Bluetooth control Bot Car to be used by healthcare workers to support Corona Patient

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Abstract: Large numbers of healthcare workers were affected in hospitals across the world, with the initial wave of Corona virus managing to infect 80% of the staff working in the medical wards. The magnitude with which this virus has taken a toll on the health workforce has taken lives of several health care workers. It is possible to avoid direct contact with COVID patients to some extent by using Bluetooth car to provide services to patients. In this pandemic it will act as a boon to hospital staff members and also to common man. Wireless Bluetooth Controlled Robot Car Using Arduino can be controlled wirelessly via a Smartphone. The smart phone has an Android app through which the user can send commands directly to Robot. The wireless communication techniques used to control the robot is Bluetooth Technology. Specific voice commands are given to the robot through an Android application. Health care workers can use various commands like move forward, reverse, stop, move left, and move right to reach out the patient to deliver food, water and medicines time to time without directly coming in close proximity to them. Thus, our aim is to use robot car and this helps us to maintain social distancing and thus save other people to get infected with corona virus patient.

Keywords: Corona Virus, Bluetooth Module, DC Motor, Arduino, Android app.

I. INTRODUCTION

As corona virus disease 2019 (COVID-19) spreads across the world, the intensive care unit (ICU) community must prepare for the challenges associated with this pandemic [1]. According to research, social distancing (also known as physical distancing) is designed to minimize interactions between people living in a wider community [2]. It aims, through a variety of means, to minimize physical contact between individuals and thereby to reduce the possibility for new infections which is transmitted by air droplets [3]. The droplets produced by coughing, sneezing or forced speaking have a certain transmission distance. By keeping this distance, we can reduce the spread of the virus. The World Health Organization and the Governments have prescribed maintaining an interpersonal distance of 1.5 or 2 meters (about 6 feet) from each other in order to minimize the risk of contagion through the droplets that we usually

Disseminate around us from the nose and mouth [4] . But in recent research by the scientists of the University of California and Stanford University, US, it was found that six feet distance may not be enough as the virus can travel as far as 20 feet [5]. Reports from affected countries have revealed in the past that 22% of health care workers were affected in hospitals across Hong Kong, with the initial wave managing to infect 80% of the staff working in the medical wards of Prince Wales Hospital. This is just one example of the magnitude with which this virus has taken a toll on the health workforce [19]. So, this paper tells that wireless car can travel up to 32.80 feet(10m) using Bluetooth technology by which we can easily follow the rules and regulation of social distancing and can keep ourselves as well as our near ones safe. This measure is targeted to reduce contacts by 50% in the workplace and decrease other contacts by 75%, while inadvertently increasing household contacts by 25% [6]. Working conditions in public hospitals have been of great concern to health care personnel worldwide, despite their devotion to the practice of medicine and the health of their patients. Reasons for this include long working hours, risk of infection, shortages of protective equipment [7] [8]. "Health care workers spend a lot of time up close with the patient doing high risk activities," says Terri Rebmann, a nurse researcher and director of the Institute for Biosecurity at Saint Louis University. At the family level, the pandemic has led to a reorganization of everyday life. All family members have to cope with the stress of quarantine and social distancing. To limit possible transmission to or from others, as healthcare organizations struggle to implement technology

while maintaining efficient operations, their workers may be suffering [9][10]. It appears to be important to develop alternative and appropriate means to satisfy people's social needs during the pandemic [11] so by using Bluetooth controlled bot car the health care workers can get a relief, the staff can use it to serve the patient. Thus by such social distancing we can stop, or at least slow, the spread of COVID-19, the disease caused by the new corona virus. A robot is an electromechanical machine that is controlled by a computer program to perform various operations. In conventional robotics, the controlling and operation of robots is usually done by using RF circuits. Industrial robots have been designed to reduce human effort and time to improve productivity and to reduce manufacturing cost [12] [13]. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot [14].

