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Integrated Doctor Assistant and Ward Management Kit

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Abstract: *This integrated ward management system's goal is to improve the quality of information management and operational effectiveness. The day-to-day monitoring of patients in a hospital is a taxing task under our existing medical care system. Doctors and nurses may occasionally be too busy to supervise every patient. This leads to numerous issues. Work that is related to health should be done correctly and accurately. As a result, it is critical that the health sector quickly implement a trending technology to increase modern health care techniques and technologies and use them for the simple monitoring of patients from anywhere. A Patient Monitoring Robot System, an IV Bag Monitoring System, Temperature Detection and a Disease Prediction Kit are included in this application. Patient observation Doctors will be able to easily view patients and medical data thanks to a robot system that can be controlled by them and travel from one location to another at any moment. It will be simple for one person to manage several patients using IV Bag monitoring. Monitoring a patient is an example of this type of work in our hospital. When the patient's saline bottle runs out, the system will send an alert, thus we suggested a system called the IV bag System. Utilizing patient symptoms, healthcare monitoring systems are helpful in predicting disease. By using information mining, this project hopes to create a symptomatic model of common illnesses based on their manifestations.*

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

I. INTRODUCTION

Every year, hospitals treat millions of patients, according to analysis. In many emergency circumstances, medical personnel are not present. Due to a doctor shortage brought on by a growing population, patients receive subpar care. Artificial intelligence is a strong technology that can be applied to solve these issues. Many AI-based tools, including speech recognition, have already merged into our daily lives. The use of computer-generated documentation and speech recognition to convert voice to text and show the patient's medical history so that the patient can enter it into the electronic health record are just a few examples of how speech recognition systems might help doctors in everyday hospital operations. A medical procedure called intravenous treatment allows patients to receive fluids, medicines, and nutrients directly into their veins. 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. Doctors must keep track of each patient's body temperature in order to monitor their health. However, doing so manually would take a lot of time and might require the doctor's attention. To avoid this, we will use an IOT-based IR infrared temperature sensor. It can keep track of the patient's temperature and will save the doctor time.

II. RELATED WORK

Over the past few years, there has been an increasing interest in the monitoring of patient health. Hospitals and emergency rooms are constantly in need of doctors, but finding them isn't always simple. However, doctors cannot always be present where they are needed. The drawback of video calling is that it requires using a PC or laptop at a

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desk to make a connection. This limits the doctors' ability to travel about the operating rooms or the hospital when they need to see patients or to view them.

This idea might provide older citizens living independently with a robot-assisted intelligent emergency system. Through a robot-sensing element system, it serves as an innovative senior freelancing living emergency assistance platform. But this system cannot detect temperature and humidity data of the patient so we are developing Integrated ward management system. The system is remotely operated and suing various sensors like temperature sensor we are collecting data of induvial person.

For Intravenous (IV) fluid level monitoring, using the signal from the Wi-Fi modem. Wi-Fi signal is allowed to incident on the IV fluid container embedded with metamaterial array that act as signal reflector. The reflected Wi-Fi signal is captured by the reader and is analyzed based on a threshold value set for indicating the level of the container. Additionally, many of these systems require a significant amount of technical expertise to install and operate, which can be a barrier for farmers who lacksuch expertise. Finally, many of these systems have limited capabilities, such as the ability to detect only a few types of diseases, which can lead to the spread of other diseases thatare not being monitored.

The need for a low-cost, easy-to-use, and comprehensive cattle health monitoring system that is accessible to patient in developing countries is evident. To address this need, it is crucial to conduct further research on patient health monitoring systems that are affordable, accessible,and easy to use

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. Sensors base technology use for biomedical application, size is the one of the important constraints. The sensors base device must be moderate in size and weight. However, the sensors use in such device must able to detect body temperature and heart beats which is play important role in medical treatment.

3.1 System Architecture

The Integrated Ward Assistant system consists of multiple components that work together to provide real-time information about the health status of the patient.

