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IOT Based Virtual Doctor Robot

Bhoomika D[1], Bhoomika M[2], Deepa Patil[3], Jatashree Sheelvant[4], Prof. Jyoti Patil[5]
[1, 2, 3, 4]*Student,* [5]*Assistant Prof., Department of Electronics and Communication Engineering, PDA Engineering College, Kalaburagi, Karnataka, India*

Abstract: ***The rapid growth of Internet of Things (IoT) technology has enabled innovative solutions in the healthcare domain, especially in remote diagnosis and patient monitoring. This paper presents the design and concept of an IoT-based Virtual Doctor Robot that assists in basic health assessment and remote medical interaction. The proposed system integrates multiple biomedical sensors, a robotic platform, and cloud connectivity to collect real-time patient health parameters such as body temperature, heart rate, and oxygen saturation. These parameters are transmitted securely to a cloud server, allowing doctors to monitor patients remotely through a web or mobile interface. The robot also enables audio-visual communication, providing an interactive consultation experience. This system aims to reduce the burden on healthcare professionals, improve accessibility in rural and underserved areas, and minimize physical contact during infectious disease outbreaks. The proposed model demonstrates how IoT and robotics can collaboratively enhance healthcare delivery through automation, remote monitoring, and intelligent assistance.***

I. INTRODUCTION

Healthcare systems worldwide face challenges such as limited medical staff, increasing patient populations, and unequal access to medical facilities, particularly in remote and rural regions. Traditional healthcare models often require physical presence, which may not be feasible during emergencies, pandemics, or in geographically isolated areas. Recent advancements in IoT, robotics, and wireless communication have opened new possibilities for remote healthcare solutions.

An IoT-based Virtual Doctor Robot is designed to act as an intelligent medical assistant capable of interacting with patients and collecting vital health data in real time. By integrating biomedical sensors, microcontrollers, and cloud platforms, the system enables continuous monitoring and remote diagnosis without the need for direct human intervention. The robot can move within healthcare environments, communicate with patients through voice and video modules, and transmit collected data to medical professionals for analysis. This approach not only improves efficiency but also enhances patient safety by reducing unnecessary physical contact. The Virtual Doctor Robot serves as a supportive tool for doctors, not a replacement, assisting them in decision-making and patient monitoring. The proposed system represents a step toward smart healthcare infrastructure, where automation and connectivity play a vital role in delivering timely and reliable medical services.

II. LITERATURE REVIEW

1) IoT Based Real-Time Virtual Doctor Model For Human Health Monitoring

This paper highlights the design and implementation of an IoT-based V-Doctor module for real-time health monitoring. The proposed system uses Arduino and sensors to continuously measure body temperature and pulse rate, enabling early identification of possible human health disorders through an IoT platform.

2) IOT Virtual Doctor Robot for Online Doctor Consultation of Patient Healthcare & Telemedicine International Research Journal of Engineering and Technology (IRJET)

.This paper throws light on the development of an IoT-based virtual doctor robot that enables doctor to remotely move, observe and interact within hospitals and emergency centers.The proposed system allows real-time navigation, video communication and remote monitoring using a Wi-Fi controlled robotic platform, thereby overcoming the limitations of conventional video calling systems.

3) IOT based virtual Doctor and Human care Robot

This paper throws light on the design of an IoT-based virtual doctor and smart health monitoring robot that enables doctors to remotely interact, navigate, and monitor patients in real time. The proposed system provides continuous health monitoring, emergency alert generation, and secure video communication, making it especially useful for elderly people living alone and for emergency healthcare situations.

4) IOT Based Virtual Doctor Robot

This paper throws light on the design of an IoT-based virtual doctor and smart health monitoring robot that enables doctors to remotely interact, navigate, and monitor patients in real time. The proposed system provides continuous health monitoring, emergency alert generation, and secure video communication, making it especially useful for elderly people living alone and for emergency healthcare situations.

