HEALTH MONITORING SYSTEM WITH WIRELESS ALARM

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ABSTRACT

The HEALTH MONITORING SYSTEM WITH WIRELESS ALARM is a device which will be of help to patients as well as the elderly people enabling their caretakers to easily take care of them. It transmits the data acquired from the sensors to the wireless alarm and display unit thereby enabling the caretaker to reach the patient faster in case of emergency this especially works if the caretaker thinks the patient is sleeping but is actually undergoing hypoglycemia or any other problem. The display unit immediately alerts the caretaker of the change in condition, preventing serious injury. This is achieved by detecting the heart rate and the temperature of the patient.

Keywords: **- health Monitoring, heart rate measurement, portable device.**

I.INTRODUCTION

 A heart rate monitor is a monitoring device that allows a subject to measure their pulses in real time or record their heart rate. Usually it is done by a monitoring box with a set of electrode leads attached to the chest. The heart rate of a healthy adult is around 72 beats per minute (bpm) an average human heart rate is(60-100)beats/minute. While measuring the rate when the pulse returns to normal is an indication of the fitness of the person. Lower than normal heart rates are usually an indication of a condition known as bradycardia, while higher is known as tachycardia. Heart rate is simply measured by placing the thumb over the subject's arterial pulsation, and feeling, timing and counting the pulses usually in a 30 second period. This method although simple, is not accurate and can give errors when the rate is high. More sophisticated methods to measure the heart rate utilize electronic techniques. Electro-cardiogram (ECG) is one of frequently used method for measuring the heart rate. But it is an expensive device. Low-cost devices in the form of wrist watches are also available for the instantaneous measurement of the heart rate. Such devices can give accurate measurements but their cost is high. So this heart rate monitor with a temperature sensor is definitely a useful instrument in knowing the pulse and the temperature of the subject or the patient. Heart rate can be taken at any spot on the body at which an artery in close to the surface and a pulse can be felt. The most common places to measure heart rate using the palpation method is at the wrist (radial artery) and the neck (carotid artery). Many heart rate monitors require at least a little body perspiration between the chest strap and the skin for best conduction of the signal.

II.PROCESS MODEL

The Health Monitoring System with Wireless Alarm is a device which will help the elderly be properly taken care of. This will also be of use to the people who take care of them. People who use this device will able to be in peace knowing that they are perfectly safe when using this device.The Heart of the Health Monitoring System with Wireless Alarm is the MSP430 Micro Controller. The Heart Beat is recorded using Pulse Oximetry Sensor. The Pulse Oximetry Sensor will output the Heart Beat in the form of an Analogy Signal. The Analogy to Digital converter of the MSP430 Micro Controller is used to convert the Analogy input into Digital form. This is done by taking the average of highest crest and lowest trough of the Analogy waves for 200 readings we get the accurate reading. This reading is processed by the MSP430 Micro Controller to calculate the number of beats per minute. If the Heart Rate of the person is too low or too high the Micro Controller transmits the fact to the receiving unit by the means of a RF Transmitter. The Receiving unit is in fact another MPS430 Micro Controller connected to a RF Receiver and a Buzzer. During the event of Heart attack or any other related problems the transmitting unit signals the receiver to generate an alarm. This will in turn help get timely attention to the patient.

III. Working model

Health monitoring system with wireless alarm is a device which will help the patient's as well as the elderly people to be properly taken care of. It is useful for people who are both ill and also who are healthy. People who use this device will able to be in peace knowing that they are perfectly safe. The device will be in the form of a small wrist band which contains the controller part and a small ring like extension from the band containing the sensor which can be attached to the upper part of index finger for detecting the heart beat. It will be of great use to people as many; especially elderly/patients will not be able to call for assistance in case of emergency. So this device will solve the problem by sensing the problem and then alerting the caretakers by producing some alarm. Thus proper attention and assistance can be given to the diseased person.

The hardware components used for the health monitoring device with wireless alarm are:-
1. MSPEXP430G2 MICROCONTROLLER
2. TSL2561 PULSE OXIMETRY SENSOR
3. RF TRANSMITTER RECEIVER

The device is controlled by MSP430 microcontroller. Heart beat is recorded using Pulse Asymmetry Sensor. This Pulse Asymmetry Sensor gives the heart beat in the form of analog signal. The Analog to Digital converter of MSP430 converts the analog to digital. This is done by taking the average of the highest crest and lowest trough of 200 analog wave readings in order to get the accurate reading. This digital data is processed by MSP430 to get the number of beats/minute. If the heartbeat is too low or too high then the microcontroller transmits the data to RF Receiver and a buzzer by the help of an RF Transmitter creating an alarm during the case of heart attack or any other health related problems. MSP430 is coded using code composer studio. So this product will be of great use to the medical industry as well as to the common people and it can be called a Life Saver.

