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PATIENT HEALTH MONITORING AND MANAGEMENT SYSTEM USING INTERNET-OF-THINGS (IOT)

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Abstract— This paper proposes a patient health monitoring and management system using (IOT). A raspberry pi microcomputer based system has been developed which can be used by paramedics for collecting different sensor data such as blood pressure signal, heart beat signal, Situation of Oxygen in Blood (SPO2), temperature, humidity and pollution sensor generating different signals from a patient and direct these indications to expert doctor who are in a center or in a clinic. A web based application has been developed for both doctor and paramedics for effective communication with each other. The camera captures the patient abnormal condition and send to the doctor. The buzzer will alert the patient if the weather conditions are bad.

Index Terms— Raspberry pi, Situation of Oxygen in Blood (SPO2), blood pressure signal, temperature, humidity, pollution etc.

I. INTRODUCTION

Nowadays Internet has been developed as one of the essential component of our daily life. It has improved the life style, working, playing and learning environment of the people. Internet helps us for many purpose such as education, finance, Business, Industries, Entertainment, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet of Things (IOT). The key enabling factor of IOT is in medical and health care. IOT devices are used to collect, monitor, evaluate and inform the patient with the information. The penetration of IOT devices in medical and health care is in (i) Remote monitoring medical parameters (ii) Diagnostics (iii) Medicinal Apparatus tracing. (iv) Protected and access indoor atmosphere (v) Smart clinic services (vi) Entertainment services. The remote monitoring of a patient by the doctor is still an interesting task. To analyze the health illness of the patient, various medicinal parameters are needed about the patient. Collecting the parameters and communicating them to the doctor through the proper networking channel is another challenging task. The signal has been transmitted over web server to specialist doctor and displays the data in doctor´s site. After getting the signal and available information, the doctor can give proper treatment for the patient.

II. EXISTING SYSTEM

The patient monitoring system cannot be carried by patient to various places. The pollution sensor and humidity sensor was not provided.Both client and server side utilized ASP.NET programming language.

III. PROPOSED SYSTEM

The python programming language is used. A web based application system is implemented .The patient condition is monitored and treated using Raspberry Pi. The humidity sensor and pollution sensor sense the atmosphere of the patient, if the gas and humidity content is greater than the threshold value the buzzer indicates it to the patient .If the patient is in abnormal condition the camera capture image of the patient and sends to the raspberry pi.

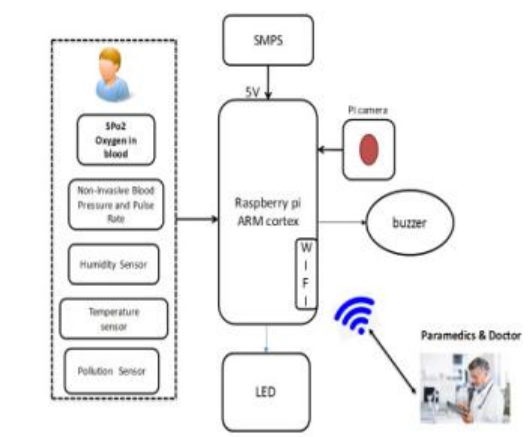

Fig.1 Block diagram description

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SPO2 sensor, noninvasive blood pressure and pulse rate sensor, humidity sensor, temperature sensor, pollution sensor sense the patient condition and send to the raspberry pi. Switch mode **power** supply is connected to the raspberry pi. The supply of the raspberry pi is 5v.The Wi-Fi is inbuilt in raspberry pi and through the raspberry pi the data is send to the doctor .The camera capture the abnormal condition of patient and send to the doctor via raspberry pi. The buzzer will alert the patient if the weather condition is bad. Based on the patient condition the LED blinks. The doctor and paramedics send the prescription via raspberry pi. [3] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry.

A. RASPBERRY PI

Raspberry pi is a microcomputer. Instead of CPU connected to the computer the raspberry pi is connected. The Wi-Fi is inbuilt in the raspberry pi. Through the raspberry pi the data is send to the doctor, paramedics and the camera capture the patient condition.

B. SENSORS

SPO2 Sensor:
SPO2 oxygen in blood sensor. This sensor sense the amount of oxygen content in blood, then it indicates to the raspberry pi.

Humidity sensor
HR202 humidity sensor sense the moistourization of the air. Inside the humidity sensor the tungsten filament is placed. It senses the moistourization, if temperature increase humidity decreases.

Temperature sensor
The LM35 temperature sensor is used to sense the body temperature of the patient. Inside the sensor the resistor is placed when temperature increase, resistance will decrease. There by the temperature sensor analyze the temperature of the patient.

Pollution sensor
MQ6135 Pollution sensor is a device which detects the presence of various gases within an area, usually as part of a safety system.