III. SYSTEMARCHITECTURE

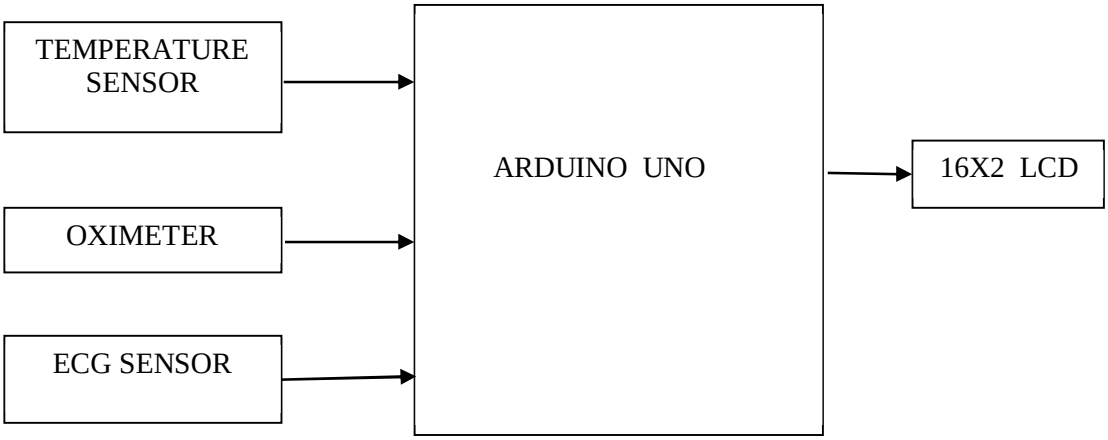

Fig.1.Detailed Block diagram of IOT Based Virtual Doctor Robot

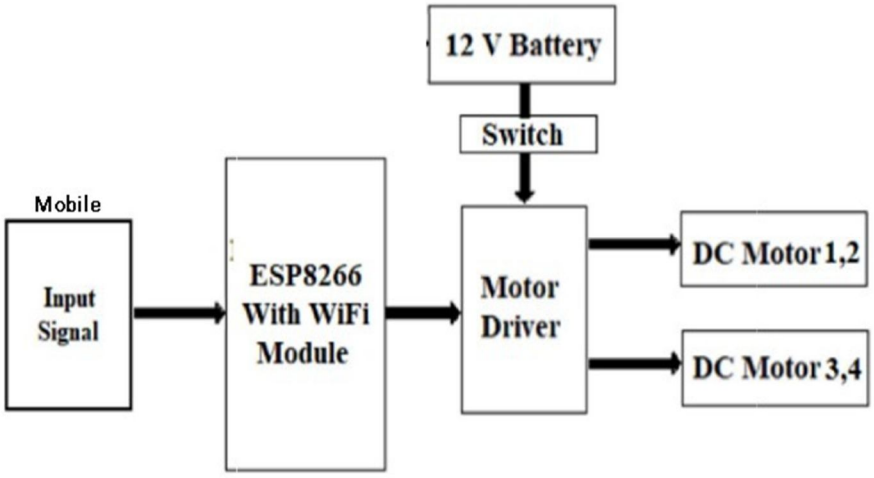

Fig.2. Wi-Fi Control Block diagram

1) The hardware used for this project includes: Arduino UNO(Atmega328P),Temperature sensor(LM35), Oximeter (MAX30100), ECG Sensor (AD8232), Bluetooth (HC05) 16x2 LCD

2) The software used for this project includes: For the software implementation, Visual Studio Code (VS Code) was used to develop and execute the program. The system receives sensor data from the Arduino via Bluetooth, enabling wireless transfer of readings to the computer for further processing and monitoring.Once collected, the data is uploaded and saved in Dropbox, allowing it to be stored securely in the cloud. This setup enables doctors to access patient readings from anywhere at any time, supporting efficient remote observation and timely medical decisions.