IV. Description

a.   Microcontroller:-
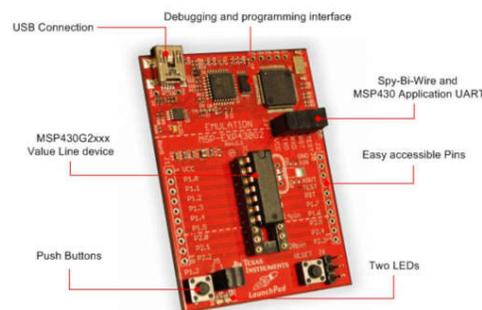
It is a self-contained system with a processor, memory and peripherals and can be used as an embedded system. Microcontrollers has input/output devices (sensors, LCD displays, relays etc.), which is used for controlling the input from the sensors and transmitting it to the receiver unit. It has a dedicated input device and often has a small LED or LCD display for output. A microcontroller also takes input from the device it is controlling and controls the device by sending signals to different components in the device.

b. RF Transmitter Receiver:-

RF transmitter and receiver are used to transmit data from the microcontroller to the buzzer with a wifi module esp8266 through which data if transmitted from the transmitter to the receiver. It is achieved through serial communication between the transmitter and the receiver.
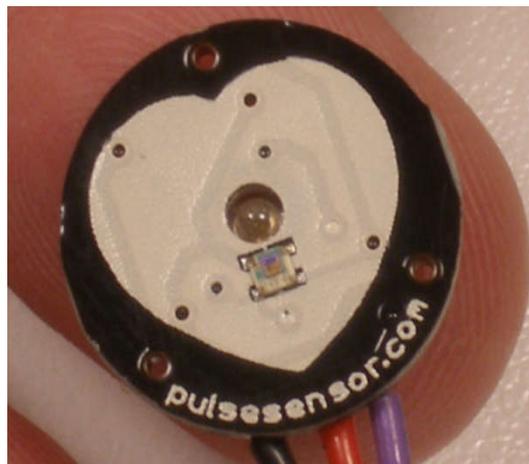
i.   Serial communication:-

For communication between two devices on longer distances is possible through serial communication. The factors which influence it are the no of microcontroller used for exchange of data and their speed and their distance between them. The calibration of data being sent and received is done through microcontroller MSP430 which is also called protocol.
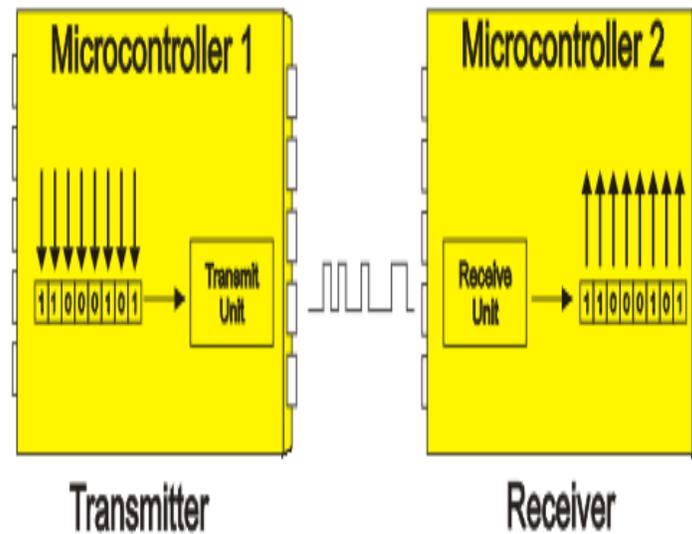
Pulse oximitry sensor:-

A sensor device is placed on a thin part of the patient's body, usually a fingertip or earlobe, or in the case of infants, across a foot. The device passes two wavelengths of light through the body part to a photo detector. It measures the changing absorbance at each of the wavelengths, allowing it to determine the absorbance's due to the pulsing arterial blood alone, excluding venous blood, skin, bone, muscle, fat, and (in most cases) nail polish.[1]

BLOCK DIAGRAM:-

Acquistion of Pulse

Detection of heart beat using Pulse Sensor	Amplification of the pulse

Signal processing

Process signal using MSP430 series MCU	Temporary storage of sensor data

Wireless transmission of data

By the use of radio frequency data is transmitted to receiver unit	Data is received by the MSP430 series MCU at the receiving end

Processing of received data

The data is processed into signals using the MSP430 MCU	This triggers an audible alarm in the event of any sudden change in pulse

Display unit

This data is used to display the current situation of the person wearing it	This is done using a dot display with a lm3619 IC

Alert system

Incase of high pulse rate or low pulse rate an audible alarm will be sounded	And the display will be showing red in either extreme of the pulse rate

In this process the heart beating pulses are read from the pulse oximetry sensor and amplified and sent to the signal processing unit which is the microcontroller MSP420 which acts as a temporary storage device for the incoming signals then these signals are transmitted to the receiver unit using IR sensors from the receiving end of the MSP430 these signals are again received through a IR receiver which has a microcontroller MSP430 which is used to amplify the received signals and display it in the display unit. And triggers the alarm in case of emergency.
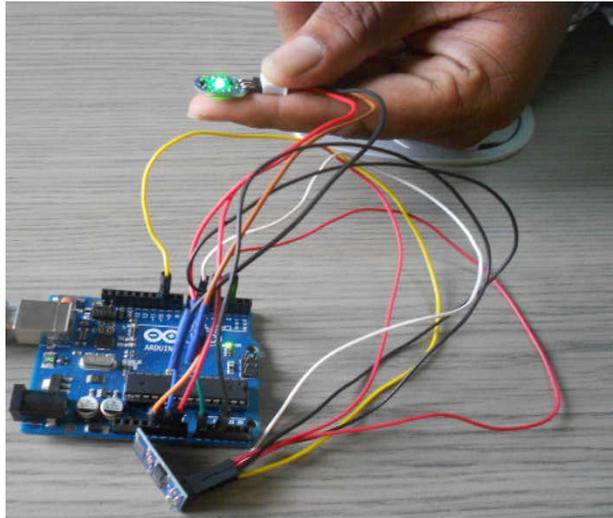
Monitoring of heart rate

FUTURE DEVELOPMENTS

- We would also be adding a temperature monitoring system.
- A Dot display would also be added to the receiving unit for continuous monitoring.

References

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