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"UV FLOOR SANITIZATION"

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Abstract - *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 Sanitizing. Commercial areas of today are becoming smarter and more automated. Commercial automation delivers convenience and creates more time for people. However, a growth is predicted and the adoption of Commercial robots is evolving. Several robotic sanitizer are available on the market but only few ones implement UV sanitization of floors. The purpose of this project is to design and implement a UV Sanitization Robot for Autonomous dry Sanitization. UV sanitization Robot is designed to make Sanitization process become easier rather than by using manual Sanitizers. The main objective of this project is to design and implement a UV robot prototype by using Arduino Uno, Motor, Ultrasonic Sensor, and IR Sensor and to achieve the goal of this project. The whole circuitry is connected with 12V battery. UV Sanitizer Robot will have several criteria that are user-friendly.*

Key Words: **UV Sanitization robot, UV light, Sterilizer, Corona Virus Sanitization, Ultrasonic sensor, Automatic sterilization robo, Arduino Robo.**

1.INTRODUCTION

In the recent condition of this global pandemic. Robots are being used for jobs such as sanitizing hospitals and delivering food and medicines, and hence been proved to be very much useful. Each and every day single as frontline helpers like Doctor and nurses, Scientist and governments are struggling to control the spread of the corona virus that has infected Globally, as of {last updated:-11:03am CET, 17 February 2021},there have been **109,068,745 confirmed cases** of COVID-19, including **2,409,011 deaths**, reported to WHO. Robots are also being send for treatment and providing support to quarantined patients. The World Health Organization has advised Social distancing for people around the world to prevent community Spread transmission of Corona Virus (Covid-19).

Sanitization, which has become a very major aspect in these pandemic period of time and plays a very crucial role in preventing us from exposure of this deadly virus and thus helping in extermination of this global pandemic is very important. One of the high-risk zones of exposure to this deadly virus is in the area where people rush to for the cure, that are the hospitals and the medical wards and medical camps. Sanitization in these areas is indeed challenging and requires very high measures to be taken. But in spite of all these high-end measures taken, there is always a risk associated with it.

The objective of this project is minimizing human contact as much as possible and thus automation of the tasks such as sanitization with the help of robots. In this case, the use of robots can reduce human exposure to pathogens, which has become increasingly important as epidemics climb up. The project uses **Arduino IDE** software for its design and development of the sanitization robot. Arduino integrated development and **HC-04** Bluetooth module used for control and programming. The design of the robot has a positive feature that helps in spreading positivity amidst these times. A company called UVD robots designs robotic based UV disinfection solutions for hospitals. Although
these robots are effective in killing bacteria in hospital rooms, we are aiming to market our design for smaller applications. We hope that small restaurant owners will be able to use our design to disinfect surface areas, such as tables. Our attempt of a UV solution will also be cost-effective compared to similar technologies on the market.
Our automated robot is essential to alleviating pressure from employees by fully disinfecting tables of bacteria and germs. If an employee only has time to wipe up crumbs and garbage after customers leave, the employee can set our device on the table to vanish the disinfecting part of the task.

2. LITERATURE REVIEW

There are few research papers related to medically related robots have been discussed and the following references show impact on the design of the smart medical assistant robot. Marcin Zukowski et al [10] have developed a anthropomorphic(manlike) medical assistant and companion robot committed to children hospitals. They have concentrated on the robot being able to express emotions and communicate with the children by recognizing their faces and using pictures and text on the chest display to tell stories and present educational videos. The 'Bobot' autonomously navigates through hospital rooms and performs simple medical tests like measuring patient's body temperature or heart rate and sends live video feed to the doctors and nurses. The robot is run using ODROID XU and XU4 with Ubuntu 14.04 operating system and has a dedicated Raspberry Pi 2 computer to animate the robot's eyes.

Mahmoud Tarokh and Malrey Lee [2] proposed systematic method for kinematics modeling of multi-legged robots for walking on rough terrain. An extended D-H table is proposed for characterizing the robot joints and linkages parameters. Marcin Zukowski et al hand over the implementation of patients' temperature measurement system for the medical robotic assistant. They have experimented with MLX90614 infrared thermometer and FLIR Lepton thermal camera and found out that the MLX90614 infrared thermometer cannot be used as the only input source of the system and to get more accurate results, robot would need to come as close as less than 0.3 metres to a patient's face. To overcome this they created a hybrid system having infrared thermometer along with thermal camera to provide ambient temperature and approximate skin temperature that can be used to detect presence of humans in front of the robot.

