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Doctor Helping Monitoring Kit using IOT

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Abstract: *The primary objective of the doctor helping monitoring kit is to enhance the quality of information management and operational efficiency within healthcare facilities. The current demands of day-to-day patient monitoring in hospitals can be overwhelming for doctors and nurses, often making it difficult for them to supervise each patient closely. Consequently, this situation gives rise to various challenges. Considering the critical nature of healthcare, it is imperative for the industry to adopt innovative technologies promptly to advance modern healthcare practices and utilize them for seamless patient monitoring from any location. This application encompasses several components, including a Patient Monitoring Robot System, an IV Bag Monitoring System, Temperature Detection, and a Disease Prediction Kit.The Patient Monitoring Robot System enables doctors to remotely monitor patients and access their medical data. This robot system can be controlled by healthcare professionals and move between different locations as needed. The system simplifies the management of multiple patients by allowing a single person to oversee their well-being. An IV Bag Monitoring System is also integrated to facilitate efficient patient care. This system alerts healthcare providers when a patient's saline bottle is running low, ensuring timely replenishment. This feature streamlines the monitoring process, allowing healthcare professionals to focus on patient care.In conclusion, the doctor helping monitoring kitaims to address the challenges associated with patient monitoring in healthcare facilities. By implementing innovative technologies such as the Patient Monitoring Robot System, IV Bag Monitoring System, Temperature Detection, healthcare professionals can improve the quality of patient care, ensure accurate data management, and enhance operational effectiveness.*

Keywords: Internet of things, Temperature, Mask, Disease, Humidity, Doctor, Patient, Nurse, Cloud, IV Bag, Sensors.

I. INTRODUCTION

Every year, hospitals treat millions of patients, according to analyses. In numerous emergency situations, medical personnel may not be present, leading to substandard care due to a shortage of doctors caused by a growing population. Artificial intelligence (AI) presents a robust technology that can be applied to address these challenges. Many AI-based tools, such as speech recognition, have already become integrated into our daily lives. Utilizing computer-generated documentation and speech recognition, for instance, can convert voice into text and display a patient's medical history, allowing the patient to enter it directly into the electronic health record. These are just a few examples of how speech recognition systems can assist doctors in their everyday hospital operations. One specific medical procedure, intravenous treatment, enables patients to receive fluids, medications, and nutrients directly into their veins. To ensure the efficient monitoring of individuals who are not wearing face masks, IoT-based technology will be deployed. Given the difficulty or near impossibility of monitoring every individual manually, this technology will enable the rapid identification of those not adhering to face mask protocols. In public spaces, live video captured by cameras will be utilized to collect facial photos, which will then be employed for face mask identification purposes. Monitoring each patient's body temperature is essential for doctors to track their health. However, manually performing this task would be time-consuming and demand the doctor's constant attention. To streamline this process and save valuable time, an IoT-based infrared (IR) temperature sensor will be used. This sensor can continuously monitor a patient's temperature, reducing the burden on doctors and enabling them to allocate their time more efficiently. By leveraging these AI-based technologies, hospitals can enhance patient care, particularly in emergency situations and areas with doctor shortages. These advancements improve efficiency, accuracy, and monitoring capabilities, ultimately contributing to better healthcare outcomes for patients.

II. RELATED WORK

In recent years, there has been a growing interest in monitoring patient health, particularly in situations where doctors are not readily available. However, the challenge lies in the fact that doctors cannot always be physically present where they are needed. While video calling has been used as a solution, it often requires a stationary setup with a PC or laptop, limiting doctors' mobility within the hospital or operating rooms.

To address this issue, an innovative solution is being explored: a robot-assisted intelligent emergency system for older citizens living independently. This system utilizes a robot equipped with sensing elements, serving as an emergency assistance platform for seniors. However, this system currently lacks the capability to detect temperature and humidity data of the patients. To overcome this limitation, an integrated ward management system is being developed, which operates remotely and collects data from various sensors, including temperature sensors, to monitor individual patients.

