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Robot for the Treatment of Communicable Diseased Patients using AI & ML

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Abstract: *In recent years there has been significant research in the development of medical assistance autonomous robots these robots have the potential to revolutionize healthcare by improving efficiency reducing workload and improving patient outcomes one common theme in this research has been the desire for medical professionals to control their assistant robots remotely through the internet many advanced healthcare technologies have been developed such as smart healthcare systems digital thermometers non-contact infrared thermometers pulse oximeters heartbeat monitoring devices and iot devices for heart problem detection in addition temperature humidity measurement systems have been developed to monitor environmental conditions in healthcare facilities our work focuses on utilizing robotics to provide unique prescription medication care in the digital healthcare sector we have explored various methods of controlling these robots including pathfinding autonomous movement and obstacle avoidance additionally some research has focused on user end manual control through android apps however the development and implementation of medical assistant robots also raise important ethical legal and social implications patient privacy and data security must be protected and there must be regulations in place to ensure the safe and responsible use of these technologies.*

Keywords: Digital Thermometers, Data security, Iot Devices.

I. INTRODUCTION

According to the WHO member status report, there is a shortage of doctors, with less than one doctor per thousand people worldwide. This shortage is particularly noticeable during emergencies such as the current coronavirus pandemic. As a result, medical professionals such as doctors, nurses, and medical assistants are at increased risk of contracting the virus themselves and spreading it to their families. In addition, poverty is a significant issue in developing countries, where more people require medical attention and healthcare spending is high. A possible solution to these problems could be the use of robots to collect initial patient information such as body temperature, heart rate, oxygen saturation levels, and ECG readings, reducing the need for direct contact with medical staff. This could also help with tasks such as administering medication and conducting regular check-ups. As we sort out this research and summarize this, we have concluded that a complete solution can only be achieved by combining these three points. Those are: (i) Mobility- Movement and Transportation characteristic from one location to another; (ii) Physiological monitoring- to evaluate the physiological conditions of patients and monitor their health status remotely; (iii) Assistance with daily activities- help in carrying out activities related to self-care. One task that is crucial is ensuring that the elderly receive their medication on time. To help with this, an automatic medicine dispenser has been designed specifically for those who need to take medication without close supervision. This dispenser eliminates the possibility of administering the wrong medicine at the wrong time, thus reducing errors. The dispenser comprises various components, including a microcontroller, alphanumeric keypad, LED display, Motor Controller, Alarm system, multiple pill container, and dispenser.

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II. LITERATURE SURVEY

A literature survey on nurse robots reveals that there is significant research being conducted in this field. Nursing robots are designed to provide care and assistance to patients in a variety of healthcare settings. They are being developed to help alleviate the workload of healthcare professionals, improve patient outcomes, and reduce healthcare costs. Here are some of the key findings from the literature survey: Types of nurse robots: Nurse robots can be categorized into several types, including telepresence robots, social robots, and assistive robots. Telepresence robots are designed to provide remote care and enable healthcare professionals to interact with patients from a distance. Social robots are designed to interact with patients in a more natural and social way, using gestures, facial expressions, and speech. Assistive robots are designed to perform physical tasks, such as lifting and transferring patients.

Benefits of nurse robots: The literature suggests that nurse robots can provide several benefits to patients and healthcare professionals. They can improve patient outcomes by providing continuous monitoring and timely interventions. They can also reduce the workload of healthcare professionals, enabling them to focus on more complex tasks. Nursing robots can also help to reduce healthcare costs by reducing the need for human resources and improving efficiency.

Challenges of nurse robots: Despite the potential benefits, nurse robots also face several challenges. One of the main challenges is ensuring that they are safe and reliable, especially in critical care settings. There are also ethical considerations to be considered, such as privacy and confidentiality. Additionally, there is a need to ensure that nurse robots are user-friendly and acceptable to patients and healthcare professionals. Current state of research: The literature suggests that there is a significant amount of research being conducted in the field of nursing robots. There are several ongoing projects that are focused on developing nurse robots for various healthcare settings. These projects are exploring different types of nurse robots, as well as their potential benefits and challenges.