The paper by Himadri Nath Saha [8] et.al, propose a IoT Based alarm system for Garbage Monıtorıng and Clearance. This system has a level sensor to monitor the garbage level in the bin and when the level is reached, it alerts the municipality officials. An android app is developed for connectivity. The Microcontroller is Arduino Uno and the system takes energy from a solar panel. This deice has RGB Lights to indicate the exact level of the garbage.

The scope of the present study is to design a smart medical assistant robot by exploring various contactless sensor technologies. The robot should be compact for efficient handling and incorporate a quick learning real time environment recognition technology for its locomotion in a crowded hospital.

The paper by Uman Khalid [16] proposed a smart floor cleaning robot. This system has automatic and manual modes as per user will. The robot automatically starts and starts cleaning the whole room in a pattern when the whole room is cleaned then the garbage is been stored in trash bin and after it clean itself.

The another paper Gabriele Ferri,[4] Alessandro Manzi, Pericle Salvini, Barbara Mazzolai, Cecilia Laschi, and Paolo Dario, "DustCart, an autonomous robot for door-to-door garbage collection: from DustBot project.

Hiroo Takahashi, Kojiro Iizuka,[1]introduced "Analysis on Weight Arrangement Scheme to Reduce the Weight of Multi-Legged Robot. I this system he concluded the weight balancing of multi legged robot can be balanced. The simulation results showed that it is better for a light-weight robot to design a walking robot so that all the weight can be put on the tip of a leg. The prototype robot was developed based on the proposed design. The effectiveness of the proposed scheme was confirmed by hardware study.

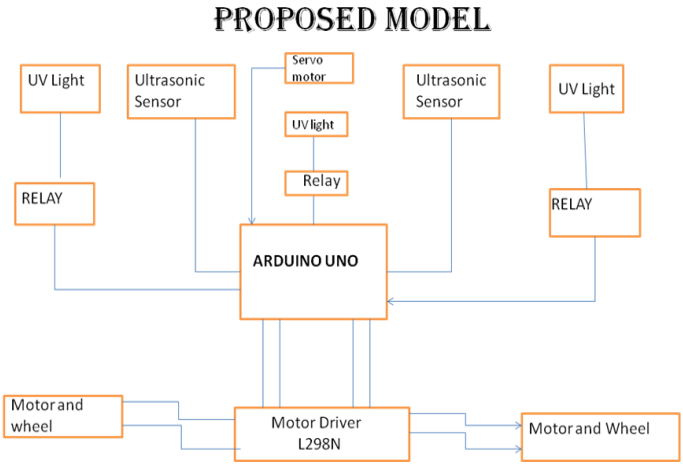
Samuel K. Moore and Seoul Viosys shows UV-C LEDs are deadly, lays out path to better efficiency [14]. UV LEDs are deadly to viruses and bacteria, because the 100-280 nanometer wavelength C-band shreds genetic material. Unfortunately, it's also strongly absorbed by nitrogen in the air, so sources have to be powerful to have an effect at a distance. (Air is such a strong barrier, that the sun's UV-C doesn't reach the Earth's surface.) Working with researchers at Korea University, in Seoul, the company showed that its Violed LED modules could eliminate 99.9 percent of the SARS-COV-2 virus using a 30-second dose from a distance of three centimeters.

Many robotic solutions have been designed and developed, targeting routine tasks in healthcare facilities. The works [11,12] demonstrate that service robots are used to deliver food and medicine.

UV-light-installed mobile robot was introduced by Danish-based company UVD Robot [13] for efficiently disinfecting hospital rooms, which could slow the disease spread through viruses. These robots can disinfect anything much better than other techniques, using a mobile array of powerful short-wavelength ultraviolet-C (UVC) lights that emit enough energy to shred the DNA or RNA of any microorganisms exposed to them. In [3], author proposed an autonomous robot to performs bed baths

in the pursuit of patient hygiene. In addition to this core functionality, the robot is equipped with a fall-detection system consisting of a video camera and a 3D LiDAR to identify patients who have fallen to the ground. The robot can notify the medical staff for the assistance in an emergency condition of a person detected by the fall detection module and remote condition monitoring module. In [14] the mode of UV disinfection and sterilization, condensed ultraviolet beams are emitted to kill bacteria and other harmful microorganisms, with a disinfection rate of 99% shown.