The world is at the dawn of a smart phone era where everything in our day-to-day life is, and can be controlled via a smart phone [15]. Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods [16]. Android is a safe and secure operating system. We know that all manual operations have been replaced by automated mechanical operations hence; we can say that Android smart phones will serve a great benefit for industrial, commercial and other general-purpose applications. The DC motors are widely used for providing variable speed drive systems in industrial applications resembling automation, electrical traction, and military instrumentality, fixed disk drives, thanks to their high potency, noise-free operation, compactness, dependability and low maintenance and cost [17]. The exposure to the virus causes debility, morbidity and mortality but to a significant extent, also leads to immense physical and psychological exhaustion.[19]

This bot can be used in the material handling process. This process is improving the customer service, reducing the delivery time and physical hard work. To minimize the material handling issues through robotics, the Bluetooth-controlled robot car is an emerging technique which is cheap, user-friendly, and effective. [18].

II. PROPOSED METHODOLOGY

Android controlled Arduino robot car make use of an Android mobile phone for robotic control with the help of HC-05 Bluetooth technology. An Android based robot has a HC-05 Bluetooth receiver unit which receives the commands and gives it to the microcontroller circuit to control the motors. The microcontroller then transmits the signal to the motor driver ICs to operate the motors. For this the android mobile user has to install an application on her/his mobile. This android application could be downloaded from the android market. A robot can be controlled using Bluetooth module HC-05 and ATMEGA328P-PU microcontroller with android Smartphone device. The controlling devices of the whole system are a microcontroller. Bluetooth module, DC motors are interfaced to the microcontroller. The data received by the Bluetooth module from an android smart phone is fed input to the controller. The controller acts accordingly on the DC motor of the robot. The robot can move in all the four directions using the android phone. These commands are sent from the Android mobile to the Bluetooth receiver which is interfaced with the Arduino robot. At the receiving side, a Bluetooth transceiver module receives the commands and forwards them to the Arduino and thus the robotic car is controlled.
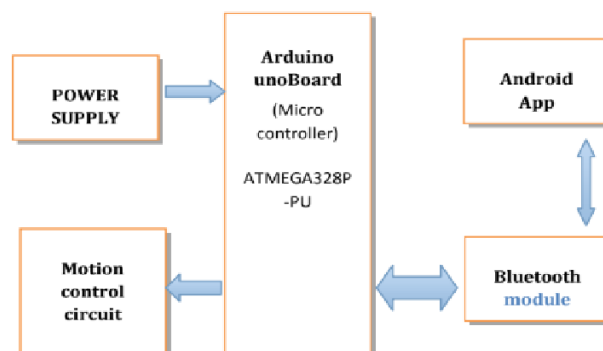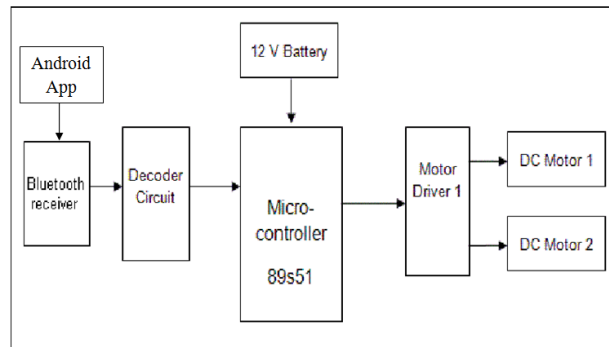

Fig.1. Architecture of the system

Fig.2. Block diagram of the system

III. CIRCUIT DIAGRAM

Below is the circuit diagram of the hardware which shows the connections between Arduino, Bluetooth and motors. It also shows a motor driver L293D which is responsible for movement of the motors in either direction. RxD pin of the Arduino is connected to the TxD pin of Bluetooth and vice versa. Supply of 5V is provided to the motors.
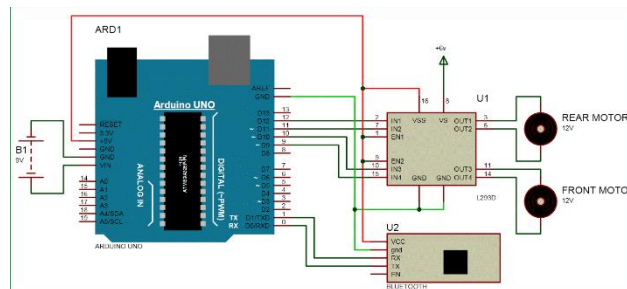

