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A Prototype Device for Medicine Disbursement and Sanitization in Covid Zones

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Abstract: ***COVID-19 is a pandemic viral outbreak. All the existing preventing methodologies for COVID have some shortcomings and are short-lived. This system is proposed with the view of achieving a long-term solution for this issue and would help to connect the doctors with the patient without physical contact. It consists of a master-slave system. The master system is the mobile application and the slave system is the Bluetooth module mounted to the system. The master system commands the slave system which in turn drives the controller to perform desired tasks. This system consists of a movable chassis and can be controlled remotely via Bluetooth module. The two-way communication between the doctor and the patient can be achieved using the wireless Wi-Fi camera and it is also used for monitoring the physical condition of patients. This system has a provision to distribute food and medicine to the patients when required without being in contact with the patient. Also is incorporated with the sanitizer spray and UV light strips to disinfect the affected area without physical labour. Thus, this system reduces direct contact among people and would be helpful in reducing the spreading of the deadly virus.***
Keywords: COVID, Chassis, UV light strips, Bluetooth module, Wireless Wi-Fi camera.

I. INTRODUCTION

The recent outbreak of COVID-19 was discovered in 2019 and it is caused by the SARS COV-2 or Severe Acute Respiratory Syndrome. Scientists researched and announced the arrival of a slowly growing pandemic. Now, 208 countries around the globe are fighting with this deadly virus. On one side our medical team is trying its best to find its cure whereas on the other side it is our duty to help them by following the safety measures like wearing masks, following social distancing, and washing hands-on frequent intervals, etc. Though these precautionary measures are followed, the people such as doctors, nurses, janitor are the most affected as they serve the infected people in person. Even though they use reusable PPE kits to protect themselves from the virus, it causes more discomfort to doctors and it is also expensive. Maintaining social distance between a doctor and the patient also remains to be a complex task. On the other hand, the situation of the janitors is pathetic, when they manually clean and sanitize the infected area they too get affected. Considering all these existing issues, a system is designed which performs various task such as sanitization, sterilization, food and medicine distribution to patients and monitor and interact with the patients via a device remotely operated using Bluetooth module. This reduces direct human contact, which in turn reduces the spreading of virus and makes management of COVID more effective and simpler.

II. LITERATURE REVIEW

There are various issues faced by doctors and janitors in management of COVID. This alarming pathetic scenario motivated to search for an idea to develop a system which provides solution to all the existing issues and various proposals have been studied to develop this system. Anjali M. Yelasange et.al [1] proposed an Autonomous Robot for Delivering the Orders in Restaurants by using Raspberry Pi. In this The Robotic application uses a Raspberry-pi based kit mounted with ultrasonic sensors for mapping and localization of destination table is described from which we gained an idea to construct waiter-robot which can deliver food to the desired table. Ashish Gupta et.al [2] proposed Novel Design of Automatic Sanitizer Dispenser Machine Based on Ultrasonic Sensor. The circuit includes ultrasonic sensor SC-04 that senses the proximity of hands under the machine and the signal is sent to the microcontroller and the controller takes decision to actuate the pump and valve simultaneously to dispense the liquid sanitizer through a mist nozzle. From this, an idea to setup an automated sanitizer dispenser with help of ultrasonic sensor is gained. Saif uldun Mostafa Kamal et.al [3]. In this a Butler Robot with Multi-wireless Connections is proposed.

In this a butler robot is designed that can provide services in a restaurant, like any butler or waiter. The robot is controlled through human supervision using a wireless camera. The robot contains two wheels to help with movement in all directions, two human-like arms and a tray for holding food and drinks in one hand. From this a concept for building a Wi-Fi controlled robot for providing food service is evolved.

Pacharawan Chanprakon et.al [4] proposed an Ultra-Violet Sterilization robot for Disinfection. In this Ultra-Violet sterilization technology is used to aid in reduction of microorganisms on the surface to the minimum number. It can either manually or autonomously navigate around room including avoiding obstacles and sterilize the floor using Raspberry Pi. This led to an idea to design UV bot for sterilization of micro-organisms on the floors. Vijayalakshmi.S et.al [5] proposed a Robotic Car Using Arduino With Bluetooth Controller. This robotic car is controlled by Bluetooth and values of temperature and humidity are viewed in a mobile app. From this a method to create app for controlling robot via Bluetooth technology is identified. Marcel Bentancor et…al [6] proposed a Programmable and low-cost ultraviolet room disinfection device. This room disinfection device based on Ultraviolet-C radiation. It offers the capacity to be remotely programmed using an Android mobile device and it has an infrared detection security system that turns off the system when triggered. From this an effective way to disinfect the floors without human intervention by exposing UV-C radiation to the floors has been evolved.