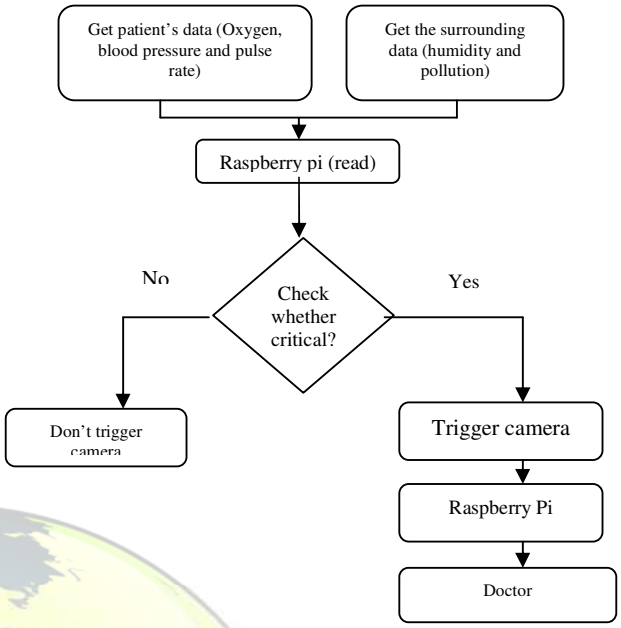

Fig.2 Flow diagram

FLOW DIAGRAM DESCRIPTION

The patient data and surroundings data's are given to the raspberry pi. The raspberry pi read the data and checks the patient condition. If the condition is critical, the camera is triggered and the information are sent via raspberry pi to the doctor. If the patient condition is normal the camera won't trigger.

C. KIT SETUP

In cuff the temperature and pressure sensors are placed. The buzzer is placed to alert the patient.SPO2 sensor is used to indicate oxygen level in the blood. Humidity and pollution sensor senses the atmosphere of the patient and send the signal via raspberry pi to the doctor.

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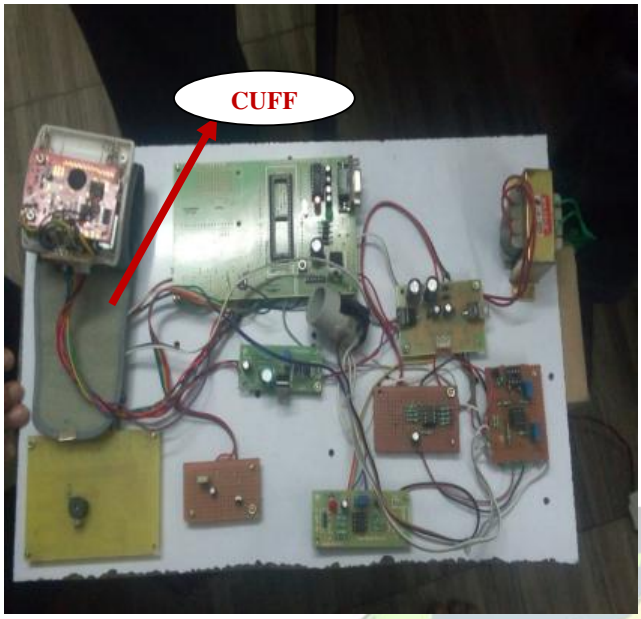

FIG.3 KIT SETUP

IV. RESULTS AND DISCUSSION

The system was implemented as previously described. As mentioned, both client and server side utilized python programming language. The proposed system is meant to operate in an application by doctor and paramedics. The major task will be monitoring the patient health condition by checking on different signals and doctor could prescribe to the patient and then paramedics send the list of prescription to the patient. Evaluating the result is an important issue of patient monitoring system. In order to evaluate the effectiveness, the proposed system works with different types of data set. For example, Blood pressure data set, heart beat data set, Situation of Oxygen in Blood (SPO2) data set, temperature data set. After getting data set proposed model pre-process the signal, analyse the signal and finally evaluate the result.

V. CONCLUSION

In this paper patient health monitoring management system has been developed. The patient condition is monitored and treated using Raspberry pi. The signal has been transmitted over web server to specialist doctor and displays the data in doctor´s site. After getting the signal and available information, the doctor can give proper treatment for the Patient. In future a doctor assisting system will be included video along with the portable patient monitoring system. It moderates and increases the quality of life of patients. As the modern life becomes more hectic and severe diseases appear, sustained treatments become more necessary. The paper fulfills the requirements to both the patient or remote paramedics and the specialist doctor. This time communication takes place via the wireless transmission which is more fast and easy system. If proper research and development work is initiated in this field today, then it is possible to propose a better solution. It moderates the need of transporting between hospital and patients.

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