Future directions: The literature suggests that the development of nurse robots is likely to continue in the future, as healthcare systems seek to improve patient outcomes and reduce healthcare costs. Future research is likely to focus on developing more advanced nurse robots that are capable of performing a wider range of tasks, as well as improving their safety and reliability.

In conclusion, nurse robots are an area of significant research interest, with the potential to provide several benefits to patients and healthcare professionals. While there are several challenges to be addressed, the development of nurse robots is likely to continue in the future, with a focus on developing more advanced and user-friendly robots.

III. METHODOLOGY

Nursing robots are an emerging technology that aims to enhance the quality of care for patients and reduce the workload of healthcare professionals. These robots can perform a variety of tasks, such as monitoring vital signs, administering medication, and assisting with mobility. They can also provide emotional support and companionship to patients.

Animal Detection

One of the key features of nursing robots is their ability to interact with patients in a human-like manner. Some robots are equipped with artificial intelligence and natural language processing capabilities that enable them to understand and respond to verbal and nonverbal cues from patients. They can also use facial recognition technology to identify patients and personalize their interactions.

Objective.

The goal of this project is to design a robot that can perform various human tasks, including the important task of dispensing medication. This is especially important for elderly individuals who may need medication but do not have constant supervision from healthcare professionals.

To accomplish this task, we have designed an automatic medication dispenser that is user-friendly and reliable. The dispenser includes a microcontroller that is connected to an alphanumeric keypad, LED display, motor controller, alarm system, and multiple pill containers.

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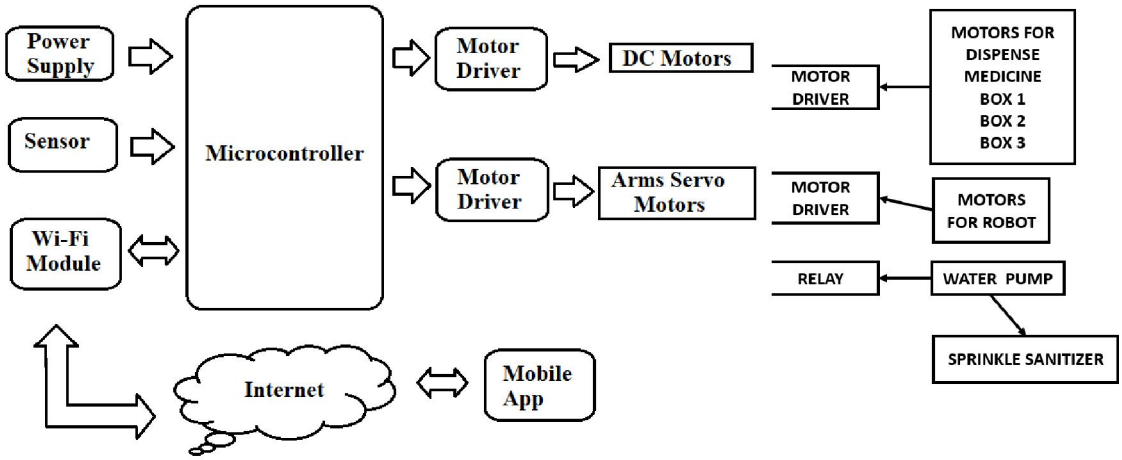
Methodology

Our methodology involves pairing high-tech advancements with an easy-to-use dispenser that can be loaded with the patient's medication. The dispenser will dispense each dose according to a preset schedule, with an audio reminder to notify the patient when it's time to take their pills. The system can accommodate up to three separate medication times each day, depending on the patient's needs.

By designing this robot with a medication dispenser, we aim to provide a reliable and efficient solution for patients who need to take medication regularly. We hope to make the process of taking medication less daunting and error-prone, ensuring that patients receive their medication on time and in the correct dosage.

