Remotely Controlled Toxic Chemical Sprinkle Automaton with Video feedback

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Abstract: In this study, With the increase and spread of the severe extreme respiratory disease coronavirus 2, or 2019 novel coronavirus (2019-nCoV), there are new general health crises endangering the entire world (SARS-CoV-2). People have been afflicted with the Covid-19 illness as a result of its global spread. Other than the lack of specific therapy and vaccination, covid19 are known to exhibit a significant degree of ecological resilience. The infection was thought to pass from person to person, making an epidemic easily manageable.

Droplets from breathing or sneezing that are infected cause the virus to propagate. Even in the air, these droplets can continue to exist on inert surfaces and spread illness to people. When faced with the requirement for a specific antimicrobial therapy, developing novel methods to stop the proliferation of infections is fundamental. The goal of this study is to create a spray decontamination system to fight the coronavirus (covid-19) using automation technology that utilizes the Internet of Factors. Besides that, a sprayer with a gas fluid incidental mix structure has been constructed to combat the issue of long-lasting splashier. The design includes an optical monitor for watching the sprinkling process. This foundation has been used to evaluate the robot's efficiency. The technology as it is now can clean a large area with little assistance from humans and in a shorter amount of time.

Keywords: Arduino Uno, Gear Motor, Wheel, Motor Driver, Bluetooth module, Servo motor, Wi-Fi camera, Battery (8 volt), Power bank (5 volt).

I.   INTRODUCTION

The COVID-19 pandemic in Bangladesh is a component of the global COVID-19 coronavirus disease pandemic that is brought on by coronavirus 2 that causes serious acute respiratory syndrome (SARS-CoV-2). In March 2020, it was determined that the pathogen had made its way to Bangladesh. IEDCR, the nation's epidemiology agency, released the first three instances on March 8th, 2020. Since then, the epidemic has expanded steadily across the entire country, and the number of victims has risen. After India, Bangladesh is the nation in South Asia that has suffered the most damage [1]. SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), a novel human coronavirus that was first identified in Wuhan, China, at the end of 2019 and is currently causing an epidemic. The illness known as Covid-19 is brought on by a brand-new coronavirus known as n-Cov19 [2]. The results from these three separate kits are identical for each sample, and only 47.4% of the suspect individuals had a positive nucleic acid detection ratio for 2019-nCoV [3]. WHO. Encourages the sharing of data to better understand and thus manage COVID-19outbreak, and to develop countermeasures [4]. This virus revealed on the underlying case at China and start to outbreak to the world [5]. Coronaviruses are wrapped positivesense RNA infections extending from 60 nm to 140 nm in diameter with what looklike spike projections on its surface providing a crown appearance under electronmicroscope; henceforth the name coronavirus [6]. On the other hand, from 23 March to 30 May, the government imposed a "lockdown" on the entire country in order to safeguard the populace, and it prepared the required measures to raise consciousness of this syndrome [7]. Until the end of March, infection rates were modest, but April saw a sharp increase. [8] The week concluding on April 11 saw a 1,155 percent increase in new cases in Bangladesh, the greatest increase in Asia and higher than Indonesia's 186 percent increase [9]. Cases were verified in every region on May 6. The last district to submit verified COVID-19 cases was Rangamati. The absence oftreatment, the high death rate and the transmission examples of COVID-19 includedthe setting of effective and facilitated methods for avoidance and stop the overall spreadof this infection. To forestall this imperfection, an alternative innovation is requiredwith less human co-operation to limit the likelihood of infection spreading. The management of pandemics requires the use of healthcare institutions. Artificial applications are crucial in these circumstances because they simulate human actions in risky settings, reducing human-to-human interaction [10]. Because of the sharp rise in deaths among frontline employees, the majority of nations have already employed a variety of robots to help human staff [11]. Since robotic tools have been used in a variety of sectors since the middle of the 2000s, they can be easily improved upon and put to use in the clinical field [12].

The White House Office of Science and Technology Policy (OSTP) and the National Science Foundation (NSF) organized workshops with scientists and researchers who used robots in such contagious outbreaks during the Ebola epidemic in West Africa between 2014 and 2016 as one such example of a health crisis [13]. The market growth for medical robots over time is shown in Figure 1. Epidemics and other unforeseen events are anticipated to add to this market's 40% development between 2019 and 2022.

