

Uvc Sterilization and Assistive Bot for Palsy Using Iot

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ABSTRACT

The main objective of system is to sterilized the patient's surrounded area by using UV light In this study have adopted the physical disinfection technique by exploitation UVC light as agent. Our finding shows that a mobile robot is that the most efficient device to inactivate microorganisms, thus a robot with ultraviolet light lamp and controlled through IOT. Nowadays a major challenge is highly infectious microbial and viral diseases that cause huge risk like health related and also financially this system can overcome the problem. By use of UV light, generally UV has a strong capability of germicidal affect it provided by light in shortwave UVC. Not only this system disinfects the surrounding if patient needed water, tablets etc., it easily identified and bring to the patient. The robot can kill 99,999% microorganism and numerous through UVC lamps led. Additionally to this, the robot additionally contains a feature for drugs reminding for patients. A lot of individuals have to take certain medicines regularly. A number of diseases like diabetes, blood pressure, heart problem etc., are nowadays quite common very common patients need to take medicines without break to keep such shortwave UVC under control. Most of the folks don't seem to be punctual concerning taking medicines and sometimes forget one or the other dosage. In this system, a shortwave UVC is intended within which the user can feed the schedule of their medicines and additionally the system alerts by voice announcement if they miss taking a dosage.

Key words

UV Light; Mobile Robot ; UVC Lamps Led; Disinfects; Shortwave UVC; Health Issues; Sterilized The Patient Surrounded Area; Miss Taking A Dosage; Voice Announcement.

INTRODUCTION

Paralysis (also known as plegia) could be a loss of motor function in numerous muscles. Palsy are in the midst of a loss of feeling among the affected area.If there's sensory injury furthermore as motor. A study known as the paralysis Population Survey, that was started by the Christopher and Dana Reeve Foundation and conducted by the University of New Mexico's Center for Development and Disability; found that almost 1 in 50 Americans resides with some variety of palsy, regarding 6 million individuals. In

the US, roughly 1 in 50 individuals are diagnosed with some kind of permanent or transient palsy. Palsy amid involuntary tremors is typically known as "palsy".

It is a lot of possible because of a problem somewhere along the chain of nerve cells that runs from the body part to your brain and back again. These nerve cells deliver the signals for your muscles to move. Palsy could be a medical term which refers to numerous kinds of paralysis, typically amid weakness and the loss of feeling and uncontrolled body movements such as shaking. The word originates from the anglo-norman paralysis, parlesie et al., from the accusative sort of Latin paralysis, from Ancient. The word is longstanding within the West Germanic language, having appeared within the play Grim the collier of Croydon, reported to possess been written as early as 1599. a lot of trendy editions simply discuss with a person World Health Organization is paralyzed. Although the term has traditionally been related to paralysis typically is now almost always employed in connection to the word "cerebral" which means the brain". Tremor is an involuntary, rhythmic muscular contraction resulting in shaking movements in one or additional parts of the body. It is a common movement disorder that most often affects the hands but also can occur within the arms, head, vocal cords, torso, and legs.

Specific forms of palsy include:

- BELL'S PALSY - Partial facial paralysis
- BULBAR PALSY - Impairment of bone nerves
- CEREBRAL PALSY – A neural disorder caused by intracranial lesions
- CONJUGATE GAZE PALSY - A disorder affecting the flexibility to move the eyes
- ERB'S PALSY - Also referred to as brachial palsy, involving palsy of an arm
- SPINAL MUSCULAR ATROPHY It also referred to as wasting palsy
- PROGRESSIVE SUPRANUCLEAR PALSY - A degenerative disease
- SQUATTER'S PALSY - A typical name for bilateral personal nerve palsy that will be triggered by sustained squatting .
- THIRD NERVE PALSY - Involving cranial nerve III.

Diagnosis And Analysis

Diagnosing paralysis is commonly easy to do as a result of the most symptoms loss of muscle control in an exceedingly body area is obvious. A vital a part of the diagnosing is to determine the reason for the palsy. This could be comparatively straightforward if the palsy happens after a happening like a stroke or medulla spinalis injury.