In the context of intravenous (IV) fluid level monitoring, a novel approach is being employed. The system utilizes the Wi-Fi signal from a modem and directs it towards the IV fluid container, which is embedded with a metamaterial array acting as a signal reflector. The reflected Wi-Fi signal is captured by a reader and analyzed based on a predetermined threshold value, indicating the level of fluid in the container.

While these advancements in patient monitoring systems show promise, there are certain challenges to overcome. Many existing systems require significant technical expertise to install and operate, which can be a barrier, especially for farmers or individuals lacking such expertise. Additionally, some systems have limited capabilities, only able to detect a few specific diseases, which can lead to the spread of other diseases that go unnoticed.

Considering the need for affordable, accessible, and comprehensive patient health monitoring systems, especially in developing countries, further research is necessary. Efforts should focus on developing low-cost and user-friendly solutions that cater to a wide range of healthcare needs and can be easily implemented in resource-constrained settings.

III. PROPOSED SYSTEM

Sometimes, doctors are obliged to work at every hospital and urgent care facility simultaneously. However, it is impossible for every doctor to be available at all times or in all locations. With video business, it's necessary to do video calls from a laptop or laptop computer on a table. This restricts the doctor's ability to observe the patient, walk about the operating area, or maybe travel among the hospital rooms on a PRN basis. To assist in resolving this problem, we have created a virtual doctor automaton that enables a physician to virtually roam around in a distant country and even sit down with patients. Sensorsbasetechnologyuseforbiomedicalapplication,sizeis the one of the important constraints. The sensors base devicemust be moderate in size and weight. However, the sensors usein such device must able to detect body temperature and heartbeats which is play important role in medical treatment.

3.1 System Architecture

The doctor helping monitoring kit system consists of multiple components that work together to provide real-time information about the health status of the patient.

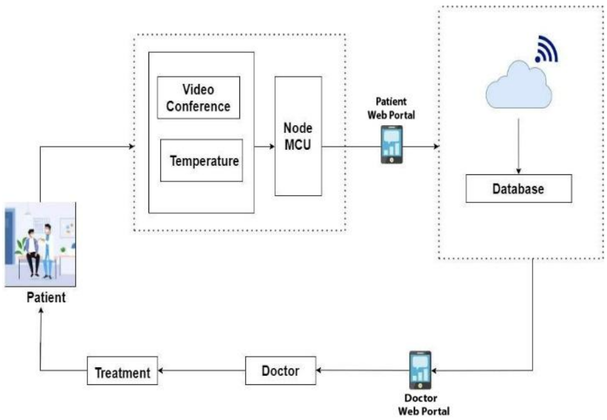

Fig.3.1.SystemArchitecture.

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3.2 Mask Detection

We will deploy IOT-based technology to enable us quickly monitor those who are not wearing a face mask because it is difficult or nearly impossible to monitor every individual. Additionally, the camera will record live video in public spaces, from which facial photos will be collected and utilized to identify face masks.

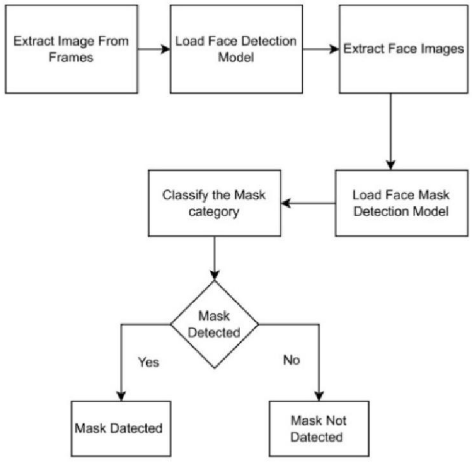

Fig.3.2.Mask Detection

3.3 IV Bag

The system makes use of a Weight Sensor with an microcontroller and WiFi transmitter and LCD display to achieve this functionality. The Weight Sensor is attached to a small stand. A small rod stretching from the top allows user to suspend the weight sensor hook on the stand The weight sensor is used to measure the weight of empty IV bag at first. This is considered as empty weight. When the IV bag is suspended onto the sensor stand, it keeps on dripping until the fluid runs out. The controller constantly processes this data and processes it. The current level of IV bag is parallelly displayed on an LCD display. Also, this data is transmitted on IOT server via WiFi Module. This level is displayed on IOT server online. As soon as the level falls below certain level it LCD display as well as Online dashboard displays as bag empty.

