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IOT BASED VIRTUAL DOCTOR ROBOT

Senthil Kumar K[1], Kaushik T[2] , Mohamed Aashiq S[3] and Pavithran P[4]

[1]Professor, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu, India

[2] Student, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu ,India

[3] Student, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu ,India

[4] Student, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu, India

Abstract:

This paper presents an IoT-based virtual doctor robot that utilizes Arduino Uno, Node MCU, a mobile phone camera, a motor driver, four motors, a temperature sensor, a pulse sensor. The proposed system aims to provide patients with a personalized and responsive healthcare service that can improve their health outcomes. The system's hardware components, including the motor driver and four motors, enable the robot to move around and interact with patients. The mobile phone camera provides real-time video conferencing capabilities, allowing remote access to medical professionals. The temperature and pulse sensors collect real-time health information, send to Webpage. And the RFID reader allows for secure patient identification and login.

Keywords: doctor robot, video conferencing, pulse sensors.

1. INTRODUCTION

The development of Internet of Things (IoT) technology has paved the way for numerous innovations in the healthcare industry. One such innovation is the IoT-based virtual doctor robot, which is a cutting-edge device that leverages the power of IoT to provide remote medical consultations and services. An IoT-based virtual doctor robot is essentially a robot that is equipped with various sensors and connected to the internet. The robot is designed to interact with patients and healthcare providers through Live virtual calling system. It can be programmed to perform a wide range of tasks, including taking patient histories, conducting physical examinations, and providing diagnoses and treatment recommendations. The primary benefit of an IoT-based virtual doctor robot is its ability to provide medical services remotely. This is particularly useful in situations where patients are unable to physically visit a doctor due to distance, mobility issues, or other constraints. The robot can be accessed from anywhere with an internet connection, making it an ideal solution for people in rural areas or those who live far away from medical facilities.

In addition to remote consultations, an IoT-based virtual doctor robot can also assist healthcare providers with in-person visits. For example, the robot can be programmed to conduct basic physical exams, such as taking a patient's temperature, blood pressure, and heart rate. It can also be used to collect medical data, such as lab test results and imaging scans, and share that information with healthcare providers in real-time. Another advantage of an IoT-based virtual doctor robot is its ability to provide personalized healthcare services. The robot can be programmed to collect data on a patient's health and lifestyle, such as their exercise habits, diet, and sleep patterns. This information can be used to create a personalized healthcare plan that takes into account the patient's unique needs and goals. An IoT-based virtual doctor robot can also improve the efficiency of healthcare services by reducing wait times and improving patient flow. The robot can be programmed to triage patients, prioritizing those with urgent medical needs and directing others to appropriate resources. It can also provide patients with educational materials and resources, reducing the need for additional consultations and follow-up visits.

Finally, an IoT-based virtual doctor robot can enhance the safety and security of healthcare services. The robot can be equipped with advanced security features, such as biometric authentication and encryption, to protect patient data and ensure compliance with privacy regulations. It can also be programmed to monitor patient vitals and alert healthcare providers if there are any concerns or emergencies.

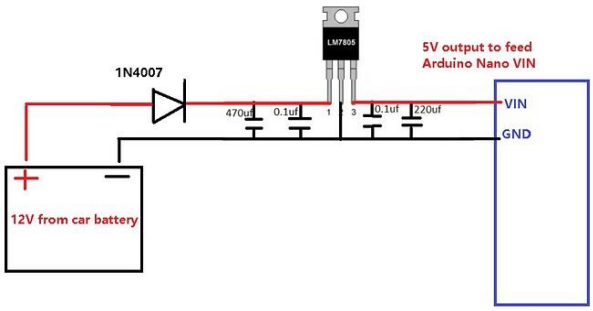

Fig.1. HARDWARE COMPONENT.

2. LITERATURE SURVEY

[1] IoT-based healthcare monitoring systems have gained immense popularity due to their ability to provide continuous and real-time monitoring of patients' vital signs. The system can be implemented using Node MCU, heartbeat sensor, and temperature sensor. The Node MCU is used for data communication and processing, while the heartbeat sensor and temperature sensor are used to collect data on the patient's heart rate and body temperature. The collected data is then transmitted to the cloud for storage and analysis. This system has the potential to revolutionize healthcare by enabling remote monitoring of patients and reducing hospital visits.