Rapid deployment of a variety of machines with the potential to sterilize, transport medicines, measure vital signs, etc. was possible in technologically sophisticated nations [14]. The upkeep, training, and integration of robots into existing infrastructure are additional costs that the majority of fiscally underdeveloped nations were unable to pay [15]. Due to the rising demand for these robots, there was ultimately a shortage [16] due to high usage rates. Physical distance-keeping precautions may also be necessary until 2022, according to the forecast [17]. The creation of these medical robots for defense has become a necessity because, according to some experts, COVID-19 outbreaks could continue for years to come [18]. Additionally, the COVID-19 catastrophe proves that unremarkable robots can function alongside front-line healthcare providers in the tiniest possibility of a life-threatening scenario [19]. As shown in Figure 1, the industry is anticipated to grow significantly over the next few years, exceeding $9 billion in 2022.
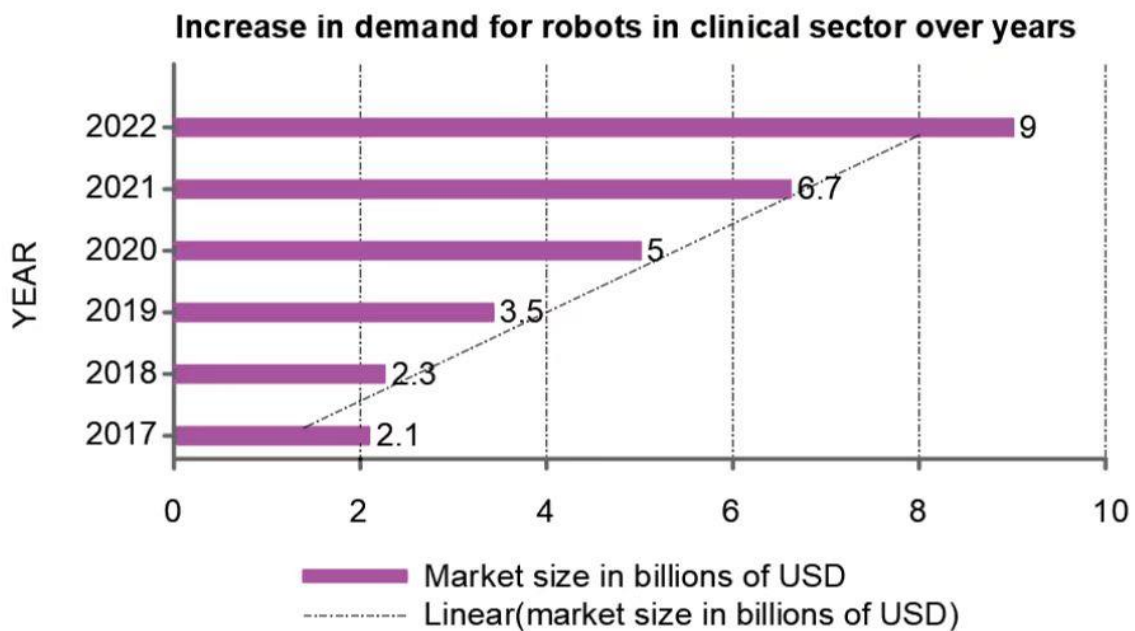

Figure 1: Market size of medical robots used worldwide [20].

II. EXPERIMENT

Arduino Uno

Single-board Figure 2, microcontrollers and microcontroller packages are created and manufactured by Arduino, an open-source hardware and software initiative, user community, and business. It has a GPIO connector, allowing for expansion for research and development initiatives.
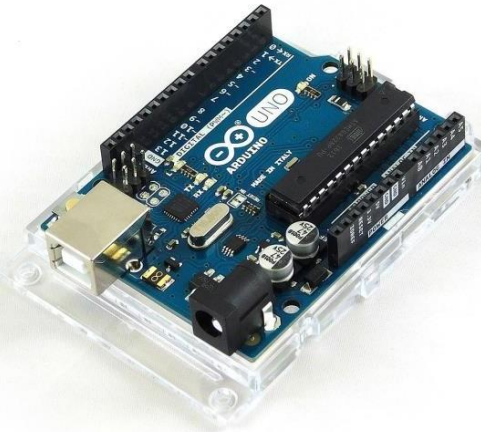
Figure:2 Arduino Uno

Table 1: Description of Arduino Uno

Micro Controller	ATmega328
Clock Speed	16MHz
Operation Voltage	5V
Max Supply Voltage	20V
Supply Voltage (Recommended)	7-12V
Analog Input Pin	6
Digital IO Pin	14
DC Current per Pin	40mA
SRAM	2KB
Flash Memory	32KB

Table 2: Description of Motor Driver

Driver Model	L298N 2A
Driver Chip	Double H Bridge L298N
Motor Supply Voltage (Maximum)	46V
Motor Supply Current (Maximum)	2A
Logic Voltage	5V
Driver Voltage	5-35V
Driver Current	2A
Logical Current	0-36mA
Maximum Power (W)	25W