The scope of present work is to reduce the viral spreading of corona by designing a remotely operatable & movable device for sterilizing and sanitizing the floors without human intervention, monitoring and Interacting with the affected patients, disbursing medicine & food in COVID affected zones.

III.PROPOSED SYSTEM

The block diagram for the proposed system is shown in Fig 1. The system is controlled by Arduino ATMega328p and operated via android phone. The input block consists of Bluetooth module which is usually capable of receiving serial data from master Bluetooth device (phone or pc). After getting commands from phone, it sends the commands to Arduino. Arduino in turn control the output block based on the commands given by the Bluetooth module. The output block consists of dc motor, motor driver, relay, UV strips, water pump.

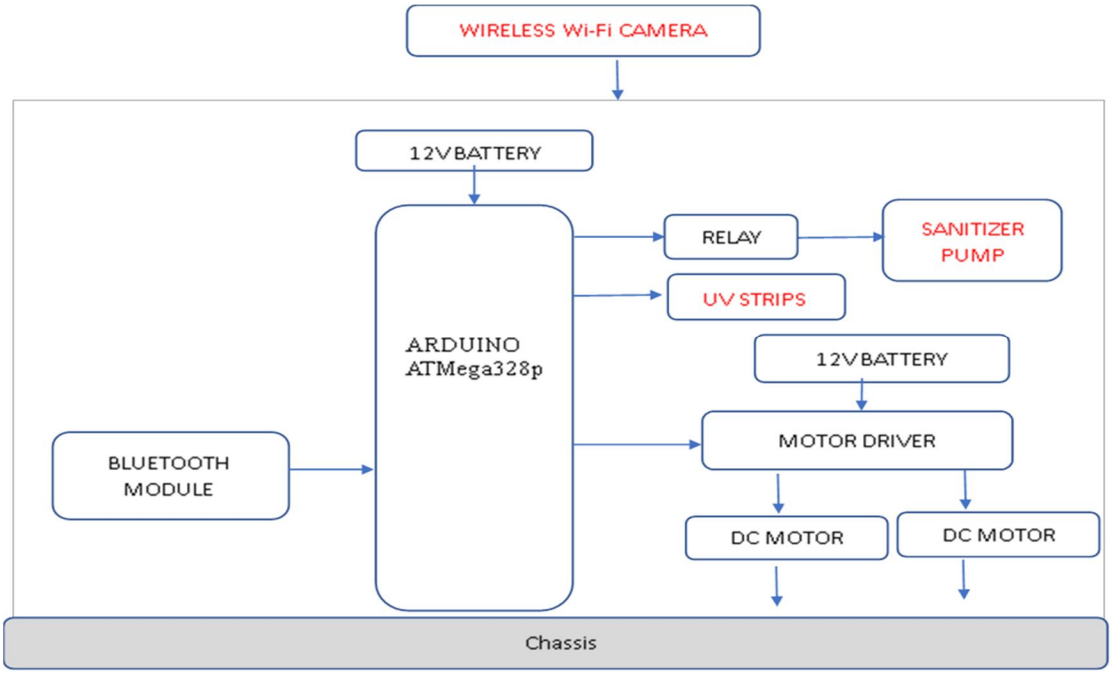

Fig. 1 Block diagram of proposed system

Control circuits work at low current signal whereas motor needs high current signal to work. So, motor driver is required in the circuit. It converts low current signal to high current and make the motor work. Whenever needed, sanitizer pump and UV strips can be switched on from phone for cleaning purpose and a wiper is provided at the bottom to absorb excess water from the floor. The attachment of UV strips to the base of chassis is shown in Fig 2. A wireless Wi-Fi camera is mounted to top of the device. It is 720p Night vision HD camera. It, has provision for SD card and has option for recording, replaying, fixing direction of camera and speaking.so that interaction, communication between doctors, nurses and patients can be easily done. They can also monitor physical state of patients with the help of it. The food tray mounted to the device can be used for disbursement of medicine and food. Thus, the device reduces person-person contact and helps in reducing viral spreading of corona. The entire hardware assembling of the proposed system is shown in the Fig 3.

