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Design and Implementation of Online Heart Rate Monitoring System

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Abstract: ***In this paper a different technique has defined for monitoring of pulse rate of human being and how this technique is helpful in taking immediate action for his care. Many different pulse rate or heart rate monitoring system has been designed and has proven to helpful in saving one's life. In the earlier systems the data transmission are allowed to local area only. The data transmission rate is slower. The method defined in this paper is globalized, for monitoring over the pulse rate of individual a system has designed using Atmega16 controller and later on the data is transmitted through website. This data can be accessed by the medical staff or any individual related to that medically challenged person.***

Keywords: Atemga16 Microcontroller, Internet, pulse rate, RSMAX232, Website

1. Introduction

Pulse rate is one of the vital signs of the body basic function and study of pulse is specified as sphygmology. In medical pulse signifies the tactile arterial palpation of one's heartbeat observed by the trained person using fingertips or with the help of pulse oximeter sensor. Pulse can be obtained from any place of the body that allows an artery, compressed behind the bone at different part of body i.e. at neck known as carotid artery, inside elbow known as brachial artery, the count of arterial pulse per minute is known as pulse rate or heart rate. It can also be measured using traditional stethoscope.

Pulse rate not only defines the heart rate, but also indicates the heart rhythm, strength of the pulse. Normal pulse count of a healthy person lies between the range of 72 to 80 pulse/min. Fluctuation in pulse rate can occurred at different occasion such as at the time of exercise , illness, injury, and some time at different mood known as emotion. For any medically challenged person it varies from 80 to 100(Fever) and when it below 60pulse/min. it indicates the critical condition and 0 pulse/min. or a DC line in the indicator indicate that the person is no more or dead.

2. History

In an earlier monitoring system, a microcontroller has been used to monitor the heart rate of the patient. This system record the heart rate of patient for every 24 hours and this data is mailed to the doctor. This system uses the zero crossing algorithms to compute the heart rate [1]. The major limitation of this monitoring system is that it allows doctor to get data after 24hours.An another monitoring system, displays the heart rate of the patient at the LCD display [4]. This monitoring system can only be used to monitor patient health within limited premises.

3. Online Heart Rate Monitoring System

In this monitoring system the heart rate of the patient can be monitored from anywhere using a computer or a device (mobile) having internet connectivity. This system works on real time.

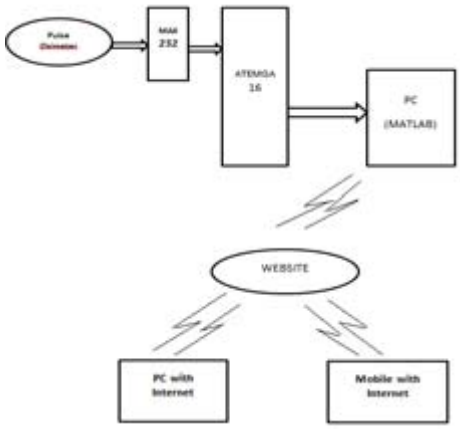

Figure 1: block diagram

3.1 Pulse Oximeter

This device is used to measure the pulse rate of the patient. It functions on the principle of the absorption of red and infrared light by pulsatile blood. These devices are cheaper, continuous functioning and portable. Red light is absorbed by the oxygenated blood at 660nm, while deoxygenated blood absorbs at 940nm the infrared light. It consist of two LED and two light collecting sensors that measure the amount of red and infrared light emerging from tissues traversed by light rays. This device delivers data not only about pulse rate but also the oxygen saturation and also the cardiac output.This device has proved as revolutionary product for de-facto monitoring device in the operating room, patient transfer, and instant care

Figure 2: pulse oximeter

3.2 Atmega16 Microcontroller

In this system, the microcontroller ATMEGA16 has been used to take the controlling action of the monitoring system. It is an 8 bit microcontroller with low power consumption characteristic. It has advanced RISC based architecture. The architecture consist powerful instruction set which requires only one clock cycle for execution. This enables the microcontroller to achieve the throughput of 1 MIPS per MHz which results to a very less power consumption. It is a very high performance microcontroller. It contains 16KB in self-programmable flash memory for programming, 512 bytes of EEPROM and to provide additional security to the software it contains programming locks.

