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### Measuring and monitoring of physiological parameters in patients

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#### ABSTRACT

In India people are facing various health problems which remains unnoticed for a long duration of time. Due to the patients negligence in the early stage health problems they are facing critical health issues as the days goes on. This intends to propose an online health monitoring system in order to avoid critical issues in patient health problems. Health monitoring systems are gaining their significance as the fast growing universal elderly population increases demands for care taking. In ICU there is needed for continuous monitoring of their health conditions. In so many cases patients discharged from hospital are strongly advised to be under rest and observation for a period of time. In these type of cases this system is very much helpful. This system is a real time intelligent model using multiple sensors on a single system using wireless technology. The system can measure and present the real time activity of the patient without the on-site medical assistance. Literature survey indicates that in the hospitals, the main problem leading to increase in the death rate is due to unavailability of doctor or the staff nurse when required. To resolve this issue, this system has been introduced. We have to set the threshold value to each monitoring parameters in the system. When it exceeds the threshold level it sends an alarm notification to the prescribed doctor mobile application through server. If doctor doesn't respond to the alert message within 5 to 10 seconds, then the doctor will receive an alarm. When doctor is not near the patient, doctor will forward the notification to the duty nurse with prescription and remedial action to attend the patient.

**Keywords:** ESP8266 WIFI module, Blood pressure Sensor, ECG Data Sensor, Temperature Sensor, Infrared saline Level Detector

#### INTRODUCTION

Technology has entered almost all aspects of daily life and the medical field is no longer an exception. In today's competitive world physical and emotional stress is a part of life leading to increased mortality and morbidity. The need of technologically well-equipped hospitals is there. Patients are spread over a large area in such hospitals and continuous monitoring of all the patients is challenging for a doctor. Keeping all these aspects in the mind we have developed "biomedical data transmission system" which can be used efficiently to get rid of these problems.

Recently, wireless sensor network are used to structure home – care system in many researches. Wireless sensor network application for physiological signals communication transmission has many technologies. Such as IR, Bluetooth, WIFI, zigbee etc. [1-3].

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for a period of time. In these case the system is very much helpful.

The modern visionary of health care industry is to provide better health care to people anywhere in the world in a more economic and patient friendly manner. The medical world faces two basic problems when it comes to patient monitoring. Firstly, need of health care providers presence near the patient and secondly the patient is restricted to bed and wired to large machines. In order to achieve better quality patient care, the above cited problems have to be solved. As the bio instrumentation, computers and telecommunications technologies are advancing, it has become feasible to design more portal vital sign tele monitoring systems to acquire, record, display and to transmit the physiological signal from the human body to any location. Recent works in communication technologies have inspired the development of telemedicine to a large extent. Telemedicine benefits not only the customers who are able to receive health care more efficiently; it also benefits the doctors who can streamline their efforts to assist more patients. Previously it is impossible to monitor the patient by doctor in remote areas during critical conditions. So we introduced a method which continuously monitors the patient condition and automatically sends the data to server, so the doctor can access the data continuously and we can intimate caretaker when patient is in critical condition.

In previous methods, monitoring of patient can be done only by using different instruments for different parameters. So, we decided to monitor required conditions of patient by assembling different instruments in a single module. Here WIFI technology is used. We have recorded the data of each sensor and uploaded the data into the server. We have observed the data on many devices using WIFI with secured manner. By employing this system, we can reduce their manpower. By this the workload on doctors can be reduced and ensure efficiency. The data can be monitored accurately and human error can be significantly reduced, thus the health care scenario may be significantly improved. [4-6].

## LITERATURE SURVEY

Yedukondaluudara, Srinivasaraoudara, Harish H M, Hadimani H C: The authors in paper [3] has built a frame work to create a low cost affordable health monitoring system for people in remote locations where availability of specialist doctors is not possible. Also this concept is developed using IOT, so that we can send the data to a remote server from which it can be accessed by doctors. The parametric readings are transmitted to the IOT account using ESP8266 Wi-Fi interface. Then the IOT platform processes them and adds to the previously stored values to log data. The logged parametric data can be accessed from anywhere by accessing the IOT account. Also, we can add multiple users to a single account to monitor data like remote specialist doctors etc. [7-9].