Fig. 2 UV strip mounted to the chassis

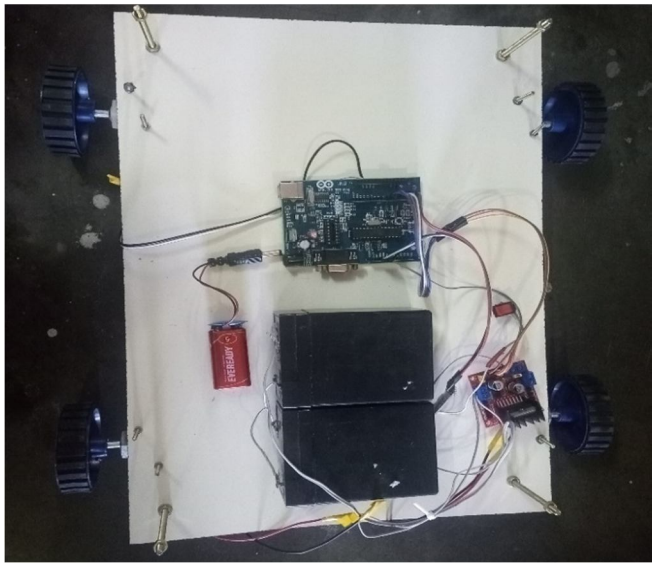

Fig. 3 Hardware model of the proposed system

IV. METHODOLOGY

Bluetooth technology is used for remotely accessing the device. First, communication is built between Android and Bluetooth module by an app which can be created with help of MIT app inventor. The app consists of several input command buttons like Right, left, forward, backward, sprayer on and off, UV strips on and off. This is shown in Fig 4. When the command is pressed, the information is sent in the form of string to Bluetooth module. Bluetooth module communicates the exact information to Arduino ATMega328p. Arduino ATMega328p checks the string with predefined commands in the code and execute the corresponding operation. The Wi-Fi camera can be accessed via app in the phone which is available in the play store named V380 pro Wi-Fi camera guide. With the help of camera, correct route can be navigated and the device can be moved in the right path.

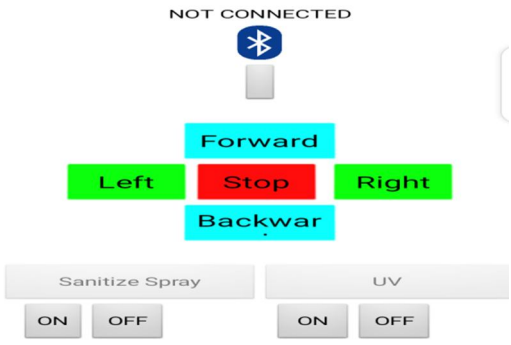

Fig. 4 Mobile Application

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The master mobile application commands the slave Bluetooth module which in turn drives the controller to move the motors in desired direction by the driver circuit. The flowchart for the process is shown in Fig 5.

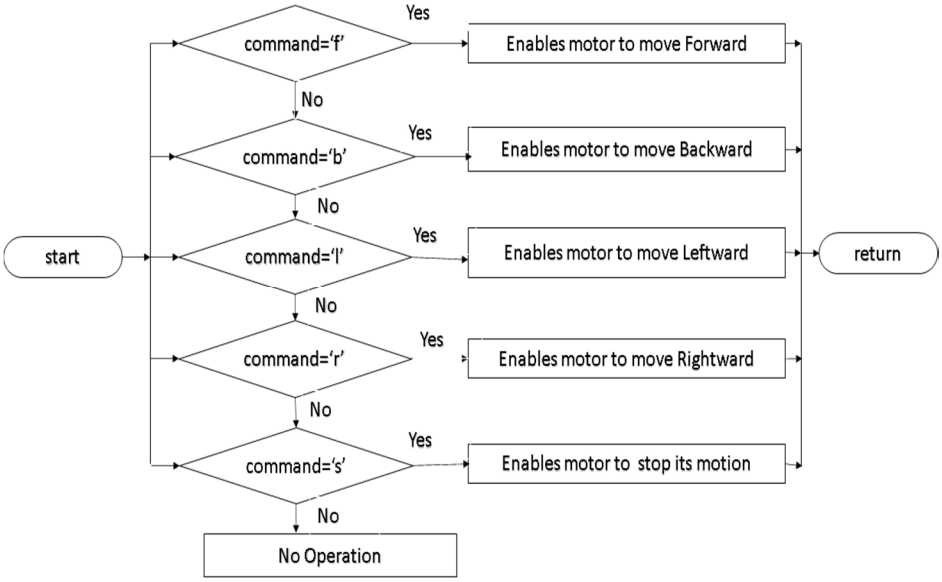

Fig. 5 Motor Operation

The sprayer and UV can be switched on and off from the mobile app and the flowchart for sprayer and UV operation is shown in Fig 6 and Fig 7 respectively.