IV. METHODOLOGY

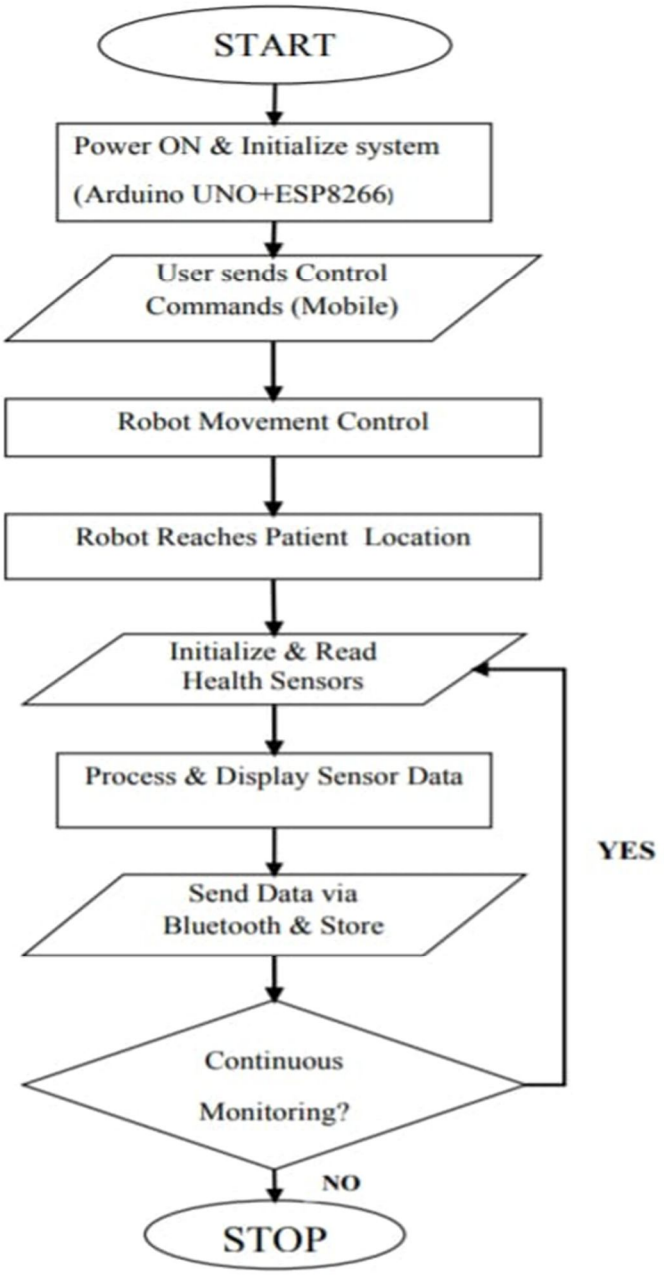

Fig 3. Flowchart of IOT based Virtual Doctor Robot

The flowchart explains the overall operation of the IoT-based virtual doctor robot. Once the system is switched on, the Arduino UNO and ESP8266 modules are initialized to set up communication and control. The user sends movement commands through a mobile device, allowing the robot to move and reach the patient's location. After reaching the patient, the health sensors are activated to measure vital parameters. The sensed data is then processed and displayed, after which it is transmitted via Bluetooth and stored for future reference. If continuous monitoring is required, the system repeats the data collection process; otherwise, the operation ends and the system stops.

