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An Energy Efficient Programmable Controller For Personalized Biomedical Applications

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Abstract: Wearable personalized health monitoring systems can offer an effective solution for human health care system. And it keeps patients engaged and performs many functions. It monitors a patient's physiological signals continuously and transmits it with minimum power. It also helps in improving the chances of saving human life. In wearable personalized health monitoring systems, the signals are continuously monitored. For this operation, power is consumed heavily. It needs charging for a certain time, (i.e.) every 2-3 hours for continuous monitoring. During the charging of the equipment, if the patient suffers any difficulties, this wearable personalized health monitoring system become helpless at that time. In already existing system the power is consumed heavily because they transmit the bit for every second from the physiological signals. So, a power efficient health monitoring system using "WIFI CONTROLLER ESP8266 MOD" has been proposed to give timely needed information about the patient's health with low power consumption.

Keywords: Personalized health monitoring, Biomedical sensors, Physiological signals, Heart rate, SpO2, BPM, Abnormality, Alert message system.

I.INTRODUCTION

Recent innovations within the semiconductor industry made it is possible to integrate various sensors and computing components in an embedded system on a chip (SoC) processing platform. Wearable mobile platforms use embedded SoC's to process sophisticated and computationally intensive applications. With the rapid advances in small, low-cost signals including smart phones and smart watches, there's an incredible opportunity to develop ubiquitous personalized biomedical embedded systems capable of continuous vigilant monitoring of physiological signals. These systems have the potential to cut back the morbidity, mortality, and economic cost related to many chronic diseases by enabling early intervention and preventing costly hospitalizations. Additionally, recent advances in non-invasive sensor technologies enable the chance that these systems can potentially monitor and analyze several modalities, including pressure, temperature and electrocardiography. With biomedical applications, embedded systems allow doctors to remotely monitor patients ' health and make diagnoses and treatment decisions through telemedicine and other remote systems. The utilization of embedded systems in healthcare has empowered doctors and patients alike. Embedded biomedical applications primarily contains three basic stages: A sensor front-end to capture and digitize physiological signals, A processing stage to investigate, classify, and potentially store the sensors' data, and An RF module stage to transmit the information, classification, and/or diagnostics to the user or medical personnel. There has been an implausible amount of innovation and improvement in sensor design that has dramatically reduced power while maintaining high accuracy

II.LITERATURE SURVEY

In Wearable personalized health monitoring systems, the signals are continuously monitored. For this operation, power is consumed heavily. It needs charging for a certain time (i.e.) very 2-3 hours for continuous monitoring. At that point, the patient may suffer any difficulties; this wearable personalized health monitoring system will be failed [at that time]. So, a power efficient health monitoring system is designed.

III.METHODOLOGY

The proposed system explores the look of remote monitor for efficient processing of personalized biomedical applications. E-Health remote monitoring systems have bloomed rapidly with a myriad of applications. Here, a design of a distant wearable health monitor for the biomedical field is employed. Two biomedical sensors which are vital sign sensor, humidity and temperature (DHT11) sensors are accustomed to measure the physiological signals of human. Wi-Fi ESP8266 MOD connected with Arduino IDE Software the specified results produced. Here the physiological signals are taken and given through the sensors for further processing. The software further as hardware implementations using controller for personalized biomedical application is compared. The power has been utilized only, there's an abnormal state is proposed. The proposed system ready to achieve high accuracy where the proportion of temperature difference is a smaller amount than 1% compared to the commercial devices. For these end to finish applications the module will provide the alert message if the patient condition is abnormal. This condition indicates both high and low recordings of the mentioned data. With a mean power consumption of every working sensor on board is ≤9W. The results show satisfactory output for each experiment using the recorded physiological signals.