3. PROPOSED MODEL



Block Diagram: Proposed Model of UV sanitization Robot

3.1 COMPONENTS

Arduino Microcontroller: Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz

ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.

Fig 1: Arduino Uno

HC – 04 Bluetooth Module: The Bluetooth technology manages the communication channel of the wireless part. The Bluetooth module can receive and transmits the data from a host system with the help of the host controller interface (HCI). It provides a range of up to 10m at a transmit power of 1 m watt. The range can be extended to 100m if the transmit power is increased to 100 m watt. A Bluetooth module is a short range device of around 10 meters which provides both sound and data transmission.

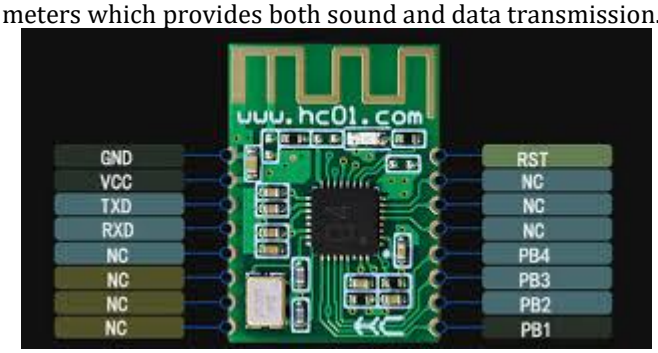


Fig 2: HC-04 Bluetooth Module

HC-SR04 Ultrasonic (US) sensor: It is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the transmitter and Receiver. The transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the receiver module.

Fig 3: HC-SR04 Ultrasonic Sensor

Motor Driver: It is an integrated circuit chip used as a motor controlling device in autonomous robots and embedded circuits. A motor driver is undoubtedly something that makes the motor move as per the given instructions or the inputs (high and low). It listens to the low voltage from the controller/processor and control an actual motor which needs high input voltage.

DC Motor: DC motors are used for the movement of the robot where it is connected with the motor driver, whenever the trigger signal is given to the motor driver then the motor moves according the trigger with the given speed.

Servo Motor: A servo motor is a rotary actuator or a motor that allows for a precise control in terms of the angular position, acceleration, and velocity. In order to control the turning of the robot, servo is used in the design.

3.1.2. Sanitization Part-

DC Pump Motor: DC powered pumps use direct current from motor, battery, or solar power to move fluid in a variety of ways. Motorized pumps typically operate on 6, 12, 24, or 32 volts of DC power. Solar-powered DC pumps use photovoltaic (PV) panels with solar cells that produce direct current when exposed to sunlight. Here, DC pump is used to pump out the sanitizer liquid and spray it through the nozzle in a controlled manner.

Relays: Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. Here, Relay is used to switch the UV lights with separate power.

UV Light: UV light connected to separate power supply via relay and switched on by electronic trigger generated from Arduino. Here UVC lights are being used as it is effective for the destroying pathogens and other bacterial, virus present in air and moisture. From relays UVC lights are connected and when trigger from Arduino is given, switch is closed in relay and UVC lights are ON.

4. CONCLUSION

This study presents a comprehensive overview of the robotics potential in medicine and allied areas with special relation to the control of the COVID-19 pandemic. Effective management of COVID-19 can significantly reduce the number of infected patients and casualties as witnessed in the case of the Chinese outbreak. Since, it has currently turned out to be a global challenge, technologically advanced countries can aid others by donating support equipment and robotic infrastructure to enable a good outcome in controlling this disease. This review substantiates that the introduction of medical robotics has significantly augmented the safety and quality of health management systems compared to manual systems due to healthcare digitization. Classification of medical robots is only done using application-based categories to fit every aspect of hospital service ranging as well as fault tolerant control and dependable architectures for reliable and safe operation within the healthcare facilities.

REFERENCES

1. Hiroo Takahashi, Kojiro Iizuka, "Analysis on Weight Arrangement Scheme to Reduce the Weight of Multi-Legged Robot Takashi Kubota",Proceedings of the 2005 IEEE International Conference on Robotics and Automation, Barcelona, Spain, April 2005.