V. RESULT

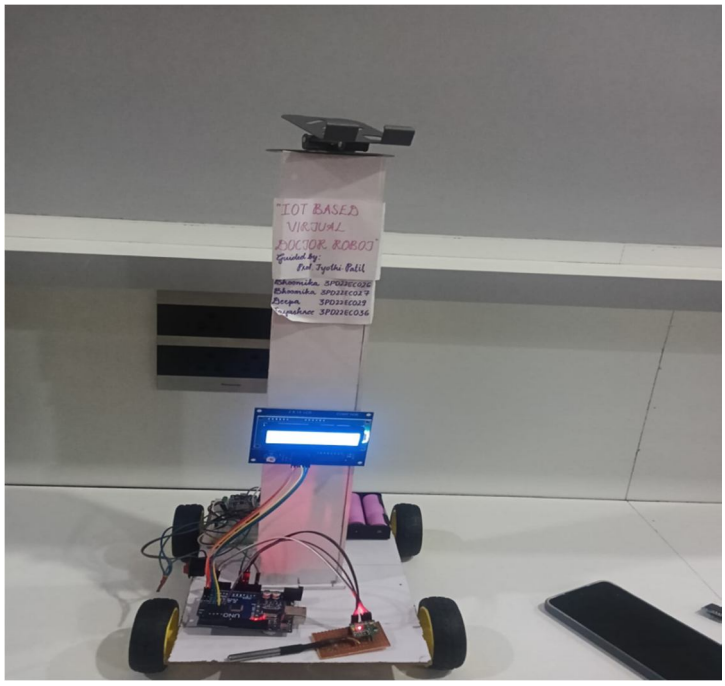

Fig.4.Hardware implementation of IOT Based Virtual Doctor Robot

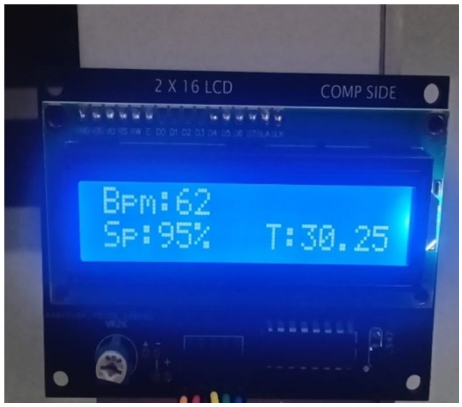

Fig.5. Displays showing Output of Bpm(Beats Per Minute),SpO_2(Oxygen Saturation)and Temperature

Fig.6. ECG Sensor Output

The experimental results demonstrate the effective functioning of the proposed IoT-based virtual doctor system in real-time health monitoring. As shown in the output display, the system successfully measures and displays key physiological parameters, including heart rate (BPM), oxygen saturation level (SpO_2), and body temperature. In the observed result, the heart rate is recorded as 62 BPM, the oxygen saturation level as 95%, and the body temperature as 30.25°C. These values are clearly visualized on the 16×2 LCD, confirming accurate sensor integration and real-time data processing by the microcontroller. The stable and continuous display of readings indicates reliable sensor performance and proper data acquisition. This result validates that the proposed system can effectively monitor vital health parameters and provide immediate feedback, making it suitable for remote health assessment and preliminary medical observation in virtual healthcare applications.

The ECG sensor detects the electrical activity of the human heart using body-mounted electrodes. The obtained signal is amplified and displayed as a waveform on the monitoring system. Each sharp peak in the waveform represents a heartbeat caused by ventricular contraction. The time gap between consecutive peaks is used to calculate the heart rate. Smaller variations in the signal indicate different phases of the cardiac cycle. Minor noise may appear due to body movement or external interference. The processed ECG data can be stored and shared with doctors for remote health monitoring.

VI. CONCLUSION

The IoT-based Virtual Doctor Robot presents an effective and scalable solution for modern healthcare challenges by combining robotics, sensor technology, and cloud computing. The system enables real-time monitoring of vital health parameters and facilitates remote interaction between patients and doctors, thereby improving accessibility and response time. This technology is particularly beneficial for rural healthcare, emergency situations, and infectious disease management where direct contact may be limited or risky. The proposed model demonstrates the potential of IoT-enabled robotic systems to support healthcare professionals, reduce workload, and enhance patient care quality. Future improvements may include the integration of artificial intelligence for predictive diagnosis, advanced data analytics, and enhanced security mechanisms. Overall, the Virtual Doctor Robot contributes to the evolution of smart healthcare systems and highlights the transformative role of IoT in medical applications.