IV. BLOCK DIAGRAM

4.1 Proposed Block Diagram for Virtual Doctor Robot



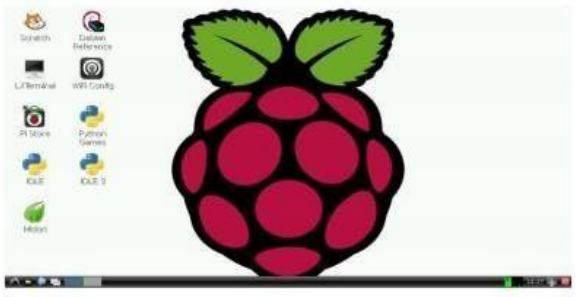
Our team has designed a virtual doctor robot with the aim of making healthcare more accessible and convenient for patients who may face difficulty in physically visiting their doctor's office.

To achieve this, we equipped the robot with a 4-wheel drive system to ensure easy navigation, as well as an arm for lifting a tray and a controller box for circuitry. We also added a mounting to hold a mobile phone or tablet, which patients can use to have live video calls with their doctor.

To control the robot, doctors can use an IoT-based panel to send commands online, which are then received by the robot controller over Wi-Fi internet. This allows for real-time movement commands to be executed by the robot's motors.

We wanted to ensure that the robot is always ready for use, so we added a battery status alert system. This reminds users to charge the battery on time, ensuring that the robot is always available to provide care.

Our aim was to create a virtual doctor robot that not only improves accessibility to healthcare but also enhances the overall patient experience. With its features, the robot can provide remote healthcare services to those in need, ultimately making healthcare more convenient, affordable, and accessible for everyone.



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Raspberian OS

When it comes to the Raspberry Pi's operating system, some people might find it like the Mac but with a desktop interface that's more reminiscent of Windows. While it may take a bit of getting used to, using Raspbian is pretty much like using Windows (except for Windows 8, which is a whole different story!). One thing that's great about Raspbian is that it has all the familiar features you'd expect from a desktop environment. There's a menu bar, web browser, file manager, and plenty of desktop shortcuts for the pre- installed applications. In fact, Raspbian is an unofficial port of Debian Wheezy arm, with compilation settings optimized to produce "hard float" code that runs smoothly on the Raspberry Pi. This means that applications that heavily rely on floating-point arithmetic operations will perform much faster, and all other applications will run more efficiently thanks to the advanced instructions of the ARMv6 CPU in the Raspberry Pi.

While Mike Thompson (MP Thompson) and Peter Green (plug wash) are primarily responsible for Rasp Bian's development, the Raspberry Pi community has played a huge role in its success as well. The community is always finding new ways to maximize the performance of their devices, and their passion and enthusiasm have greatly contributed to the continued development and improvement of Raspbian.

LCD MODULE

To connect the LCD module to the Arduino, we use a simple method that requires fewer connections and allows us to utilize almost the full potential of the LCD module. The RS pin of the LCD module is connected to digital pin 12 of the Arduino, while the R/W pin of the LCD is grounded. The Enable pin of the LCD module is connected to digital pin 11 of the Arduino.

To interface the digital lines DB4, DB5, DB6, and DB7 with the Arduino, we connect them to digital pins 5, 4, 3, and 2 respectively. Additionally, we use a 10K potentiometer to adjust the contrast of the display.

To power the Arduino, we can use the external power jack provided on the board. Alternatively, we can tap into the 5V source on the Arduino board to power any other parts of the circuit that require +5V. The Arduino can also be powered via the USB port on a PC. Overall, this method is quite simple and allows for easy connectivity between the LCD module and the Arduino, making it a great option for various projects.

V. CONCLUSION

In this project, mainly focused on designing and developing of medical assistant robot "Virtual doctor robot" as primary patient monitoring and patient caring assistance with daily activities. For user friendly the robot is designed with the manual and autonomous control system. Doctors from anywhere in the world will be able to show the all patient data without touching the patient through the IoT system and make communicate video calls with the patient. This type of robots will go a long way in alleviating the lack of adequate doctors in medical services around the world. Anyone who

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knows primary operating can also use virtual doctor robot as a medical assistant in his family. Machine learning and AI system will be carried through in the future

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