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Virtual Doctor Robot using IoT

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Abstract: The IoT-powered Virtual Doctor Robot helps doctors explore hospitals and communicate with patients in real time for distant healthcare. The three-wheel drive system of this new robotic device allows doctors to roam freely between places. The robot's smartphone or tablet for live video communication allows fast consultations and medical report access from anywhere in the hospital. Doctors can remotely control the robot using an IoT-based control panel to monitor battery status and ensure continued functioning. This technology combines telemedicine with modern robotics to promote patient involvement and accessibility in varied medical settings and enable healthcare workers to provide efficient care..

Keywords: Industries, Hospitals, Service robots,Robot vision systems, Medical services,Batteries

I. INTRODUCTION

In the rapidly evolving field of healthcare, the integration of Internet of Things (IoT) and robotics has opened new possibilities for remote patient monitoring and virtual consultations. Traditional hospital visits often pose challenges for both doctors and patients, especially in cases of emergency, infectious diseases, or when specialized healthcare professionals are not physically available. To address these challenges, the IoT-powered Virtual Doctor Robot provides an advanced solution that enhances telemedicine, enabling doctors to interact with patients and navigate hospital environments remotely.

This robotic system is designed with a three-wheel drive mechanism, allowing smooth mobility across hospital premises. It is equipped with a smartphone or tablet for live video communication, ensuring real-time doctor-patient interaction and remote medical assessments. The IoT-based control panel allows doctors to operate the robot efficiently, monitor its battery status, and maintain continuous operation. Additionally, the system enables remote access to patient medical records, facilitating quick decision-making and timely medical interventions.

By combining telemedicine with IoT and robotics, this technology aims to improve healthcare accessibility, enhance patient engagement, and optimize hospital workflows. It is particularly beneficial in scenarios where doctors need to provide

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remote assistance, such as in rural healthcare centers, emergency wards, or during disease outbreaks. The Virtual Doctor Robot represents a step forward in the digital transformation of healthcare, promoting efficiency, convenience, and innovation in medical services..

II. EXISTING SYSTEM

The current healthcare system focusses on in-person consultations in hospitals or clinics to diagnose and treat patients. Telemedicine services provide video conversations for distant consultations, however they are usually limited to PCs or laptops. This static technique limits doctors' capacity to interact in dynamic situations like operating rooms and patient wards, limiting remote treatment quality. Traditional systems also use basic telehealth techniques to monitor patients remotely, restricting complete health assessments...

III. PROPOSED SYSTEM

The suggested Virtual Doctor Robot uses IoT technologies to revolutionise remote healthcare delivery to address these issues. This unique solution lets doctors remotely operate a mobile robot to explore hospitals and interact with patients and staff. Doctors may conduct virtual rounds, evaluate patients, and see medical reports from anywhere in the hospital using the robot's mobile device for real-time video communication. Doctors can control the robot over WiFi using an IoT-based control panel and interact with patients remotely. The robot is always ready to use thanks to power management capabilities that indicate for low battery condition. The Virtual Doctor Robot improves healthcare delivery, lowers costs, and expands access to medical care by increasing patient interaction and personalising consultations..

SOLUTION

We propose a Virtual Doctor Robot that uses IoT to deliver remote healthcare to address these issues. This robot lets doctors virtually navigate hospitals, interact with patients, and consult remotely. Features of the suggested solution include
The robot's three-wheel drive lets it navigate hospital corridors and operating rooms, allowing doctors to do virtual rounds.
With a mobile device for live video streaming, the robot lets doctors observe and interact with patients, examine medical records, and offer rapid advice.

An IoT-based panel lets doctors submit real-time movement commands to the robot over Wi-Fi.
Patients can get a more personalised consultation with the robot, enhancing satisfaction and care.
Battery status signals keep the robot running and prevent downtime.

Fig.1. Architecture

IV. COMPONENTS USED AND DESCRIPTION

1. Arduino UNO

The ESP-12E module, which houses the ESP8266 chip with Tensilica Xtensa 32-bit LX106 RISC CPU, is included with the

NodeMCU ESP8266 development board. This microprocessor runs at a configurable clock frequency of 80MHz to 160MHz and supports RTOS. To store information and applications, the NodeMCU features 4MB of Flash memory and 128 KB of RAM. It is perfect for Internet of Things applications because of its powerful processing capacity, built-in Wi-Fi and Bluetooth, and Deep Sleep Operating capabilities.