Vishal Ambala, KaustubhChuri, Prasad Virkar, Pankajkumar Gupta: The authors in paper [6] have equipped a Remote Patient Monitoring (RPM) system based on wireless technology using a cellular phone, to send an SMS (Short Message Service) to the medical staff. In real time the patient parameters are sent to the doctor. It enables the doctors to monitor patient's health parameters (temperature, heartbeat etc.) in real time. This system combines two commonly used technologies namely, Global System for Mobile (GSM) and ZigBee technology. Also in critical situations, it is very important to report the live health status of the patient to the doctor and provide immediate medical help to the patient during the critical hour.

Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, Mohammed Tarique: The authors in paper [11] proposed a real time wireless health monitoring application using mobile devices. The prime goal of this project is to develop a reliable patient monitoring system so that the health care professionals can monitor their patients, who are either hospitalized or executing their normal daily life activities. In this project we present a mobile device based wireless healthcare monitoring system that can provide real time online information about physiological conditions of a patient. The system mainly consists of sensors, DAQ unit, microcontroller, and software. The patient's temperature, heart beat rate, muscles, blood pressure, glucose level and ECG data are

monitored, displayed and stored by our system. To ensure reliability and accuracy the proposed system has been field tested. The results shows the system is able to measure the patient's physiological data with a very high accuracy. [10-12].

N. V Panicker, A. Sukeshkumar, Sivin M. Stephen: The author in paper [14] discussed that the Wearable physiological monitoring devices are used to monitor the health status of a patient in Intensive Care Units (ICU). In this system a wireless physiological parameters are continuously monitored. This system includes sensors for continuous collection and evaluation of physiological parameters. A wireless personal area network has been introduced for reliable transmission of physiological information. The hardware design of this patient monitoring system is based on 8051 microcontrollers. Microcontroller acts as the gateway to ZigBee and GSM module. ZigBee wireless communication module has the advantage of lower power consumption which is attractive for portable applications. This system provides safe and accurate monitoring. It also gives the freedom of movement. The proposed system can be used to monitor the physiological condition of a person in and out of the hospital condition also. [13]

## METHODOLOGY

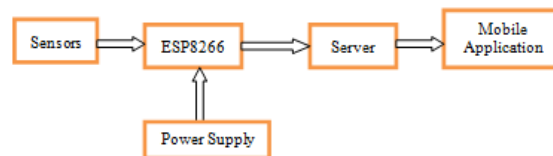
The online patient monitoring in hospitals has to be implemented effectively. The proposals are put forward and some of them were already implemented. The proposed patient monitoring system is based on the online monitoring of patients in hospitals. If the monitoring parameter is exceeds the threshold voltage, the sensor will send the notification or alert message to the preconfigured doctor's mobile number. The key feature of this system is to save the human's life. The expectation of this project is to save human life by giving correct treatment at the right time and to improve the monitoring of patients in hospitals.

The following components are used to complete the project.

- Blood pressure sensor
- ECG data sensor
- Temperature sensor
- Infrared saline level detector
- ESP8266 node MCU
- Power supply
- Server
- Mobile Application.

## BLOCK DIAGRAM

The following figure shows the various parts of the patient monitoring system. Each part is explained below.