- X-RAY
- CT SCAN
- MRI
- MYELOGRAPHY
- ELECTROMYOGRAPHY
- SPINAL faucet

Management And Treatment

Currently, there's no cure for palsy itself. In certain cases, some or all muscle control and feeling returns on its own or when treatment of the cause for the palsy.

- Physical therapy uses treatments like heat, massage, and exercise to stimulate nerves and muscles.
- Occupational therapy concentrates on ways in which to perform activities of daily living.
- Mobility aids embrace manual and electrical wheelchairs and scooters.
- Supportive devices embrace braces, canes, and walkers.
- Assistive technology like voice-activated computers, lighting systems, and telephones.

Outlook/Prognosis For Palsy Patients

The evolution of palsy depends on the cause, however in most cases the palsy cannot be fully reversed. Paralysis, particularly sudden palsy, results in several emotions. For this reason, depression is common in people with dysfunction help is obtainable to manage this powerful life transition. Folks with some forms of dysfunction, like palsy, hemiplegia, and palsy, can generally lead freelance and active lives with the assistance of quality aids and subsidiary and accommodative devices. Whereas people with palsy would really like long care and support from others, they will still live happy and fulfilling lives.

People with some kinds of paralysis, like monoplegia, hemiplegia, and paraplegia, will typically lead independent and active lives with the assistance of quality aids and supportive and adaptive devices. While folks with quadriplegia want lifelong care and support from others, they will still live happy and fulfilling lives.

LITERATURE REVIEW

A literature review functions as a tool to provide a background to the work by summarizing the previously published work. A detailed study on UV sterilization and assistive bot for paralyzed patients is discussed Based on the survey have developed a 'UVC STERILIZATION AND ASSISTIVE BOT FOR PALSY USING IOT'.

Chanprakon. P. et al., (2019) have designed An Ultra-violet sterilization robot for

disinfection. In this system Ultraviolet (UV) sterilization technology is used to aid in reduction of microorganisms that may remain on the surfaces after a standard cleaning to the minimum number. Our research team developed a UV robot for sterilization in an operating room or a patient room. This UV bot has three 19.3-watt of UV lamps mounted on top of the UV bot platform covering 360° direction. It is an embedded system based on a Raspberry Pi to aid in navigation to avoid obstacles. In addition, they tested the effectiveness of eliminating *Staphylococcus Aureus* bacteria sample plates located 35 cm away from our UV bot to be within 8 seconds after UV light exposure. [1]

Kwak. S. et al., (2013) have proposed Smart device interface for intelligent control of pipeline type UV Sterilizer. In this pipeline type UV sterilizer, UV lamps are located in the conduit. So it is hard to find out whether the lamp is working or not from the outside of sterilizer. Thus, it is necessary to install a control panel at outside to monitor and control of UV lamp and cleaning wiper. However, setting up the control panel is not only needed the installation cost but also needed another space. In this paper, proposed interface is using smart device to monitor and control of a pipeline type UV sterilizer. It is more convenient and economical than the existing control panel. And it is also extensible one to add more sensors and motion for cleaning UV lamp guard to keep sterilizing power. [2]

Khan. J. et al., (2019) have proposed an Assistive Exoskeleton for Paralyzed People. In this paper represents the design of an exoskeleton robotic technology to assist the paralyzed people to move on their own, by supporting them physically and move their leg independently like a human leg. These working prototypes have been designed of two features, one is support and the second one is motion with the help of Arduino based micro-controller support. In the supporting part the robot is to holding the whole physique of the paralyzed person and keeps the person stand with support. The motion part is taking decision whether to sit down, stand up and walk based on the manual switch that will give command to the microcontroller which assess the command, and move the exoskeleton based on it. This system is to develop with the intention to help the paralyzed people for helping them walk and remove them from the entitlement of disability. [3]

Yang. S. et al. (2003) have presented Area-covering operation of a cleaning robot in a

dynamic environment with unforeseen obstacles. In this paper, neural network approach to area-covering performance with avoidance of unpredicted obstacles is proposed for a cleaning robot in a dynamic environment. Area-covering operation is a special kind of path planning, which requires the robot path to cover the environments. Area covering is a crucial issue for cleaning robots and many other robotic applications. There are some lateral connections among neurons, thus the computational risks depend upon the neural network size. In this paper using an approach is compared to fuzzy logic based, rule based and re-planning based models. This proposed model is capable of planning more reasonable and limited area-covering with unpredicted obstacle avoidance. In the proposed model algorithm is computationally efficacious, and can also deals with changing environments. [4]