Fig.2. Arduino UNO

2. Power Supply

Either an external power source or a USB cable can be used to power the Arduino Uno. An AC to DC converter is the most common external power source; batteries are sometimes used. The adapter can be connected to the Arduino Uno by plugging into the power jack of the Arduino board. The Vin and GND pins of the POWER connector can also be used to connect the battery leads. Seven to twelve volts is the recommended voltage range.

3. Ultrasonic Sensor

An apparatus that uses sound waves to determine an object's distance is called an ultrasonic sensor. By emitting a sound wave at a certain frequency and watching for its return, it calculates distance. It is feasible to determine the distance between the sonar sensor and the item by timing the interval between the sound wave's generation and returning.

Fig.3. Ultrasonic Senso

The **IoT-powered Virtual Doctor Robot** operates using an **Arduino Uno microcontroller**, an **ultrasonic sensor**, a **NodeMCU Wi-Fi module**, and a **motorized movement system**. The system enables doctors to **remotely navigate the robot and interact with patients** via a video communication setup. The key components and their functions are as follows:

1. Power Supply & Control System

- The robot is powered by **rechargeable batteries**, supplying energy to the **Arduino Uno board**, motor drivers, and other components.
- The **Arduino Uno board** acts as the central controller, processing input from various sensors and handling motor movements.

2. Remote Control via IoT

- The **NodeMCU Wi-Fi module** connects the robot to the internet, allowing **remote control via an Android application**.
- The **Android app** enables doctors to send movement commands

(forward, backward, left, right) to the robot.
- The **app also supports real-time voice communication**, allowing doctors to interact with patients.

3. Obstacle Detection & Navigation

- An **ultrasonic sensor** detects obstacles in the robot's path.
- If an obstacle is detected, the sensor sends data to the **Arduino Uno**, which stops or reroutes the robot accordingly.

4. Motorized Movement

- The **motor driver** controls the **motors**, based on instructions received from the Arduino Uno.
- The **three-wheel drive system** allows smooth and precise navigation across hospital floors.

5. Video Communication for Virtual Consultations

- A **tripod-mounted smartphone or tablet** provides **live video streaming** for remote interaction.
- The doctor can **observe patients, communicate with them, and access medical records** from a remote location.

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V. RESULTS

Fig 4:working

Fig 5:working

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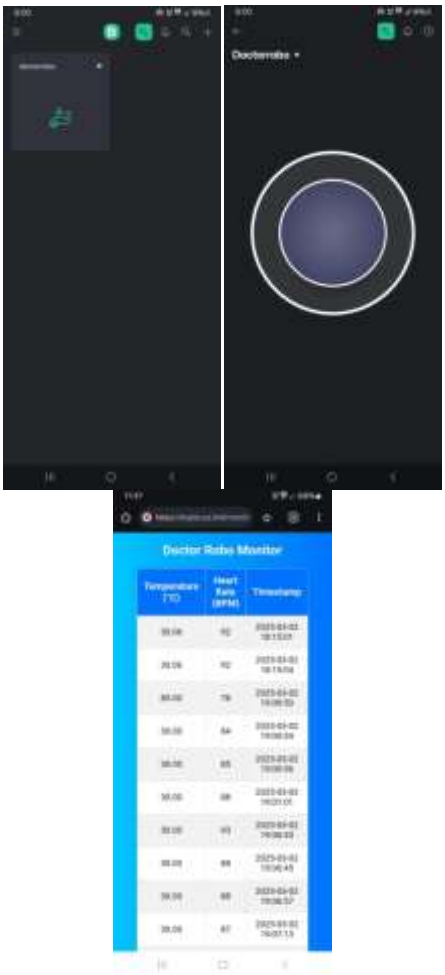

Fig 6:working

VI. CONCLUSION

The IoT-based Energy Meter with Smart Monitoring and Control of Home Appliances provides an efficient solution for real-time energy management. By integrating Arduino Uno, voltage and current sensors, NodeMCU (ESP8266), and IoT technology, the system enables users to monitor power consumption remotely and control appliances via a mobile application.

This system not only helps in reducing electricity costs by preventing unnecessary power usage but also contributes to energy efficiency and sustainability in smart homes. The ability to automate the control of appliances ensures optimized energy consumption, reducing environmental impact.

Overall, the proposed system offers a cost-effective, user-friendly, and scalable approach to smart energy management, making it a valuable addition to modern smart homes and IoT-driven energy solutions..

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