**Fig 1: Overall block diagram**

The project contains the microcontroller with WIFI module which is interfaced with sensor. The sensor converts a non electrical in to electrical. The Blood pressure sensor, indicates the blood pressure of the patient. The ECG sensor indicates the electrical value of the functioning heart. Temperature sensor indicates the body temperature of the patient. The IR saline level sensor indicates

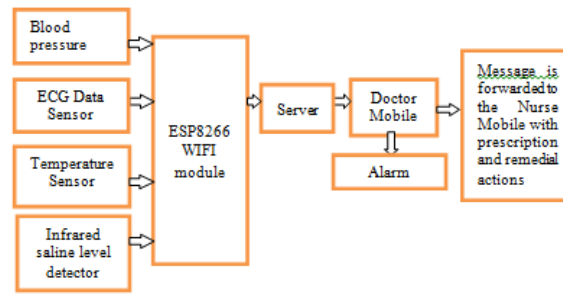
the saline level of the bottle. In the existing technology, it gives a alarm call to the doctor through GSM to attend the patient. But in this methodology we are using the Android application to intimate the doctor if any emergency situation occurs.

Now a days wireless technology plays a major role in the society. Here WIFI module is used to

make a system convenient which is programmable one. The power supply and sensors are interfaced with the WIFI module. If there is a change in parameters, then immediate action will be taken.

## BLOCK DIAGRAM OF PROPOSED SYSTEM

This block diagram explains the operation of the proposed system. The ESP8266 is interfaced with the sensor and send notification to the concerned doctor's mobile.

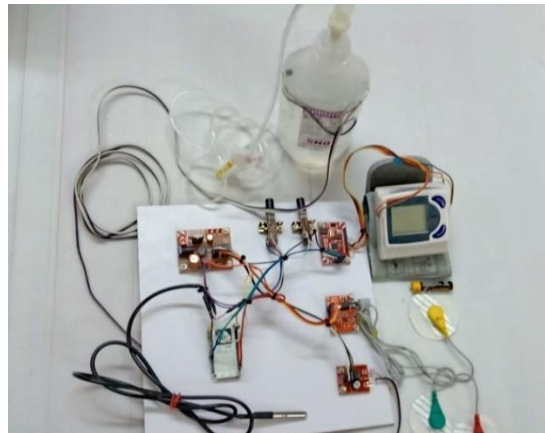


**Figure 2: Block of Proposed System**

A sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics. A sensor is always used with other electronics, whether as simple as a light or as complex as a computer. The various monitoring

physiological parameters are interfaced with ESP8266. The ESP8266 is an WIFI module, it sends the status of the patients to the mobile application through server. The mobile application is installed to the concerned doctor mobile.

This updates the status of the patient to doctor.



**Fig 4: Hardware connection setup for Patient Monitoring system**

## RESULT AND DISCUSSION

By using this method, the online monitoring of patients in the hospital becomes easier. It helps in reducing the man power and time to safeguard the people. With the help of proper technology we can monitor the patients and give the correct treatment

at the right time. This project can add an edge to the various hospitals in city and remote areas aiming to get smart and people friendly. The doctor can monitor the patient with the help of Wifi technology. This technology will provide the details about the monitoring parameters in patients.

The status of the parameters is transferred to the concern doctor whenever it is exceeding the threshold voltage. When doctor is more distance to the patient, doctor will forward the notification to the duty nurse with remedial action to attend the patient.

## CONCLUSION AND FUTURE WORKS

The project work is the implementation of online patient monitoring system using android mobile application with various physiological parameter sensors, ESP8266 wifi module and mobile application. This system assures the patient monitoring, when the parameters exceed the threshold value, the status of the parameters is send to the concern doctor. If doctor is not available or not near the patient, the alert notification is forwarded to the duty nurse with prescription and remedial action to attend the patient. This helps to monitor the more number of patients with less doctors. This project can be of great use in the field of medicine and helps the

doctor to keep a keen eye on the patients health. Therefore this system makes the monitoring is more efficient and makes hospitals smart.

An online patient monitoring system helps us to save the human life. In remote areas the monitoring of patients is more tedious and also the patient cannot get the proper treatment. This project can avoid such situations and increase the efficiency of monitoring. It helps in reducing the requirement of man power. Hence in future more number of physiological parameters like EEG, EMG, ERG, etc. can be developed and monitored.

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