Cepolina. F and Muscolo. G (2014) has developed a Design of a robot for hygienization of walls in hospital environments. In this paper describes the techniques applied to the design of a climbing robot that has been realize and studied to solve the real time task of cleaning the wall surfaces of hospital environments. This system is able to spray different cleaning and disinfecting liquids for preventing infections. This robot is light and simple and it is thought to work with fast and coordinated cleaning system to all the room walls. It has been realized, and designed taking into account critical issues in geometric modelling and functional requirements involving multiple engineering disciplines which concur to optimize the robot characteristics while reducing the development time. [5]

Teng. T.W. et al. (2020) have proposed Vision Based Wall Following Framework: A Case Study with HSR Robot for Cleaning Application. They proposed framework uses Deep Learning (DL) framework to visually detect, classify, and segment the wall or floor surface and instructs the robot to wall follow to execute the cleaning task. Also, they compile the system architecture of Toyota Human Support Robot (HSR), which has been used in their testing platform. They evaluated the performance of these proposed framework on HSR robot under various defined scenarios. As experimental results indicate that the proposed framework could successfully systematize and segment the wall or an floor surface and also detect the unpredicted obstacle on wall or an floor with high detection accuracy and demonstrates a robust behaviour of wall - following. And they develop a new vision-based wall following framework that acts as an append for any automatic robotic platform to

perform wall - cleaning. [6]

Ramalingam. B. et al. (2020) have presented A Human Support Robot for the Cleaning and Maintenance of Door Handles Using a Deep-Learning Framework. In this paper plays a major role of mobile robots for cleaning and sanitation purposes is increasing worldwide. Disinfection and hygiene are two integral parts of any safe indoor environment, and these factors become more critical in COVID-19-like in pandemic situations. Door handles are highly sensitive contact points that are prone to be contamination. [7]

Okkesim. S and Manav. T (2015) has developed the Evaluation of hydrogen peroxide vaporizing technique for environmental disinfection. Hospital-acquired infections also known as nosocomial infections are health problem and their importance has increased swiftly in recent years. They continue to work on behalf of a safe and capable exploration of these system which are hydrogen peroxide-based that are affecting the broadband spread; even bacterial endospores and not carrying carcinogenic properties by contrast with alternative disinfectants. This paper is able to evaluate the success of hydrogen peroxide vaporization technique, which is intended NTD system to provide disinfection, on pseudomonas aeruginosa lethality and distribution force of the gas phase in 1:4 scale of actual size ICU miniature experimental setup. As a result of experiments demonstrated that hydrogen peroxide vaporization is effective only in visible areas, remains incapable to reach the closed areas such as the drawer or bottom of the things that are found in the surrounded area. [8]

Muthugala. M.A.V.J. et al. (2013) have developed Wall-Following Behaviour for a Disinfection Robot Using Type 1 and Type 2 Fuzzy Logic Systems. This paper contributes to the state-of-the-art by proposing a novel method of establishing the wall-following behaviour for a wall disinfection robot using fuzzy logic. A Type 1 Fuzzy Logic System (T1-FLS) and a Type 2 Fuzzy Logic System (IT2-FLS) are developed in this admiration. The wall-following behaviour of the two fuzzy systems was evaluated through simulations by considering heterogeneous wall arrangements. The simulation results validate the real-time applicability of the proposed Fuzzy Logic System for establishing the wall-following behaviour for a wall disinfection robot. [9]

Nwosu. A et al. (2019) have presented Robotic technology for palliative and supportive care: Strengths, weaknesses, opportunities and threats. Nowadays medical robots are

increasingly used for a variety of applications in healthcare. Robots have chiefly been accustomed support surgical procedures, and for a range of helpful uses in insanity and aged care. There has been limited debate about the potential opportunities and risks of robotics in other areas of palliative, supportive and end-of-life care. The the most objective of this method is to look at the doable future impact of medical AI on palliative, appurtenant care and end-of-life care. Specifically, they analysis the strengths, weaknesses, opportunities and threats (SWOT) of this technology. [10]

BLOCK DIAGRAM

The block diagram shown in figure 1 illustrates the proposed system. The Arduino is an Open-source electronic prototyping platform these system is sterilized the patient's surrounded area by using UV light. It can control by voice recognition and also through the mobile phone via IOT interface. And it allows to controlling electronic components for physical computing and exploring it with Internet of Things (IoT).