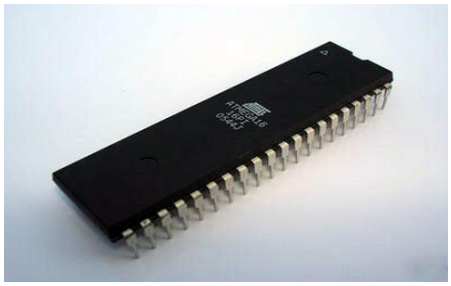

Figure 3: Atmega16 microcontroller

4. Website

In this system a server has been designed which act as the leading part of the complete monitoring system. This part removes all the limitation of the above mentioned method of monitoring system. With the help of server instant action can be taken for the care of the medically challenged person. The data from microcontroller is transmitted to the server and the data (pulse rate) at server is changed after every 5second, can be seen by the medical staff (doctor) from anywhere by simply visiting to the website and this data can also be checked by the parent or guardian of the patient. In this way instant action can be taken to save patient from going to more critical condition.

5. System Having Internet Connectivity

This part of the system is considered to be the output device. For the real time output, in this system we need a device which has the internet connectivity basically any PC or Mobile. The output device can be used by medical staff and with the guardian (if needed). With the help of this system many life can be saved and guardian can be helped from the fraud cases of receiving false payment by the hospital. This system can also be helpful for hospital from claims of death and of carelessness of medical staff and doctors.

6. PCB Layout

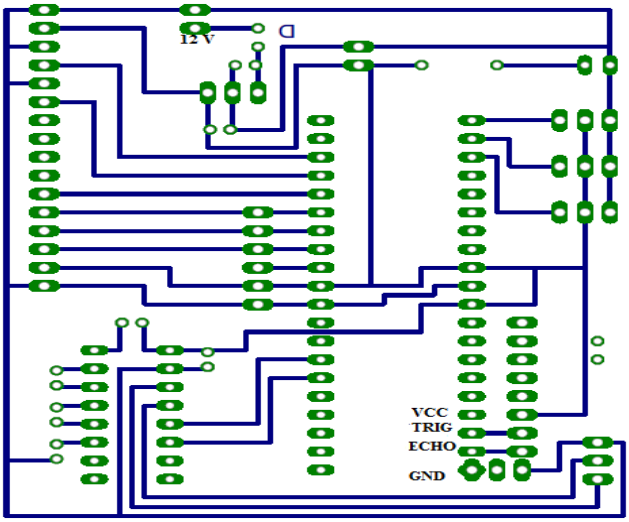

Figure 4: PCB layout of hardware

7. Results

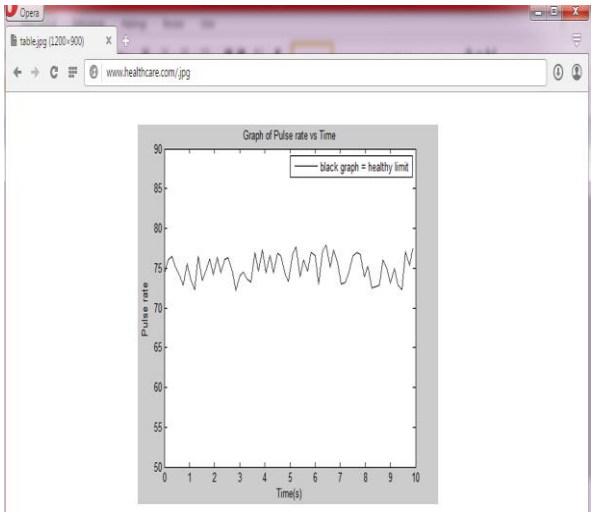

Figure 4: Pulse rate of healthy person

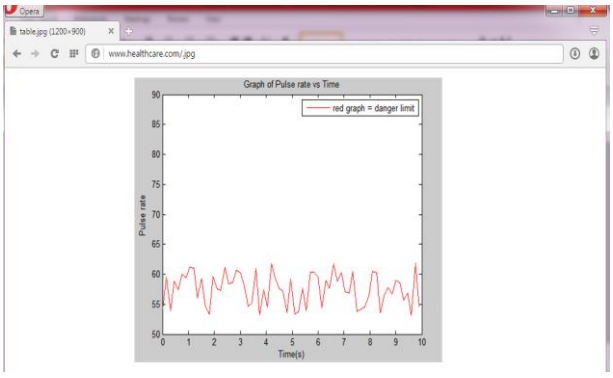

Figure 4: Pulse rate of patient in ventilator

8. Conclusion

The above mentioned system has been examined at hospitals and has been found to be worthy and more effective. The

achieved data rate is faster and more reliable. The two figures above mentioned are the data taken (live) from hospital.

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