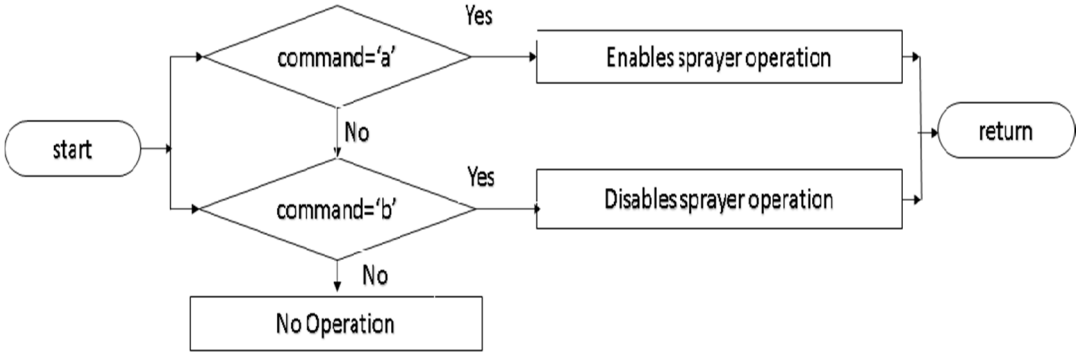

Fig. 6 Sprayer Operation

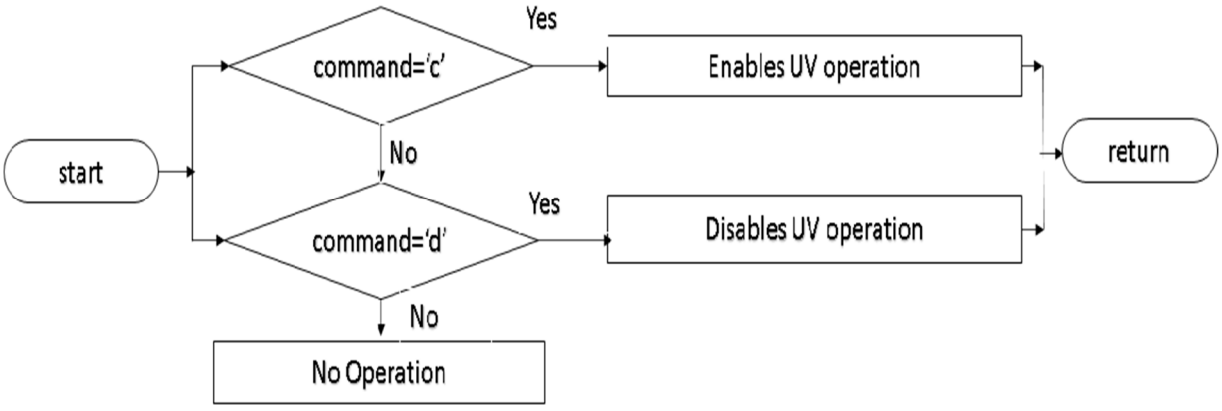

Fig. 7 UV Operation

V. RESULTS AND DISCUSSIONS

A movable system which can perform various tasks such as sanitizing and sterilizing floors without human intervention, monitoring the patient, communicating with them in half-duplex mode from a distant location is achieved and the images of the top view and bottom view of the system is shown in Fig 8 and Fig 9 respectively.