2. Mahmoud Tarokh and Malrey Lee, " Kinematics Modeling of Multi-legged Robots Walking on Rough Terrain" 2008 Second International Conference on Future Generation Communication and Networking Symposia.

3. King, C.H.; Chen, T.L.; Jain, A.; Kemp, C.C. Towards an assistive robot that autonomously performs bed baths for patient hygiene. In Proceedings of the 2010 IEEE/RSJ International Conference on Intelligent Robots and Systems, Taipei, Taiwan, 18–22 October 2010; pp. 319–324.

4. Gabriele Ferri, Alessandro Manzi, Pericle Salvini, Barbara Mazzolai, Cecilia Laschi, and Paolo Dario, "DustCart, an autonomous robot for door-to-door garbage collection: from DustBot project to the experimentation in the small town of Peccioli, 2011 IEEE International Conference on Robotics and Automation, Shanghai International Conference Center, May 9-13, 2011, Shanghai, China.

5. Bipasa Roy Patra "Smart electricity generation with solar technology - A Transformation", IJERECE, ISSN:2394-6849, June 2017

6. Bipasa Roy Patra "Sustainable trends & Necessity of improving power quality for future smarter nation by smart grid", International journal of innovations in engineering and science, ISSN: 2456-3463, April 2018

7. Bipasa Bimalendu Patra "Smart Grid - Sustainable Shaping of the Future Smarter Nation", International Journal of Emerging Technology and Advanced Engineering, First International Conference on Innovations & Engineering, Volume 8, Special Issue 10, Oct 2018 (ISSN 2250 – 2459 (Online)), pg. 101-107

8. Himadri Nath Saha, Sourav Gon, Annesha Nayak, Samabrita kundu, Sumandrita Moitra , "IoT Based Garbage Monitoring and Clearance Alert System" 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON) Pages: 204 – 208.

9. Bipasa Bimalendu Patra "Necessity for future smarter nation with Sustainable Trend- Smart Grid", PRATIBHA: International Journal of Science, Spirituality, Business and Technology (IJSSBT) ISSN (Print) 2277-7261.

10. Marcin Zukowski and Krzysztof Matus is design of the smart medical assistant robot. Published in 29 october 2018.

11. Medical Supplies Delivery Robots. Available online: https://arstechnica.com/tech-policy/2020/04/delivery-robots-move-medical-supplies-to-help-with-covid-19-response (accessed on 2 March 2020).

12. Food Delivery Robots. Available online: https://www.unido.org/stories/china-robot-delivery-vehiclesdeployed-help-covid-19-emergency (accessed on 2 March 2020).

13. UVD Robots. Available online: https://spectrum.ieee.org/automaton/robotics/medical-robots/autonomousrobots-are-helping-kill-coronavirus-in-hospitals(accessed on 2March 2020).

14. UV-C Robot: https://www.uvclight.co.uk/uvc-robot/?utm_campaign=Search%20-%20Generic%20-%20Aug%202020&utm_source=google_ads&utm_medium=ppc&utm_content=459082830384&utm_term=%2Bsanitizing%20%2Brobot&AdPos=&device=c&GeoLoc=9302215&placement=&matchtype=b&network=g&gclid=Cj0KCQiAvvKBBhCXARIsACTePW_N0YdCqhrvegu4iHaSuPYaPUpLfNMf-9CZfUaQVpQk689FC7UEYfAaAmwFEALw_wcB

15. Bipasa B. Patra Guruprasad P. Sali, Mohini J. Deshmukh, Mrunalini S. Wankhede, "Smart IOT Automation for Advanced Home Security", IJEREEE, VOLUME 6 ISSUE 4, APRIL 2020

16. Uman Khalid1 , Muhammad Faizan Baloch1 , Haseeb Haider1 , Muhammad Usman Sardar 1 , Muhammad Faisal Khan1,2 , Abdul Basit Zia1 and Tahseen Amin Khan Qasuria1

17. https://spectrum.ieee.org/tech-talk/semiconductors/optoelectronics/ultravioletled-maker-demonstrates-30second-coronavirus-kill by Samuel K. Moore shows UV C light are Deadly to Viruses are bacteria.

18. Guruprasad Sali, Mr.Prafulla Desale, Satywan Bahir "SOLAR POWER VEHICLE AUTOMATIC ACCIDENT INFORMATION USING IOT BASED ", IRJET Volume 7 ,Issue 6 , May 2020