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IOT BASED MEDICAL ASSISTANT UNIT

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Abstract - *Our paper focuses on the Internet of Things (IOT)-based Smart Medical Assistant Unit, a user-friendly health robotic device with an interactive user interface for medical needs. A virtual health system, the check-up/self-screening exam is designed at the initial point of contact for measuring heart rate, blood pressure, and temperature. A doctor will be accessible online through video call in an emergency, and depending on the severity of the patient's illness, the doctor may call to schedule an ambulance (based on the conditions). The system will also deliver prescribed medications based on health concerns in non-emergency situations. Overall, the doctors agree that the method may be used in areas without immediate access to medical facilities. Using this method in such areas boosts survival rates while also assisting in medical emergencies, epidemics, and pandemics like COVID. Microcontroller and IOT are used to control and monitor our entire system.*

1. INTRODUCTION

The development of biomedical technology has been a blessing for civilization. But it's clear from our daily activities that most individuals don't take their health very seriously issues like cancer and other illnesses whose prevalence is rising as a result of inadequate medical infrastructure. The greatest solution for personal health observation is a medical kit. There was a risk of patient death in the past because of a lack of facilities and technology that prevented doctors from seeing every patient promptly. But, thanks to technology, doctors may now digitally contact with their patients. The doctors may get all the fundamental data needed for patient care, enabling them to respond quickly in the event of an emergency and lowering the risk of fatalities. IoT, which connects people with technology, is nothing less than a blessing for us as we can see it absolutely dominating the future for the development of the health industry. It incorporates the application of numerous sensors and actuators, both of which are highly helpful in our daily lives. The ability to communicate health signals to worried family members and doctors has revolutionised people's lives by lowering the likelihood of danger and enabling us to lead healthier lifestyles.

2. THEORETICAL MODELLING

The Arduino UNO controller is the main part of the robot and runs on a battery power supply that must be recharged after each use. Esp32 Camera, which is used to view the scene in real time, is part of it. The four-wheeled robot is controlled by orders so that it may travel around the patients. The doctor controls the robot while keeping an eye on the screen using a Esp32 camera. Three voice commands are contained in the ARP voice module, which connects the speaker to the robot.

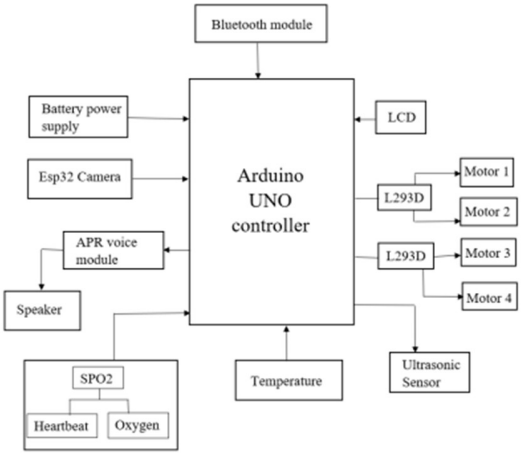

Fig1: Virtual Doctor Modelling

It has a temperature sensor, a SPO2 (heartbeat & oxygen) sensor, and when it is touched, the values are sensed and shown on an LCD. Motors that are attached to the four wheels' controls.

3. HARDWARE COMPONENTS

Arduino Uno, 16X2 LCD display, APR9600, DC motor, ESP32 cam, ESP8266, L293D, LM35, LM7085, and MAX30100 are the hardware requirements.

3.1 Arduino Uno

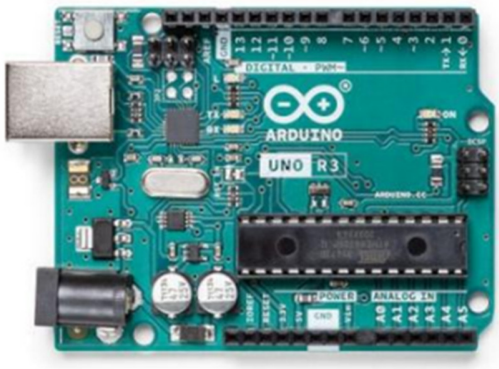

Figure 2. Arduino Uno Board

The Arduino uno is the common board for those who want to learn more about software with electronics. The newly built AT-Mega328P and the AT-Mega16U2 Processor are both included in this adaptable microcontroller.

3.2 LCD Display

Figure 3. LCD Display

Liquid crystal display is referred to as LCD. It is a particular type of electronic display system used in a large array of electronics circuits and devices, including phones, calculators, computers, TVs etc. These displays are mostly preferred for seven segments and multi-segment LED's.

3.3 ESP8266

Node-MCU development board and open-source Lua-based firmware that is specifically designed for Internet of Things (IoT) applications. It has hardware based on the ESP-12 module and firmware that runs on the ESP8266 Wi-Fi SoC from Express Systems.

Figure 4. ESP8266 Board

3.4 LM358 Precision Centigrade Temperature Sensor

Figure 5. LM358 Sensor

The output voltage of the LM358 series precision IC senses temperature of different bodies and machines also and gives output proportion in degree Celsius.

3.5 MAX-30100 SENSOR

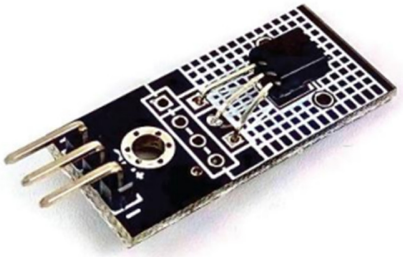

Figure 6. MAX 30100 Sensor

The MAX-30100 is a sensor with integrated pulse oximeter and heart-rate monitoring system. The sensor detects pulse oximetry and heart rate signals, it uses two LEDs, a Light sensitive detector, improved sights, and low-noise analog signal processing.

4 Features

The robot follows the operator's instructions and directions and move forward, backward, and left and right. The sensors gathers and show the patient's specific real-time data. The robot measures specific perimeters such as Spo2, BPM and Heart rate using different sensors and shows it on the webpage using IOT technology. It also uses camera for detection of movement. It also has automatic sanitization unit for sanitizing the floor as the unit moves because this experimental work, is made to be used in the contagious diseases ward.

Figure 7. Body structure of the Unit

5 APPLICATIONS

This robot can be utilized in critical wards, as Covid- 19 wards, where a doctor's physical presence puts the doctor's health in peril.

In the event of an emergency, this robot can also be utilized domestically in homes for personal support so that medical professionals can act rapidly to save the patient's life.

6 CONCLUSIONS

The workload of a doctor during their busy schedule can be lessened by IoT-based virtual doctor robots. Patients' waiting times can be cut down. It is accomplished to provide primary patient care and aid with everyday tasks. We created the "Doctor robot" with a manual and autonomous control mechanism for user-friendliness. Via the IOT system, doctors from any location in the world will be able to converse via video chats with patients while viewing all of their data without having to physically interact with them. We are confident that this robot will make a significant difference in addressing the global shortage of qualified doctors. Clinical robots facilitate a medical procedure, simplify coordinated processes at emergency clinics, and free up suppliers to focus on patients. Robots in the healthcare setting are transforming how medical procedures are carried out, streamlining supply conveyance and sanitization, and freeing up suppliers' time to see patients. The clinical robot market is anticipated to experience growth between 2022 and 2028.

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