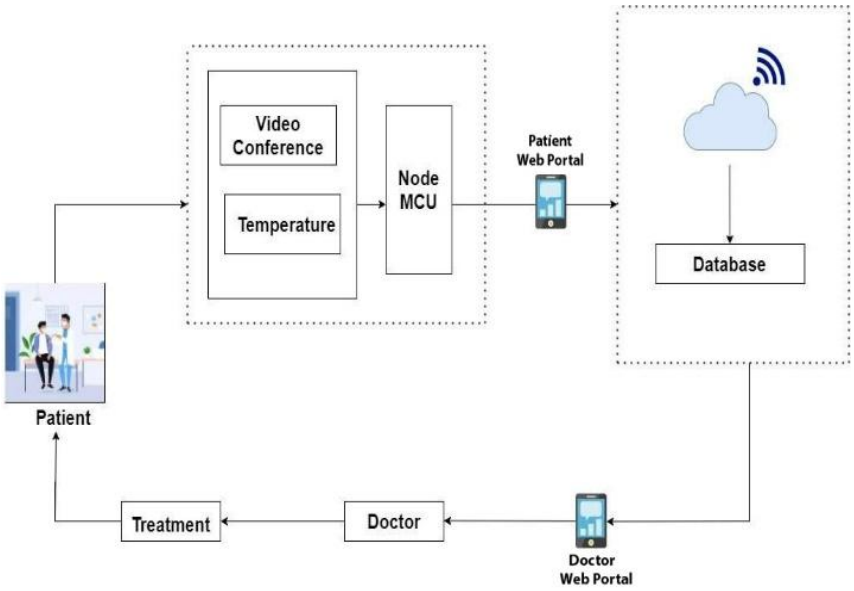

Fig. 3.1. System Architecture.

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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.

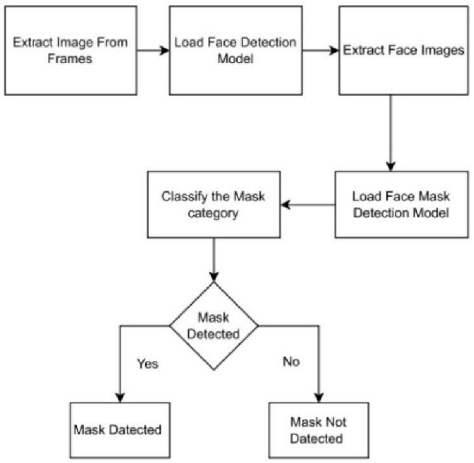

Fig. 3.2. Mask Detection

3.3 Disease Prediction

In a propose system, we are proposed experiment on detecting disease like Diabetes, malaria, Migraine, Heart Failure and Covid and recommend hospitals for specific disease with limited set of supervised data. We come through a wide range of different and major algorithms for predicting the monotonous diseases with comprehensible symptoms while working in the field of Supervised Machine Learning such as support vector machine. We are recommending the nearest hospitals from the patient's location through KNN. By using CNN, we are classifying the disease through images

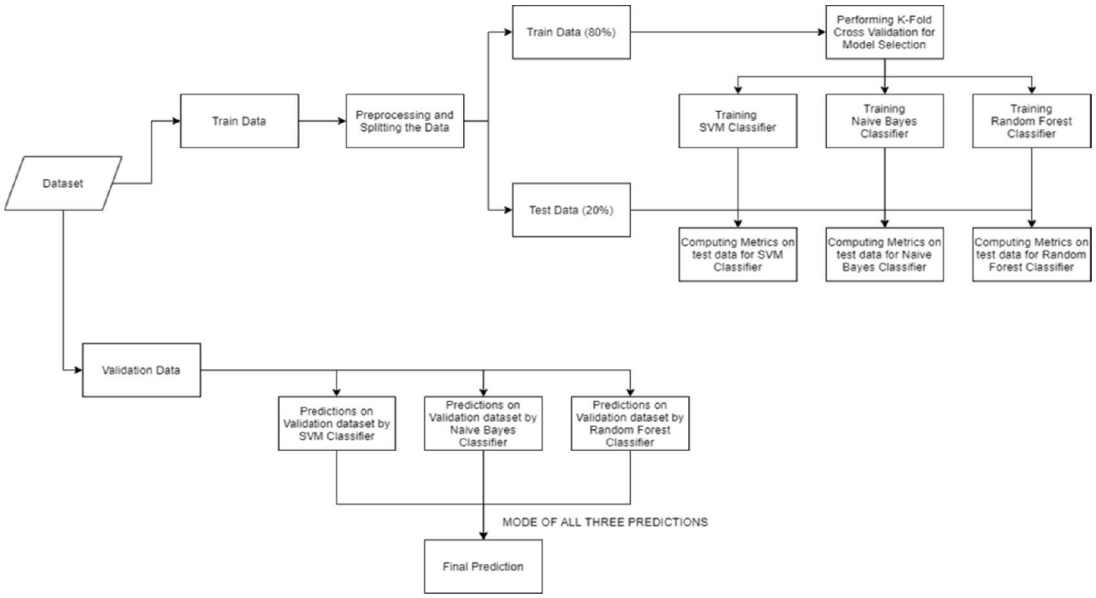

Fig. 3.3.Disease prediction Architecture

3.4 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.