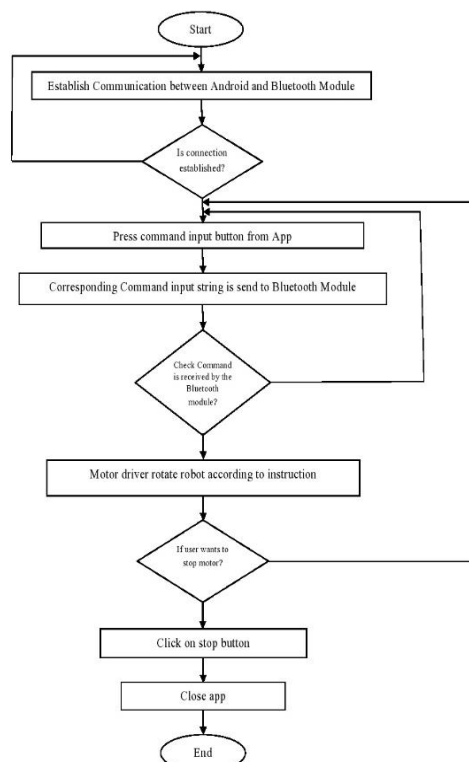Fig. 3. Circuit diagram of the system

IV. PROPOSED ALGORITHM

Fig.4. Flow chart of the system

V. RESULT

After simulating the circuit connections in Proteus 8.0, the following result was observed. Connections were made as per the circuit diagram and the hex file of the code of Arduino was attached to the Arduino Uno.
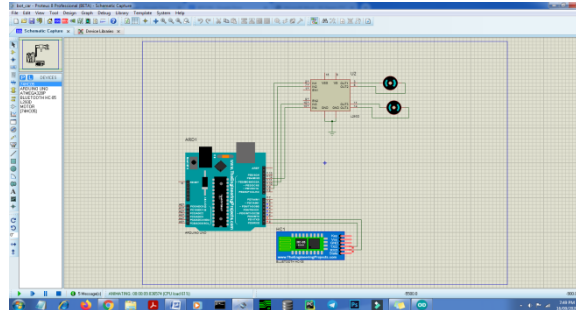

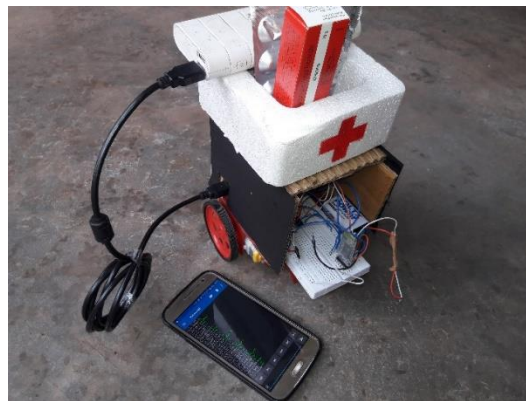
Fig. 5: Proteus simulation of the system

Fig. 6: Bluetooth Control BOT Car

VI. CONCLUSION

Wireless control is one of the most important basic needs for all the people all over the world in all the fields. Here the Bluetooth controlled BOT is used to provide a solution to the health care workers to avoid the problem of being infected by Corona virus by coming in contact with the patients. This is indeed a cost-effective and efficient project. The novelty lies in the fact that it is a cost-effective project with a simple and easy to use interface. Also, the Bluetooth RC Controller application is more users friendly. Here for robotic control an Android mobile phone is used which is very cheap and easily available. The BOT can deliver medicines, food and water to the patient within a limited range successfully.

VII.   FUTURE SCOPE

In future we can interface sensors to this robot so that it can monitor some other parameters and can improve the efficiency using Internet of Things (IoT) technology. We can also add wireless cameras, in order to incorporate other security features. It can also realize smart living, more specifically the home lighting control system using Bluetooth Technology. The robot can also be used for surveillance. The surveillance has always been a quite sensitive task that includes so many risks. So, it's better to use robots for this job instead of people. This work can be further modified for material handling in industries also.

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