[2] A healthcare monitoring and alert system can be designed using Bluetooth communication, Buzzer, Arduino Uno, and a blood pressure sensor. The system allows continuous monitoring of a patient's blood pressure, and if any critical values are detected, it alerts the medical staff using the buzzer. The Arduino Uno is used for data processing, and Bluetooth communication is used for wireless data transmission to a mobile application. This system has the potential to improve patient outcomes and reduce hospitalizations by enabling early detection and timely intervention in cases of hypertension.

[3] A patient attendance and tracking system can be developed using RFID and IoT technologies, along with the Arduino Nano microcontroller. RFID tags are placed on the patient's wristbands, and the system uses RFID readers to track their movement throughout the hospital. The Arduino Nano processes the data and sends it to the cloud for storage and analysis. The system enables medical staff to monitor patient attendance and movement, improving patient safety and reducing the risk of errors. It can also help optimize resource utilization and improve operational efficiency.

[4] The Movable robot for medicine delivery can be developed using RF control, GPS, and the Arduino Uno microcontroller. The robot can be remotely controlled using RF signals, and GPS is used for real-time location tracking. The Arduino Uno is used for data processing and to control the robot's movements. The system can deliver medication and other supplies to patients, reducing the workload on hospital staff and improving patient outcomes. This system has the potential to revolutionize healthcare delivery by enabling remote and automated medication delivery.

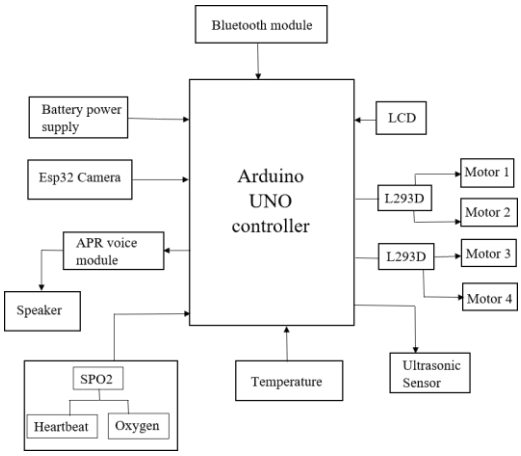

Fig.2. Virtual Doctor Modelling

3. Existing System

The robot controlled via RF for medicine delivery and patient health monitoring is a device that uses radio frequency technology to remotely control and monitor the delivery of medicine and the health conditions of patients. Equipped with sensors and connected to the internet, the robot can be programmed to deliver medicine and monitor vital signs. This technology enables the robot to operate autonomously and provides healthcare providers with real-time patient data, potentially improving healthcare outcomes. Our Proposed system Developed fully overcomes for this project.

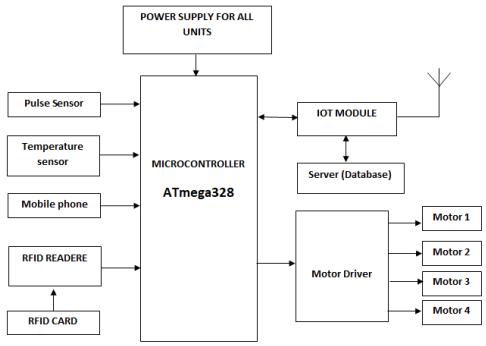

Fig.3. Block diagram of existing system

4. PROPOSED SYSTEM

The energy meter will track the user's energy use and relay that information to the controller. The controller will continuously track energy use and update the IOT with the measured use value. The utilisation in a certain IOT website might be seen by the user or the official. Via IOT [11], this system will notify the user of the payment. The system will automatically trip if the user doesn't pay the bill. This system has a power theft detecting feature. This system is able to measure both the power transmitted over the load and the power used by the load over time. This power theft is discovered as a result. The IOT is updated together with the LCD display of the monitored parameters.