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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.

IV. HARDWARE COMPONENTS

4.1 NodeMCU ESP8266

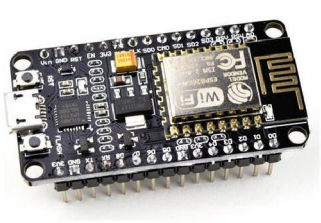

Fig. 4.1. NodeMCU ESP8266

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

4.2 DC Motor

Fig. 4.2 DC Motor

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

4.3 Oximeter

Fig. 4.3.Oximeter

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.

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4.4 Motor *Driver L298N*

Fig. 4.4. TP4056 1A Li-ion lithium Battery Charging Module

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.

4.5 Temperature Sensor

Fig. 4.5 Temperature Sensor

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

4.6 HX711

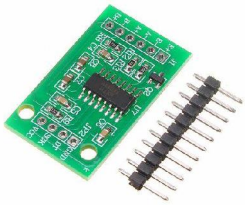

Fig. 4.6 HX7111

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

4.7 Load Cell

Fig. 4.7 Load Cell

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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.

4.8 LCD Display

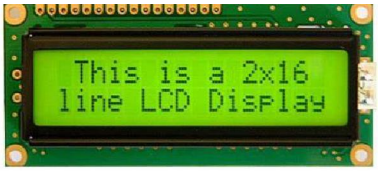

Fig. 4.8. LCD Display

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.

4.9 LM35 Precision Centigrade Temperature Sensor

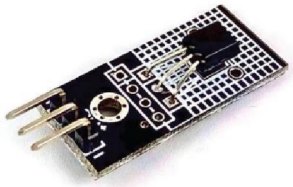

Fig. 4.9 LM35 Precision Centigrade Temperature Sensor

V. SYSTEM MODULES

There are some modules of the system.:

- Virtual Doctor System: This module comprises temperature sensors, to collect and transmit data to the web admin app. This module is design as a communication platform for patient and doctor.
- Disease Prediction: This model will predict be able to predict the disease based on the symptoms and the photos uploaded by the user.
- Bag Monitoring This module is designed to monitor Fluid level of IV Bag This IOT Intravenous Fluid Monitoring uses a weight sensor to detect as the fluid level in the IV Infusion bottle. As fluid level goes down the buzzer will buzzer.
- Mask Detection: This module design to quickly monitor those who are not wearing a face. The camera will record live video in public spaces, from which facial photos will be collected and utilized to identify face masks.
- 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 maintaining patient, doctor, nurse data. Admin module can view prescription and manage the vendors, equipment and medical stock.

VI. METHODOLOGY

6.1 Overall Approach

This system contains the temperature sensor. It records the data and stores it on the cloud. Doctor and Nurse can see the temperature and humidity data of patient directly through web application. IV Bag monitoring contains weight sensor. Sensor will continuously check the weight of IV bag if fluid level goes down then the buzzer will buzzer. Mask Detection uses the OpenCv.

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Using this it will detect if person is wearing mask or not. Disease Prediction application takes 3 symptoms and based on that the application will predict the disease and the precaution to be taken. Doctors, Nurse and admin can view the patient lap records and prescription generated by the doctor