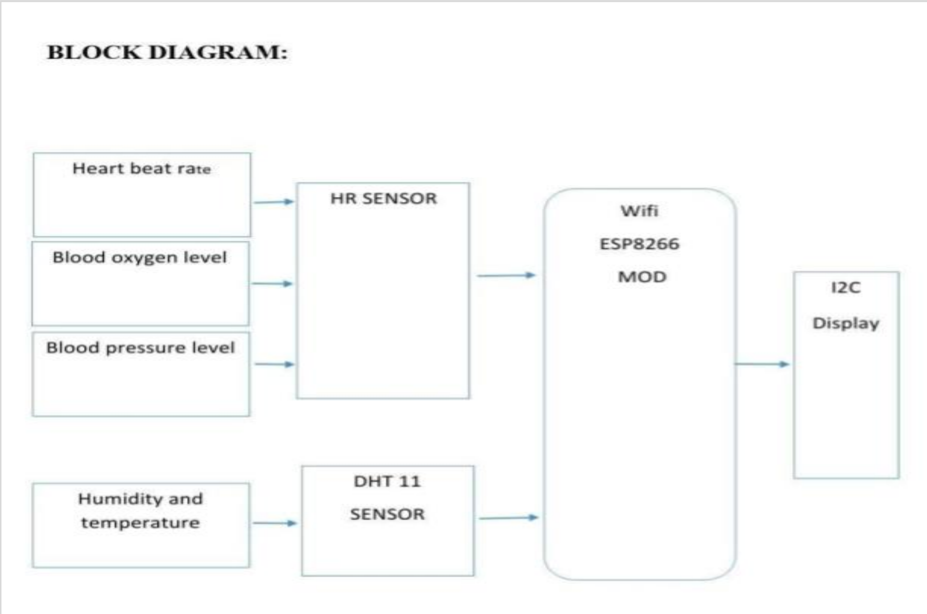

Figure.1- Block diagram of proposed system

IV.EXPERIMENTAL RESULTS WITH FIGURES

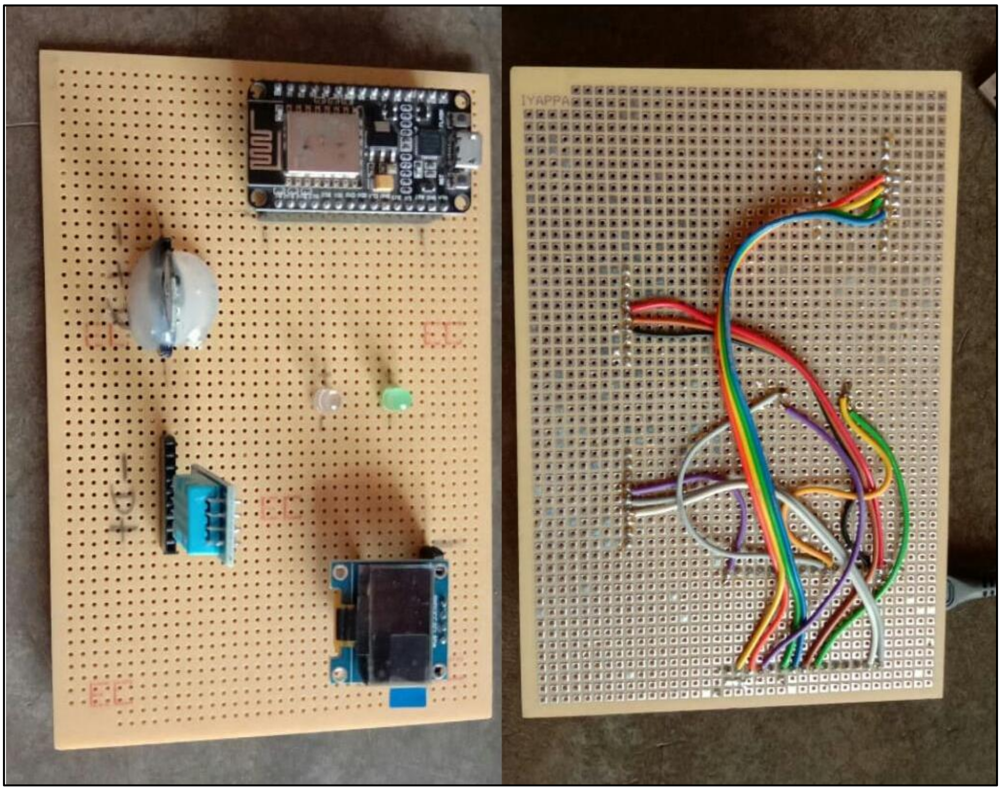

Figure.2-Experimental setup

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The experimental setup of the proposed system is shown. The connection setup shows that the HR sensor and DHT sensor inputs are connected to the Wi-Fi ESP8266 MOD controller. And so the controller is connected with the I2C display and LEDs.