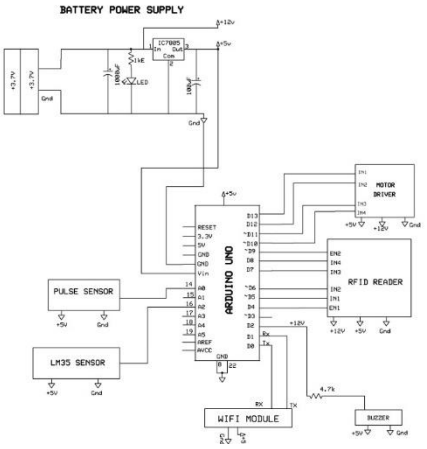

Fig.4(a).Circuit diagram of simulation

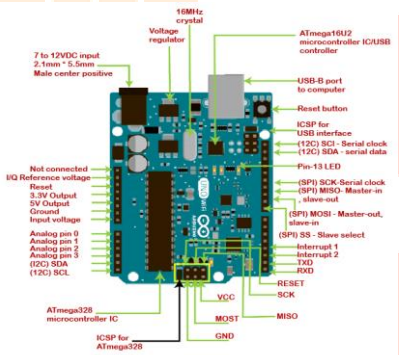

Fig.4 (b). Proteus Simulation

4.1 Software and hardware Requirements:

The programming language used is embedded C.

4.2 Arduino IDE

The compiler is Arduino Ide 1.8.3 is shown in Fig 5.

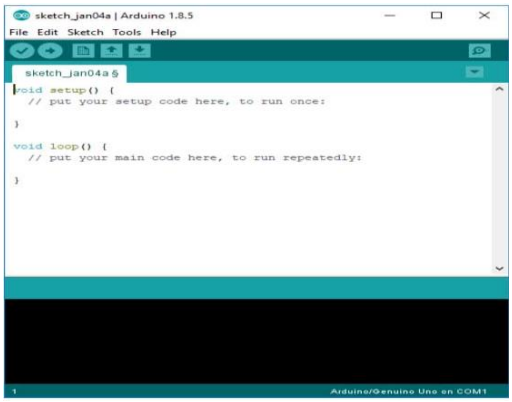

Fig.5. IDLE of Arduino

The cross-platform Arduino integrated development environment (IDE), which is accessible on Windows, macOS, and Linux, was developed using Java. It is used to write and upload programs to an Arduino board. Arduino is an open-source electronics platform with straightforward hardware and software.

An Arduino board may be used to take inputs like light on a sensor, a finger on a button, or a tweet, and then be used to start a motor, switch on an LED, or post anything online. You can control your board's operations by giving its microcontroller a set of instructions.

4.3EXPRESS PCB:

Express PCB is a free-to-use software program for designing printed circuit boards (PCBs). It is a simple and user-friendly tool that is ideal for beginners and hobbyists who want to design and create their own PCBs.

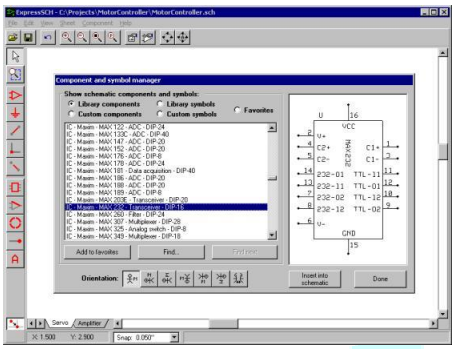

Fig.6. Express PCB

Some of the key features of Express PCB include:

- **Schematic Capture:** Express PCB allows users to create schematic diagrams of their circuits using a library of pre-built symbols. The software also provides a range of editing tools to help users create and modify their schematic diagrams.

Board Layout: Express PCB includes a powerful board layout editor that allows users to place components on the board, route traces between components, and add text and graphics. The software also includes a range of design rules to ensure that the PCB meets the required specifications.

- **Gerber Export:** Once the board design is complete, Express PCB allows users to export the design as Gerber files, which can be used to manufacture the PCB.
- **Parts Library:** Express PCB comes with a large library of pre-built parts and components that users can use to create their designs. Users can also create their own custom parts library.

5. RESULTS

The results of simulation in a proteus application is given figure 7(a) and figure 7(b).