VII. AKNOWLEDGEMENT

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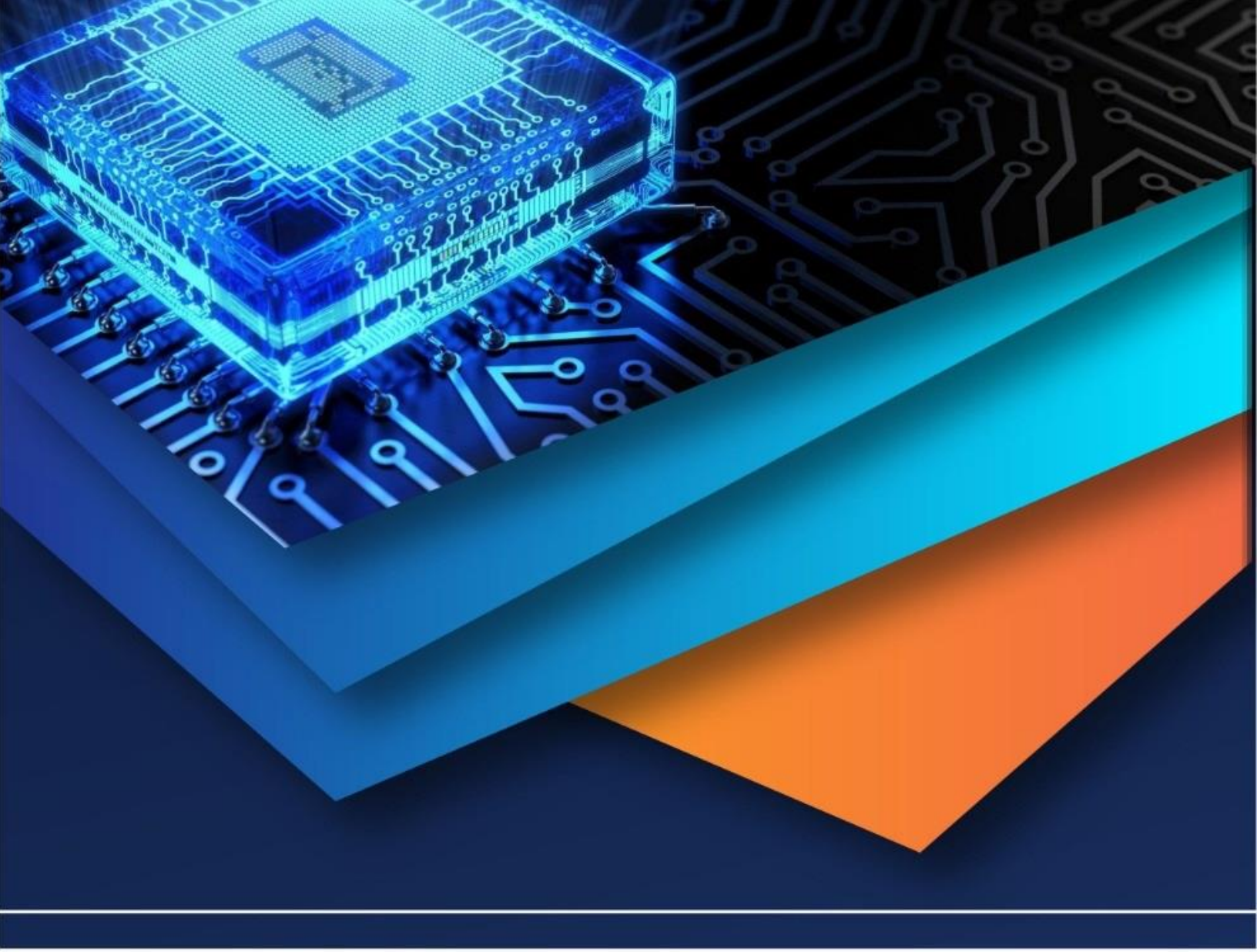

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