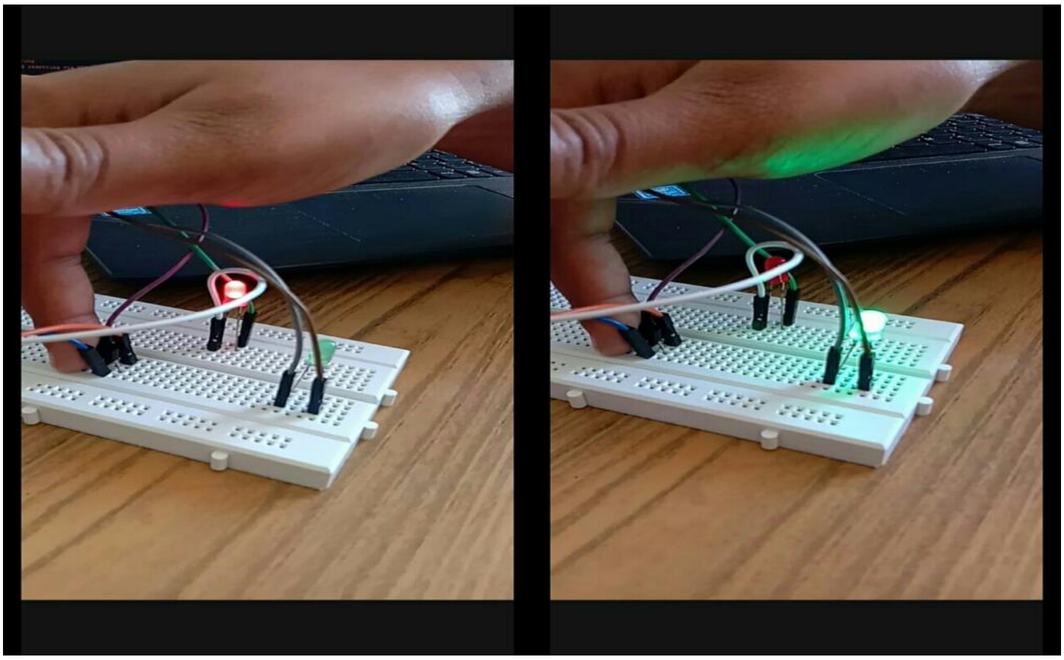

Figure.3- Blinking of green and red led

The green colour LED glows when the patient's health is normal. And the red colour LED glows when the patient's health is abnormal .Here the patient's health represents heart rate, blood pressure level, blood oxygen level and temperature of the patient.

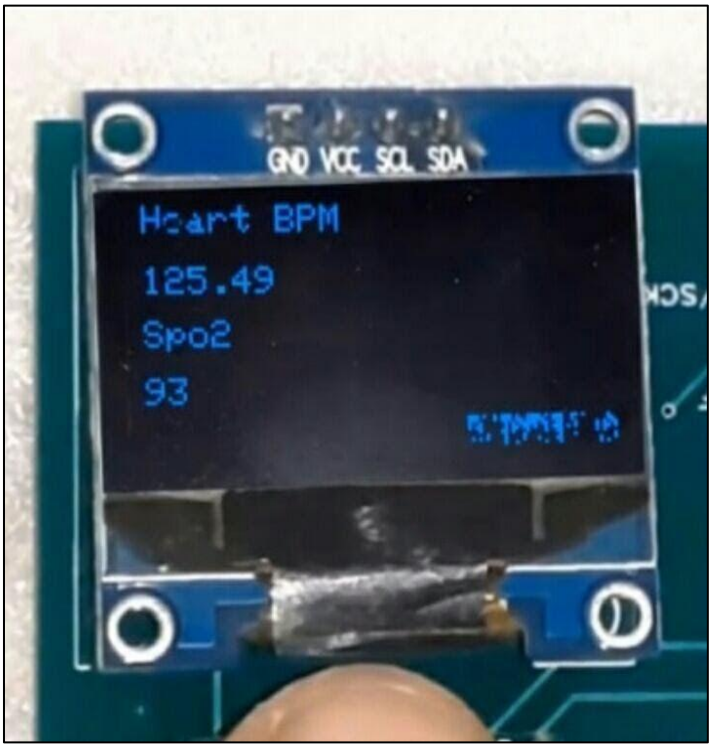

Figure.4-Patient's data displayed in I2C display.

Vital signs (HR, BP, TEMP, SPO2 level) are displayed in I2C display screen as shown in Fig [3].In case of abnormality, the vital signs are displayed with an alert message.

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V.CONCLUSION

The proposed system explores the design of remote monitoring device for efficient processing of personalized biomedical applications. Here the physiological signals are taken and given through the sensors for further processing. The software as well as hardware implementation uses controller for personalized biomedical application. The software used here is Arduino IDE and the hardware implementations of these module includes Wi-Fi ESP8266, I2C display, HR sensor and DHT sensor. In the processing stage, it records the normal and the abnormal values obtained from the sensor and the power is consumed only when there is an abnormality. This abnormal condition indicates both high and low recordings. As soon as the abnormal condition is reached it indicates what exactly the problem in the body of the patient with low power consumption and it can be wearable. So it can be taken through anywhere at any time at earliest.

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