Service delivery. Providing healthcare to a rapidly growing population while using fewer resources has become a key challenge of this century in industrial countries. As COVID-19 spreads all over the world, hospitals are going through very bad condition, Surfaces contaminated with viruses. Thus, policy-makers and citizens have high expectations that technological innovations might solve or minimize aspects of this problem.

To minimize the risks and to support COVID-19 fight we have designed a UV light cleaner & multifunctional robot which performs different operations like floor cleaning, hand sanitizer and food delivery which is very helpful to the hospital and small clinic. The project aims in designing a Robot which will be operated using Android phone. The controlling of the Robot is completed wirelessly through Android mobile phone by using the Bluetooth feature present in it. Here within the project the Android smart phone is employed as a remote control for operating the Robot. The controlling device of the whole system is a Arduino Uno. In achieving the task the controller is loaded with a program written using 'C++' language.

Our main objective of writing this paper is to design a robot which provide service in hospital.

II. COMPONENTS USED

A. Arduino Uno

Arduino-Uno is a microcontroller based on the ATmega328. It has 14 digital i/p/o/p Pins , six analog inputs, a 16 MHz crystal oscillator, a USB port, an influence jack, antispreaders, and a push button. C++ program is easist programming language to implement for programming the Arduino Uno.

Fig a] Arduino-uno.

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B. Bluetooth Module (HC-05)

Bluetooth could also be a really cool type module which may add two-way (full-duplex) wireless functionality to our project. We will use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth technology like a Phone or Laptop. There are many smart phone applications that are already available which makes this process a lot easier.

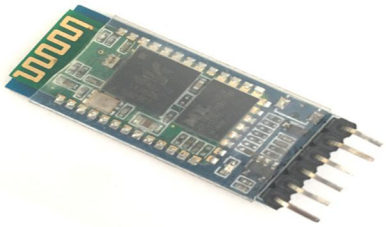

Fig.b] Bluetooth module.

C. DC Motor

An electric motor is an electrical machine which is employed to converts electrical energy into mechanical energy. The basic working rule of a DC motor is "whenever a current carrying conductor is placed during a Magnetic flux, it exposure a mechanical force". The direction of this force is given by Fleming's left hand rule and its magnitude is given by the equation F = BIL. Where, B is a magnetic flux density, I is equal to current and L is equal to length of the conductor within the magnetic field. Once armature windings are connected to a DC supply, an electric current pointed out inside the windings. Magnetic field could also be provided by field coil or by using permanent magnets. In this case, current carrying armature conductors exposure a force due to magnetic field, according to the principle stated above. Commutator is made segmented to attain unidirectional torque. Otherwise, thedirection of force would have every time reversed when the direction of movement of conductor is reversed in the magnetic field. This is how a DC motor works!

Fig c] DC Motor.

D. L298N Motor Drive

The L298N may be a dual H-Bridge motor driver that permits direction and speed management of 2 DC motors at same time. The module will drive DC motors with voltages between 5V and 35V, with a peak current up to 2A. The L298N Motor Driver module consists of an L298 Motor Driver IC, 78M05 Voltage Regulator, resistor, capacitor, Power LED and 5V jumper in an integrated circuit.

Fig d] L298N Motor drive

Features of the L298n Module

1) High working voltage – will reach up to 46v.
2) Large output current.
3) 25W Rated Power.
4) High-Voltage and Current full-bridge driver with 2 H-bridges want to drive inductive loads like DC and Stepper Motors.
5) Controlled with standard logic level signals.

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E. Battery

A 12V battery has six single cells in series connection producing a completely charged output voltage of 12.6 volts. A battery cell consists of 2 lead plates a positive plates coated with a paste of lead dioxide and a negative plates covered with an insulating material in between. Lead acid batteries used in the industries like RV and Marine. It consist of two 6-volt batteries in series, or a single 12volt battery. These batteries are constructed of several single cells connected within the series each cell produces approximately 2.1 volts. A six-volt battery has three single cells, which when fully charged turn out associate output voltage of 6.3 volts. A twelve-volt battery has six single cells serial producing a totally charged output voltage of 12.6 volts.

Fig e] Battery

F. UVC Light

Ultraviolet germicidal irradiation is a disinfection Method that uses short-wavelength ultraviolet (UV-C or Ultraviolet-C) light to kills or inactivate microorganisms by destroying nucleic acids and disrupting their DNA, leaving them unable to Perform vital cellular functions. Light is weak at the Earth's surface since the O3 layer of the atmosphere blocks it. UVC devices can Strong enough UV-C light weight in current air or water systems to make them in hospital Environments to microorganisms like bacterium, viruses, melds, and different pathogens.

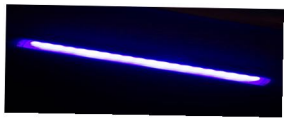

Fig g] UVC light

G. The Android smartphone

Android is a very popular mobile operating system. It is free and open source operation system(OS). It is used in mobile devices like tablets and smartphones. During this project, android smartphone has an installed app which is utilized for controlling the robot. The smartphones already come with inbuilt technology to fixed connection. Here, the technology we have used is Bluetooth.