VII. RESULTS

Fig. 7.1. Integrated Ward Management System

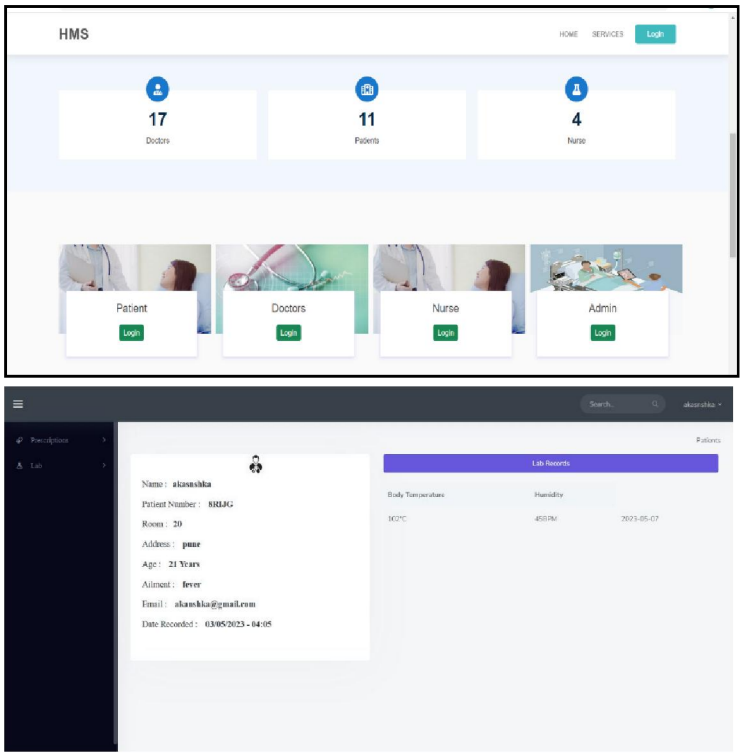

Fig. 7.2 Web Portal

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Fig. 7.3. IV Bag Monitoring

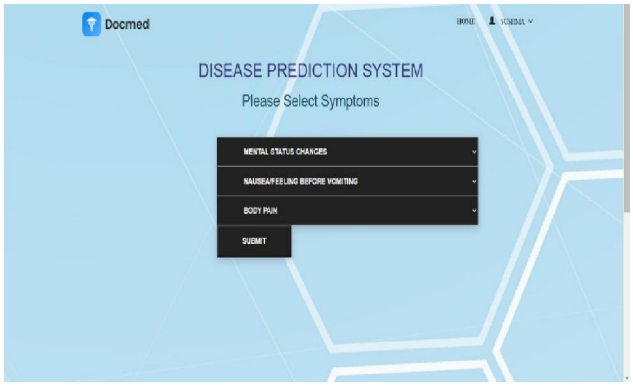

Fig. 7.4 Disease Prediction

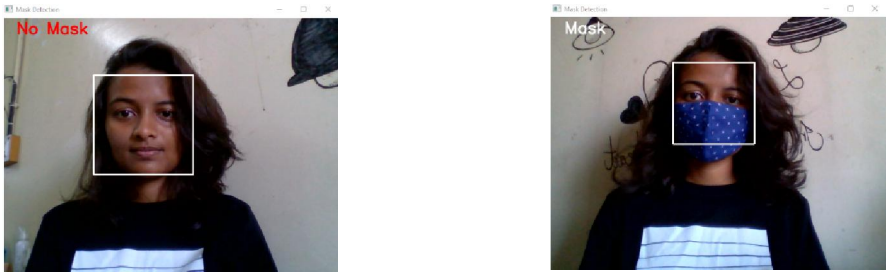

Fig. 7.5 Mask Detection

VIII. APPLICATIONS

1. 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.
2. Disease Prevention: With real-time monitoring, the system can detect and prevent diseases before they spread and become serious.
3. Livestock Management: The system helps in keeping track of the health status of all the patient, reducing the time and effort required to manually inspect each patient.
4. Prevent Disease in Early Stages.
5. Reduce Labor and Saves Time.

IX. CONCLUSION

By using an IoT-based virtual doctor robot, the workload for a doctors can be reduced. Wait times for patients can be cut down. It is possible to offer main patient monitoring in addition to compassionate assistance with routine tasks. To make the "Doctor robot" more user-friendly, we designed it with a manual and autonomous control mechanism.

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Doctors from all around the world will be able to video chat with patients and view all of their data because of the Internet of Things. We think that our robot will have a significant impact on the healthcare sector's efforts to address the physician shortage around the world. Our integrated modules, such as those for disease prediction, temperature measurement, and mask recognition, will increase the robot's usefulness.

A lot of study has been done on smart healthcare. There is a wealth of literature in the field of smart health care that covers IoT, IoMT, medical signals, AI, edge, and cloud computing at different paces and with different approaches. To the best of our knowledge, there hasn't been a comprehensive review of the state-of-the-art IoT, IoMT, AI, utilisation and fusion of medical signals, edge and cloud computing, privacy, and security in the field of smart health care.

This project's goal was to provide an integrated and focused environment for comparison of IoT, AI, edge, privacy, and security in smart health care. The utilisation of IoT, medical signals, sensor fusion, and machine learning algorithms in smart homes were all covered in the survey.

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