HARDWARE COMPONENTS

NodeMCU ESP8266

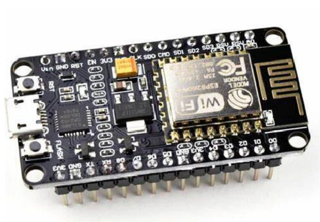

Fig. 4.1.NodeM CU ESP8266

ESP8266 is a low-cost, Wi-Fi enabled microcontroller unit that is widely used in the field of IoT and embedded systems. It is based on the Tensilica L106 Diamond series processor and has integrated Wi-Fi capability, which makes it an ideal choice for IoT applications that require wireless connectivity

DC Motor

Fig.4.2DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power

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Oximeter

Fig.4.3Oximeter

Pulse oximetry is a test used to measure the oxygen level of the blood. A clip-like device called a probe is placed on a body part, such as a finger or ear lobe. The probe uses light to measure how much oxygen is in the blood.

Motor Driver L298N

Fig.4.4.TP40561ALi-ionlithiumBatteryChargingModule

L293D Motor Driver Module is a medium power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L293 motor driver IC. It can drive 4 DC motors on and off, or drive 2 DC motors with directional and speed control.

Temperature Sensor

Fig.4.5TemperatureSensor

DS18B20 is a digital temperature sensor that uses the Wire protocol for communication. It is a programmable resolution sensor that can measure temperatures ranging from -55°C to +125°C with an accuracy of ±0.5°C. sensor comes in a small package and can be easily mounted on a circuit board or attached to a cable

HX711

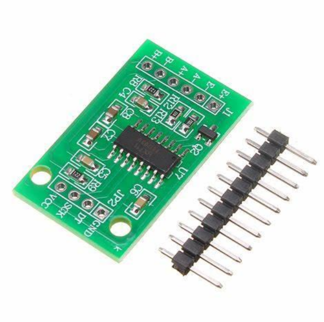

Fig.4.6HX7111

The dual-channel 24 Bit Precision A/D weight Pressure Sensor Load Cell Amplifier and ADC HX711 Module is a board; for the HX711 IC that allows you to easily read load cells to measure weight. By connecting the module to your microcontroller, you will be able to read the changes in the resistance of the load cell

Load Cell

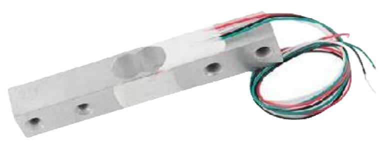

Fig.4.7Load Cell

Load cell is an electro-mechanical sensor used to measure force or weight. When force is applied to a load cell, it converts the force into an electrical signal.

LCD Display

Fig.4.8.LCD Display

This is a 16x4 LCD with Green Backlight. It is based on the SPLC780 or S6A0069 display controller which makes it is easy to interface this display with most microcontrollers in a wide range of applications. A 16x4 LCD (Liquid Crystal Display) means it can display 16 characters per line and there are 4 such lines.

LM35 Precision Centigrade Temperature Sensor

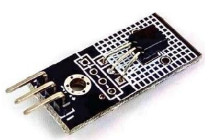

Fig. 4.9LM35 Precision Centigrade Temperature Sensor

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IV. SYSTEM MODULES

The system comprises several modules that serve different functions within the healthcare management framework:

- Patient Monitoring System: This module acts as a communication platform between patients and doctors. It incorporates temperature sensors to collect and transmit data to a web admin application, facilitating remote monitoring and consultation.
- IV Bag Monitoring: This module employs IoT technology to monitor the fluid level in IV bags. A weight sensor is utilized to detect changes in fluid levels, and when the level drops, a buzzer is activated, alerting medical staff to the need for refilling or replacement.
- Mask Detection: This module is designed to monitor individuals in public spaces and identify whether they are wearing face masks. By recording live video and utilizing facial recognition techniques, it helps enforce mask-wearing protocols and enhance public safety.
- Patient Module: In this module individual patient lap records and the prescription generated by the doctor is displayed.
- Doctor Module: In this doctor can generate prescription as per the lap result and the data collected by the virtual system. Doctor assigns lab tests
- Nurse Module: In this module nurse can view patient lap reports and prescription.
- Admin Module: This module is designed for administrative purposes, allowing the management of patient, doctor, and nurse data. Additionally, it provides features for overseeing vendors, equipment, and medical stock, ensuring smooth operations within the healthcare facility.

V. METHODOLOGY

5.1 Overall Approach

This system incorporates various features and sensors to enhance healthcare monitoring and management. It includes a temperature sensor that records data and stores it in the cloud. This enables doctors and nurses to directly access temperature and humidity data of patients through a web application.

Additionally, the system employs an IV bag monitoring mechanism equipped with a weight sensor. The sensor continuously checks the weight of the IV bag, and if the fluid level decreases, a buzzer is activated to alert the medical staff.

Furthermore, the system utilizes OpenCV for mask detection. By leveraging this technology, the system can determine whether a person is wearing a mask or not, promoting adherence to safety measures.

VI. RESULTS

Fig.7.1. Integrated Ward Management

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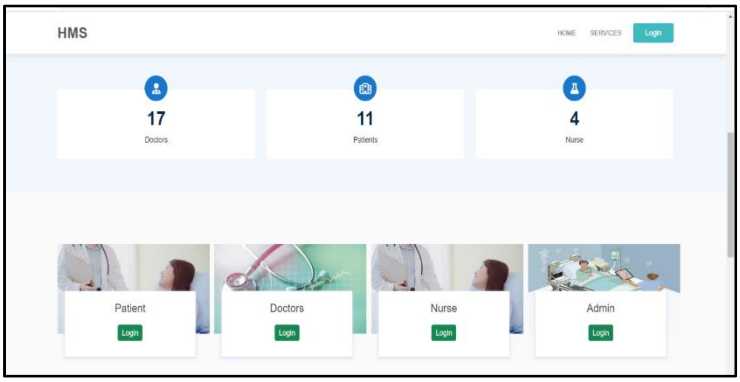

Fig.7.1. Integrated Ward Management System

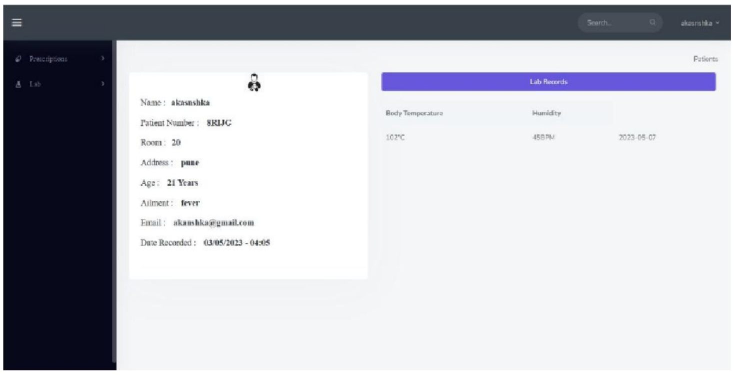
Fig.7.2 Web Portal


Fig.7.3.IV Bag Monitoring

VII. APPLICATIONS

- Livestock Monitoring: This system can be used to continuously monitor the health parameters of patient and alert the doctor and nurse in case of any health abnormalities.
- Disease Prevention: With real-time monitoring, the system can detect and prevent diseases before they spreadand become serious.
- Livestock Management: The system helps in keeping track of the health status of all the patient,reducingthetimeandeffortrequiredtomanuallyinspecteachpatient.
- Prevent Disease in Early Stages.
- Reduce Labor and Saves Time.

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VIII. CONCLUSION

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