Fig. 8 Top view of proposed system

Fig. 9 Bottom view of proposed system

VI. CONCLUSIONS

In this paper, a system is designed with the aim of reducing the spread of COVID by designing a system which is remotely operable and is meant for various purposes such as sanitization, sterilization, food and medicine delivery, monitoring and for surveillance. This helps the doctors and janitors to a greater extent by preventing them from spread and since interaction between doctor and patient plays an important part in COVID treatment and this could be achieved using the wireless Wi-Fi camera mounted to the system as this has a provision for communication. This setup can be placed in the COVID wards and can be operated from nurse station or some remote location. Thus, this system helps to solve all difficulties faced by the doctors and janitors involved in management of COVID pandemic and also lowers the spreading of virus among people. Thus, this system helps to solve all difficulties faced by the doctors and janitors involved in management of COVID and also lowers the spreading of virus among the people.

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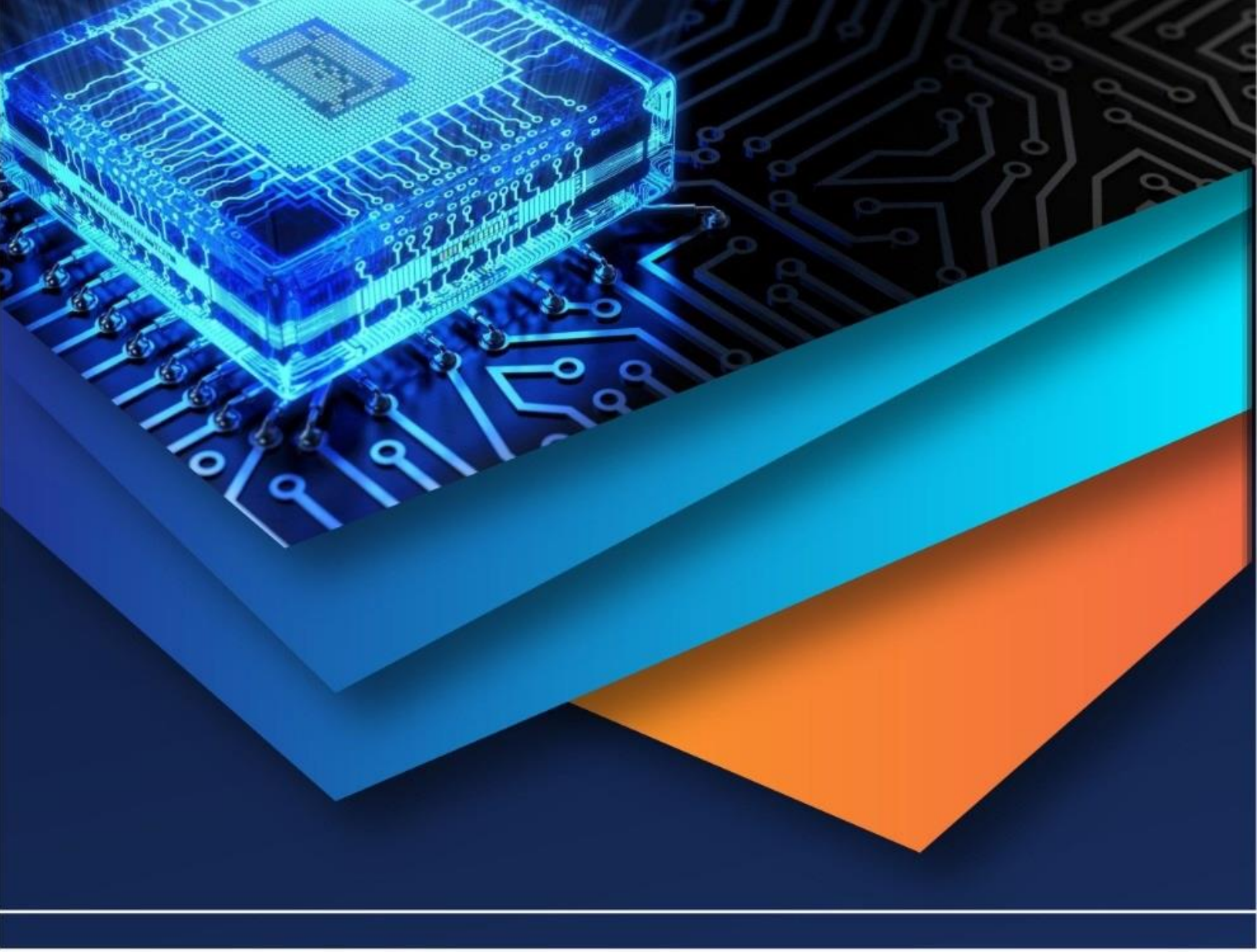

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