H. The Android Application

Here we are using the Bluetooth RC Controller application as the operating remote of this technique. The smartphone act as a transmitter of this circuit. It helps to send the instructions of forward, backward, left, right. Actually, the smart phone is used as a remote of this robot. The advantage of this project is that the application software designed for android phones is remain simple but attractive with all necessary functions.

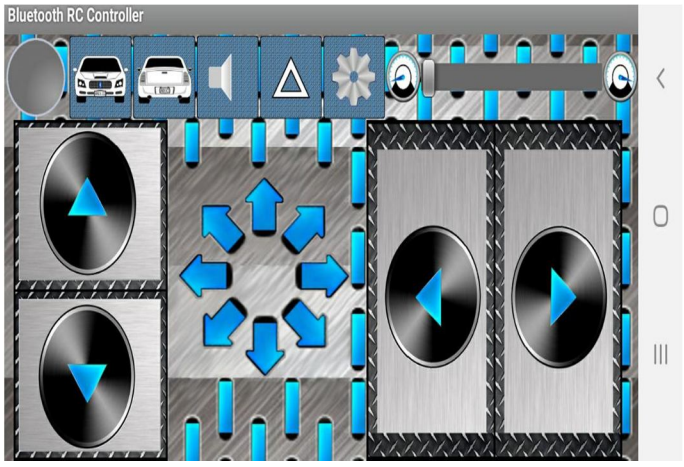

Fig h] : Screenshot of the application

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```
#include int val;
int nb;
void setup() { // put your setup code here, to run once:
    Serial.begin(9600);
pinMode(9,OUTPUT); pinMode(8,OUTPUT);
pinMode(7,OUTPUT); pinMode(6,INPUT);
    } // put your main code here, to run repeatedly:
 void loop()
{ if(Serial.available()>0) { int data= Serial.read(); Stop();
if(data=='R') { digitalWrite(9,HIGH);
digitalWrite(8,LOW);
digitalWrite(6,HIGH);
digitalWrite(7,LOW); } else
if(data=='L') { digitalWrite(9,LOW);
digitalWrite(8,HIGH);
digitalWrite(6,LOW);
digitalWrite(7,HIGH); } else
 digitalWrite(6,LOW);
 digitalWrite(7,HIGH); } else
 if(data=='F') { digitalWrite(9,LOW);
 digitalWrite(8,HIGH);
 digitalWrite(6,HIGH);
 digitalWrite(7,LOW); } else
 if(data=='B') { digitalWrite(9,HIGH);
 digitalWrite(8,LOW);
 digitalWrite(6,LOW);
 digitalWrite(7,HIGH); } } } void
 Stop() { digitalWrite(9,LOW);
 digitalWrite(8,LOW);
 digitalWrite(6,LOW);
 digitalWrite(7,LOW);
}
```

III. METHODOLOGY

1) In our project we are using four 12v 30 rpm dc motors which will help to give motion to our project, this four motor is drive by motor drive L298n which is interface with Arduino.

2) We are using 12v lithium-ion battery as power supply for the project.

3) The motor drive has four pins which used to operate the motor which is connect to Arduino. The motor drive has twice power supply port which is 12v and 5v. 12v and ground is for power supply to motor drive and 5v and ground is for providing power to Arduino.

4) To operate our project wireless we are using hc05 Bluetooth module, this module has a range of 10 meters.

5) hc05 has six pin out which we are using four pin that is rx, tx, vcc, gnd which are interface with Arduino.

6) we need to download the Bluetooth RC Controller app in mobile and connect the hc05 module.

7) Whenever the uv light is in contact with any bacteria's or germs it stop reproduce them.

8) UV light operate on220ac, for this we are using converter which convert 12v dc to 220 ac. UV light is fixed inside from the front side of the project.