Table 3: Description of the Servo Motor

Operating Voltage	4.8V DC-6.0V DC
Operating Speed	0.12sec/60°at 4.8V
Output Torque	1.3kgf-cm (18.2 oz. In) at 4.8V
Weight	8.0g (0.28oz)
Size	22.8*11.5*20.8(0.9*0.45*0.82in)

Table 4: Description of Bluetooth Module

Range	Below 100m
Bluetooth protocol	Bluetooth Specification v2.0+EDR
Frequency	2.4GHz ISM band
Modulation	GFSK (Gaussian Frequency Shift Keying)
Emission power	4dBm or less, Class 2
Sensitivity	84dBm or less at 0.1% BER
Security	Authentication and encryption
Power supply	+3.3VDC 50mA

Table 5: Description of Wireless Fidelity Camera

Sensor	1/4" HD 1Megapixel Cmos sensor
Resolution	1280*720/1280*960
Lens	3.6mm(M12) F:2.0
Chipset	8135+1045
Min. Illumination	0.5 Lux (IR LED OFF)

Disinfectant spray: The electronically controlled car, the disinfectant spraying module, and the environment monitoring module make up the core of the robot-based disinfection system, as shown in Figure 3. The automaton patrols various locations where the disinfectant is required using smartphone Wireless connection. The chemical liquid, disinfectant receptacle, and stream valve are all atomized using the disinfectant dispensing apparatus. The remote can also be used to operate the spray device. Through a WiFi camera that is mounted to the car, the operator can view the scenario. He or she could use a portable device to transmit the action instructions to the robot. Fundamentally, robots are created in a manner that reduces the need for humans to interact with hazardous and severe work environments. The robot's head's tip directs a sanitizing liquid spray toward the intended target. After being changed and managed by the user, the disinfecting liquid is circulated.

Figure: 3 Photography of Disinfectant spray

Spray Mechanism: Various configurations were tried, but this one functions the best. There are undoubtedly more complex methods, but for simple applications and demonstrations, this one works just fine. The liver is moved by a mechanical actuator. To run it, a remote location issues a command Figure: 4.

Figure: 4 Spray Mechanism.

III.   EXPERIMENT METHOD

The working mechanism of this paper Figure 5, A microprocessor, in this case an Arduino Uno, serves as the robot's brain. This gives commands to other components. Through the Bluetooth module, it talks to the central centre. After receiving the instruction, it follows it by moving and spraying. The microcontroller is not linked to the IP/Wi-Fi webcam. Direct data transmission to the user monitor is made.
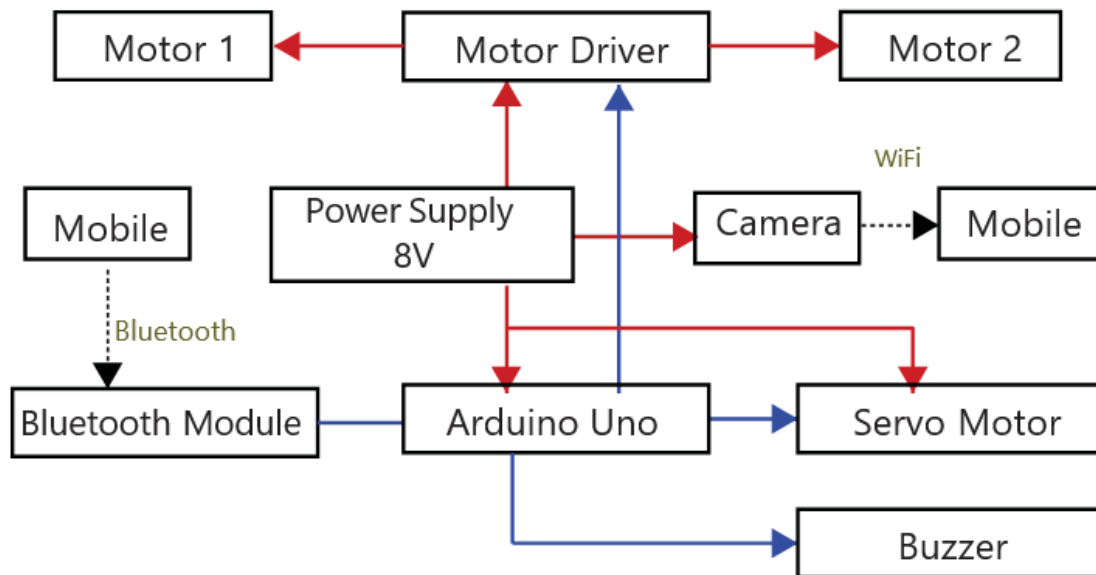

Figure 5: Diagram of this work

Motor connection:

In this endeavour, the wheel is powered. The engine is managed by a motor driver. Battery electricity and microprocessor signals are used by the motor driver. The driver's signal ports are attached to the Arduino's pins 9, 10, 11, and 12. The HC-05 has two operating modes: AT Command mode, where pre-set device settings can be changed, and Data mode, where it can transmit and receive data from other Bluetooth devices. Using the key pin as described in the pin description, we can control the gadget in either of these two settings. The key port can be grounded during power-up to switch to command mode; otherwise, it will automatically switch to data mode. The Bluetooth device should be identified as "HC-05" as soon as the module is powered. You can then link to it using the pre-set password of 1234 and begin interacting with it.