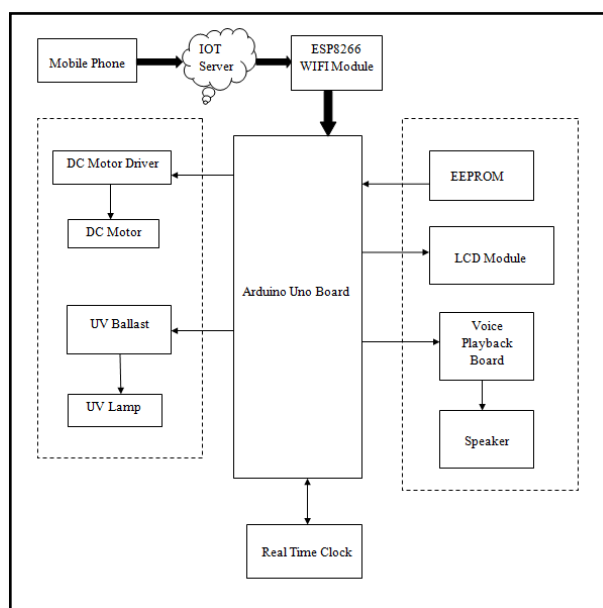


Figure 1. Block Diagram

Working Principle

The objective of this project is minimizing human association the maximum amount as much as and therefore automating the tasks like sterilization with the help of robots. During this case, the use of robots will reduce human exposure to pathogens that has become progressively necessary as epidemics escalate. The robot reminds the patient about

the pills that to be taken at a desired time, some elderly patients forget to take medicines at regular intervals, This problem of forgetting to take tablets at right time, taking wrong medicines and accidentally taking of expired medicine causes health issues of patient and this leads to suffer from unhealthy life. In this project is to develop an Arduino-Uno based Smart medicine reminder which uses Real time clock. The user can feed different number of entries like this. When there will be time for taking a dosage, the user will have to take prescribed medicine and press a button on the projecting device and confirming that the dosage has been taken. In case, the user does not take the dosage and forget to confirm on the projecting device, after 2 minutes of delay from the dosage timing, the system plays a voice message to the user reminding him of taking the medicine.

The user can feed variety of medicine such as tablet, capsule or Syrup, dosage as half, one or two capsule/tablet/spoon, After food or before food setting, doctor name as doc-A, doc-B, doc-C and so on and dosage timing as Morning, Afternoon and Night. The morning time is assumed to be 7 to 8 AM, Afternoon time is assumed to be 12 PM and Night time is assumed to be 8 to 9 PM.

The project is built on Arduino UNO and has an RTC interfaced to keep track of time without fail. The medicine data are saved in the internal EEPROM of the Arduino board. A four-switch keypad is provided to feed medicine information and an liquid crystal display is interfaced to the system for providing the user interface. The Arduino sketch manages to input and store medicine information, keep track of time using RTC, compares dosage time with real time and track confirmation of dosage taken.

METHODOLOGY

In this project, here arduino uno microcontroller board acts as central processing unit, the code written is embedded in the controller and runs in it, The Real Time Clock used here is DS1307, which gives the real time to the microcontroller, here SPI communication is used which has two pins namely SCK and SDA (Clock & Data). The controller gets the time and displays it in a LCD.

The display unit in this project is a LCD Module, which has the capacity to display 16 characters in 2 Rows, the communication between LCD and controller is 4 bit communication with two control signals Register Select (RS) and Enable(EN). This LCD is refreshed at regular intervals by the controller.

The WIFI Module used here is NodeMCU ESP8266, the module connects to a locally available WIFI hotspot, through the communication between a IOT server and the controller is done. The IOT server we used here is BLYNK APP, which runs in a ANDROID or IOS Phones. The data transmission between controller and WIFI module is Serial Communication, RX and TX pins are used for this purpose.