9) we are using 12v 100 rpm dc motor for floor cleaning. It is connected with the cleaner whenever the motor is rotate the cleaner also rotate and floor will be clean.

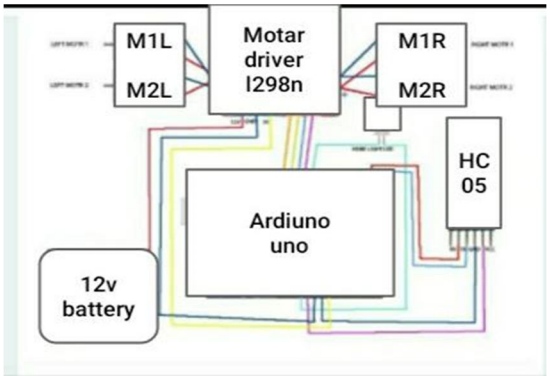

Fig i] : Block diagram of the project

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A. Specifications

1) Any material within 3kg load capacity are handled and control.
2) It is Cost effective and efficient
3) Ultraviolet light cleaning kills upto 99% bacteria
4) Used to interact in real time with patients from a secure distance
5) Provide non contact food, medicine delivery to patients
6) Movable & easy to handle

Fig j] : Snapshot of the bluetooth based smartphone control robot

B. Calculations of the project

We are using 30 rpm motor which will rotate 30 time per minute
1min= 30 rpm
We are using wheel of diameter 3inch that means 1 rotation of the wheel can cover upto 9 inche distance.
1 rotation =9 inches

Total distance = rotation ×diameter
= 30× 9=270 inches
12inch= 1foot
270 inch = 22 foot approximately

It means it will take 1 min to cover 22 foots at no load condition because the working on no load it will be more fast but in load it will take may be 1.30 min to cover 22 foots approximately.

IV. CONCLUSION

This is cost effective and efficient project. Also the Bluetooth RC Controller application is lot of user friendly. We have seen that the robots are utilized in hospital for either providing service like medicine or food delivery or cleaning or uv disinfecting purpose. This robot performs single work at a time. This robots are very costly & time consuming. That's why we derived simple solutions to provide a structure for hospital with very low cost but with high figuring and sensing capabilities provided by the smart phone that is used as a control device. This robot is all in one and time saving also. This robot provides the contact free service, hence it can be used in hospitals, small clinics to maintain a safe distance. As covid-19 pandemic is going on, this robot will be very beneficial in our normal life and will bring much needed innovation in this fast changing world of technology.
In future, we can interface some sensors to this robot so that it can monitor the path and we can improve the efficiency using Internet of Things (IoT) technology. We can also add wireless camera, in order to provide the security.

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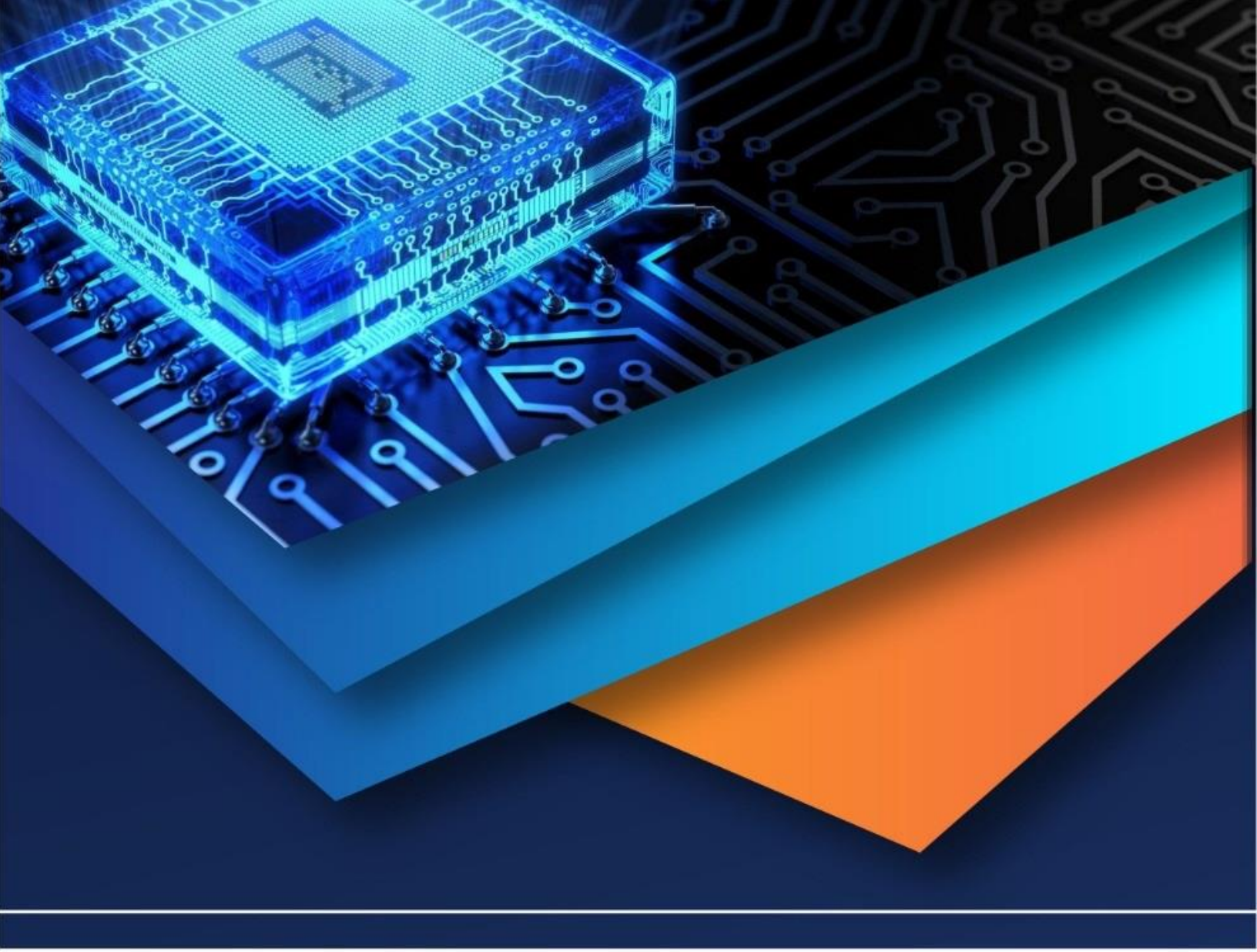

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