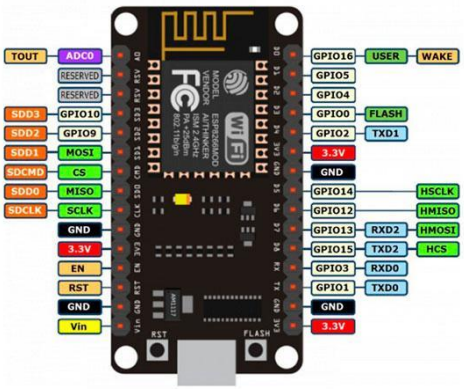

Fig.7 (a). NodeMCU

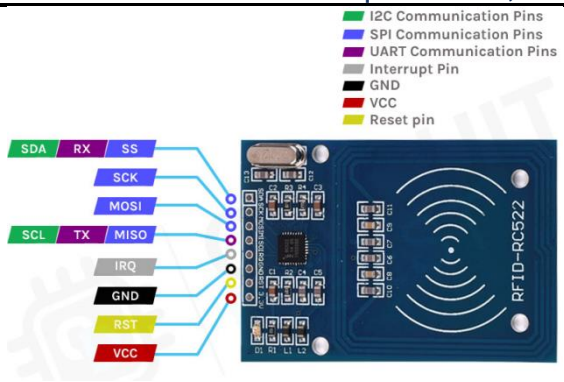

Fig.7 (b). RFID READER

5.1 Advantages and Application

- **Increased accessibility:** The IoT-based virtual doctor robot will increase accessibility to medical services for patients in remote or underserved areas **Remote patient monitoring:** The system's pulse and temperature sensors will enable healthcare providers to monitor patients' vital signs in real-time, providing early detection of health problems.

6 . CONCLUSION

In conclusion, the proposed system for an IoT-based virtual doctor robot has the potential to transform healthcare delivery by providing remote medical services, reducing the need for physical visits, and increasing access to healthcare services for people in remote or underserved areas. The system's hardware components, such as the pulse and temperature sensors, RFID reader, and motor driver, will enable it to monitor patients' vital signs, track attendance, and move around to provide medical services. By incorporating IoT technology and protocols such as MQTT, Wi-Fi, and Bluetooth, the proposed system will ensure seamless connectivity between the robot and other devices, making it easier for healthcare providers to provide remote medical services.

References

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[2] On 2nd June 2021, Sergio D. Sierra Marín, Patricio Barria, Subramanian Ramamoorthy, and Marcelo Becker published an article titled "Expectations and Perceptions of Healthcare Professionals for Robot Deployment in Hospital Environments During the COVID-19 Pandemic," which explores the views of healthcare professionals on the use of robots in hospital settings during the pandemic.

[3] At the 13th International Conference on Communication System and Networks in2021, Divya Ganesh, Gayathri Seshadri, and Sumathi Sokkanarayanan presented a paper titled "Automatic Health Machine for COVID-19 and Other Emergencies..

[4] In 2021, Divya Ganesh and Gayathri Seshadri authored a paper titled "AutoImpilo: Smart Automated Health Machine using IoT to Improve Telemedicine and Telehealth" which was published by IEEE, describing the development of an automated health machine that uses the Internet of Things (IoT) to enhance telemedicine and telehealth services.

[5] At the 2016 International Conference on Computing Technologies and Intelligent Data Engineering (ICCTIDE'16), R. Kumar and M. Pallikonda Rajasekaran presented a paper on "An IoT patient-based monitoring system using Raspberry Pi," which describes a system that uses Raspberry Pi and IoT to monitor the health of patients.

[6] In the International Journal of Computer Technology and Applications (IJCTA) in 2016, S. Siva, P. Suresh, S. Seeba Merlin, and R. Punidha published a paper titled "A Smart heart rate sensing system in IoT," which discusses the development of a system that uses IoT to monitor heart rate.

[7] In 2005, G. Y. Jeong, K. H. Yu, and Kim.N. G. presented a paper titled "Continuous blood pressure monitoring using pulse wave transit time" at the International Conference on Control, Automation and Systems (ICCAS), which describes a method for continuously monitoring blood pressure using pulse wave transit time.

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[9] In 2012, Fang, Xiang, and their colleagues published a paper titled "An extensible embedded terminal platform for wireless telemonitoring" at the International Conference on Information and Automation (ICIA), The paper was assigned the digital object identifier (DOI) 10.1109/ICInfA.2012.6246761 and was published on pages 668-673.

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