The UV led is driven through a MOSFET circuit, which is switched by the controller whenever the robot is used for sanitizing purpose, the user can control this from the IOT APP, likewise the robot is moved by dc motors operating at 12V dc, the driver used for

motor control is L293D, which is a H Bridge driver with which the motor direction can also be controlled.

A voice playback board ISD1760 plays the instructions recorded in it as a voice message to the user, such that one can listen to it and act accordingly. Here medicine time remainder voice is played. The voice to be played is controlled by the microcontroller, which checks the time and plays the particular voice on that time.

HARDWARE DESCRIPTION

Arduino UNO

Arduino software package (IDE) includes a serial monitor that permits easy textual information to be sent to and from the board. The RX and TX LEDs on the board when flash once information is being transmitted via the USB-to-serial chip and USB connection to the computer. It permits serial communication on any of the Uno's digital pins. Boards are loaded with program code via a serial connection to a different pc. Some serial Arduino boards contain A level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic level signals.

Keypad

The 4*4 matrix input device typically is employed as input in an exceedingly project. It is 16 keys. Connect power to rows, in order that they are High level. Then set all the rows Y1-Y4 as Low then find the status of the columns. Any column of Low indicates there's key pressing which the key is among the four keys of the column. If all columns are High, it suggests that no key is pressed down. Next, locate the key. Since the column within which the pressed key lies is identified, knowing the line would finalise the testing. Thus, set the rows as Low in turns till any is unveiled consequently – different rows can still be High.

EEPROM

It is an non-volatile storage could be a sort of EEPROM designed for high speed and high density, at the expense of enormous erase blocks and limited range of write cycles. it's a non-volatile memory with tiny erase blocks and a protracted time period. Genarally several microcontrollers include both: flash memory for the code, and additionally the tiny EEPROM for parameters and history.

Liquid Crystal display

It could be a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizer.

DC Motor

It is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. Let's begin by looking at an easy 2-pole DC motor.

H Bridge Motor Driver

It is an electronic circuit that allows a voltage to be applied across a load in either direction. These circuits are typically employed in artificial intelligence and different applications to permit DC motors to run forwards and backwards

UV Lamp Driver

It is an electronic ballast can convert power frequency to a really high frequency to initialize the gas discharge method in Fluorescent Lamps by controlling voltage across the lamp and current through the lamp. The ballast takes in electricity then regulates current to the bulbs.

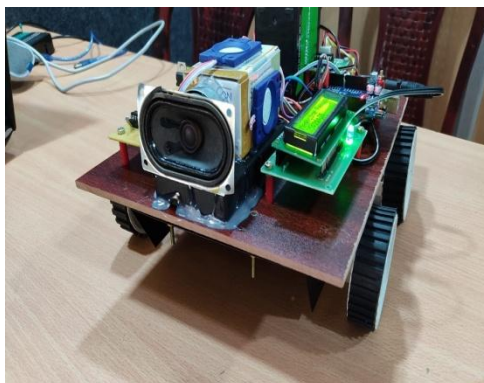
SOFTWARE DESCRIPTION

ARDUINO IDE

These tutorials are meant to be an entry to the Arduino basis. Beginners ought to get an interesting lead-in the globe of Arduino. Our tutorials are all supported practical tasks with theoretical introductions at the beginning. currently one when another the Arduino software package and the USB driver for the board have to be compelled to be installed. 2.2.1.1 Installation and set up of the Arduino software1. download the Arduino software package on www.arduino.cc and install it on the pc. afterward you open the software package file and begin 6 the program named arduino.exe. two set ups on the program are vital and should be considered. a) The board that you need to attach has to be selected on the arduino package. The “Funduino Uno” is here referred to as “Arduino / Genuino Uno”.

RESULTS

A UVC sterilization and assistive bot for palsy patients is designed in which the user can sterilized their surrounded area and also things with independently and also the user can feed their schedule of their medicines and the system alerts by voice announcement if they miss taking a dosage. This system is developed mainly for life independently without giving unnecessary disturbance and also does not feel discomfort for the caretaker of palsy patients. The figure 2 and 3 shows that the module of Front and Top view of UVC sterilization and assistive bot for palsy patients using Iot interface simultaneously.