Software: Adafruit Studio for Windows, macOS, and Linux, the Arduino Integrated Development Environment (IDE) is a cross-platform program that uses C and C++ routines. It is used to create and submit programs to boards that are interoperable with Arduino as well as other vendor development boards with the aid of third-party components. The GNU General Public Agreement, version 2 governs the distribution of the IDE's source code. The Arduino IDE uses specific code structuring principles to handle the languages C and C++. A program library from the Wiring project, which offers numerous standard input and output processes, is provided by the Arduino IDE. The GNU tool chain, which is also provided with the IDE release, is used to build and link user-written code into an executable cyclic executive program, which only needs two fundamental functions to initiate the sketch and the main program loop. The executable code is transformed by the Arduino IDE using the verdude program into a text file with hexadecimal encoding, which is then put into the Arduino board by a loader program in the board's software. Verdude is typically utilized as the uploading utility to flash user code onto authorized Arduino devices.

IV. RESULT & DISCUSSION
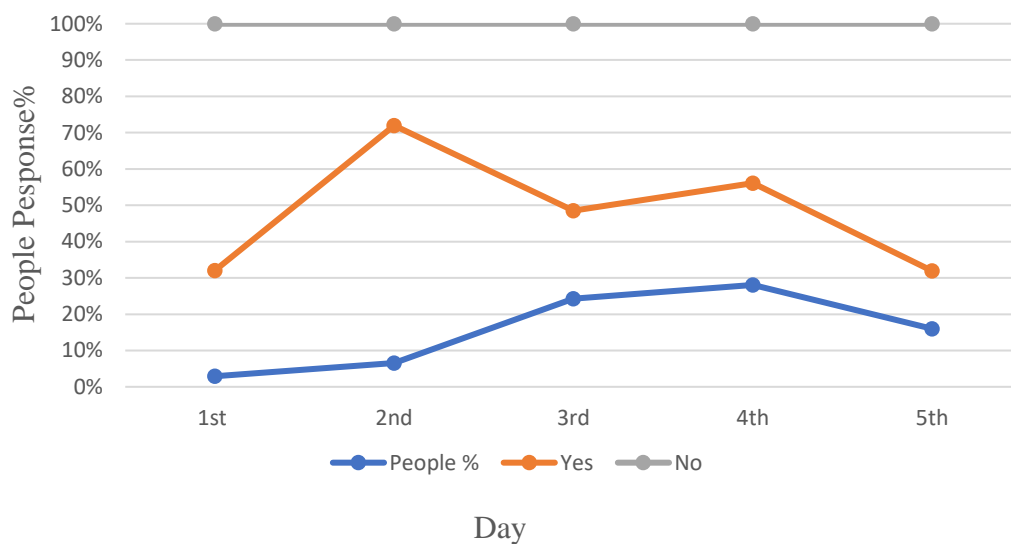
Figure:6 People Response for spray

When we start spray to human in that time 1st day response was 3% people, Figure:6, 2nd day response was 7% people,3rd day response was 32% people,4th day response was 39% people,5th day response was 19% people. It was serious period for every Human Bing, reason all people are being afraid. we do survey approximately 1000 people. The robot's lack of complete autonomy for mobility is one program restriction. In manual mode, an individual is required to operate it. Make the robot autonomous so it can carry out its functions. Boost the functionality. for instance, taking a body temperature reading to identify a perpetrator. We can see here 5th day was decreased the response; reason is our robot has some problem. But we highly recommended that it will work in near future. Need good instrument for making robot.

V. CONCLUSION

After the project was effectively completed, we created a robot that can be electronically controlled to spray disinfectant and manage the monitoring atmosphere in pandemic scenarios like COVID-19. This type of airborne pathogen spreads more readily through human contact. We anticipate that using these robots will help to contain the spread. further sprinkling disinfectants eliminate neigh boring viruses. In the end, we expect that the implementation of this initiative will be advantageous for humanity. We can propose some potential improvements for the robot by taking note of the aforementioned limitations. Make the automaton independent so that it can function on its own, for example. Increasing utility. for instance, taking a body temperature reading to identify a suspect.

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