.Figure 2. Module Of Front View Of UVC Sterilization And Assistive Bot For Palsy Patients Using IoT Interface



.Figure 3. Module Of Top View Of UVC Sterilization And Assistive Bot For Palsy Patients Using IoT Interface

CONCLUSION

In this system the functions and techniques were supported and also helpful for palsy patients and also for caretakers or caregivers for bedridden patients they also can live their life independently and also does not give any disturbance and burden for their family members .Then the system mainly for caretakers does not feel discomfort while treating the patients. In this study have adopted the physical disinfection technique by exploitation UVC light as agent. Additionally to this, the robot additionally contains a feature for drugs reminding for patients It is environmental friendly one to use and financially supported one. Nowadays a major challenge is highly infectious microbial and viral diseases that cause huge risk like health related and also financially this system can overcome the problem. It is accurate one for sterilization approach. The performance of the presented technique is estimated through ARDUINO IDE with Embedded C environment. From the analysis, it was evident that the developed system is better on comparing with the traditional

methodologies.

REFERENCES

- [1] P. Chanprakon, T. Sae-Oung, T. Treebupachatsakul, P. Hannanta-Anan and W. Piyawattanametha, "An Ultra-violet sterilization robot for disinfection", 5th International Conference on Engineering, Applied Sciences and Technology (ICEAST), Luang Prabang, Laos, pp. 1-4, 2019. doi: 10.1109/ICEAST.2019.8802528.
- [2] S. Kwak, J. Ryu, K. Chong and J. Park, "Smart device interface for intelligent control of pipeline type UV Sterilizer", IEEE RO-MAN, Gyeongju, pp. 352-353, 2013. doi: 10.1109/ROMAN.2013.6628492.
- [3] J. I. Khan, K. M. Moshir Rahman Songlap, A. M. Mizan, M. Farhan Sahar and S. Ahmed, "Assistive Exoskeleton for Paralyzed People", International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST), Dhaka, Bangladesh, pp. 474-479, 2019. doi: 10.1109/ICREST.2019.8644229.
- [4] S. X. Yang, C. Luo and Q. -. M. Meng, "Area-covering operation of a cleaning robot in a dynamic environment with unforeseen obstacles", IEEE International Symposium on Computational Intelligence in Robotics and Automation. Computational Intelligence in Robotics and Automation for the New Millennium (Cat. No.03EX694), Kobe, Japan, pp. 1034-1039 vol.2, 2003. doi: 10.1109/CIRA.2003.1222322.
- [5] F. E. Cepolina and G. G. Muscolo, "Design of a robot for hygienization of walls in hospital environments", ISR/Robotik 2014; 41st International Symposium on Robotics, Munich, Germany, pp. 1-7, 2014.
- [6] T. Teng, P. Veerajagadheswar, B. Ramalingam, J. Yin, R. Elara Mohan and B. Gómez, "Vision Based Wall Following Framework: A Case Study With HSR Robot for Cleaning Application", Sensors, vol. 20, no. 11, p. 3298, 2020. Available: 10.3390/s20113298.
- [7] B. Ramalingam et al., "A Human Support Robot for the Cleaning and Maintenance of Door Handles Using a Deep-Learning Framework", Sensors, vol. 20, no. 12, p. 3543, 2020. Available: 10.3390/s20123543.
- [8] S. Okkesim and T. . Manav, "Evaluation of hydrogen peroxide vaporizing technique for environmental disinfection", Medical Technologies National Conference (TIPTEKNO), Bodrum, pp. 1-4, 2015. doi: 10.1109/TIPTEKNO.2015.7374539.
- [9] M. Muthugala, S. Samarakoon, M. Mohan Rayguru, B. Ramalingam and M. Elara, "Wall-Following Behavior for a Disinfection Robot Using Type 1 and Type 2 Fuzzy Logic Systems", Sensors, vol. 20, no. 16, p. 4445, 2020. Available: 10.3390/s20164445.
- [10] A. Nwosu et al., "Robotic technology for palliative and supportive care: Strengths, weaknesses, opportunities and threats", Palliative Medicine, vol. 33, no. 8, pp. 1106-1113, 2019. Available: 10.1177/0269216319857628.