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Detecting Vital Signs with Wearable Wireless Sensors

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ABSTRACT: Vital signs are measurements of the body's most basic functions. The main vital signs routinely monitored by medical professionals and health care providers include the Body temperature, Heart rate, Blood pressure. Vital signs are useful in detecting or monitoring medical problems. Vital signs can be measured in a medical setting, at home, at the site of a medical emergency, or elsewhere. The emergence of wireless technologies and advancements in on-body sensor design can enable change in the conventional health-care system, replacing it with wearable health-care systems, centered on the individual. Wearable monitoring systems can provide continuous physiological data, as well as better information regarding the general health of individuals. Thus, such vital-sign monitoring systems will reduce health-care costs by disease prevention and enhance the quality of life with disease management.

KEYWORDS:PIC Micro Controller, Regulated Power Supply Unit, 16x2 LCD,Alarm,Temperature sensor,ADC,Blood Pressure,GSM Module, Heart Beat sensor

I.INTRODUCTION

This project describes the design of a simple, low-cost microcontroller based heart rate, body temperature, blood pressure measuring device with LCD output. Heart rate of the subject is measured from the index finger using IRD (Infra-Red Device sensors and the rate is then averaged and displayed on a text based LCD).The device alarms when the heartbeat, body temperature and pressure exceed the provided threshold value. This threshold value is defined by the programmer at the time of programming the microcontroller PIC 16F877A. The threshold value given for the project is as 20 to 120 pulses per minute for heart beat indication & 18°C to 38°C for temperature& 80 to 120 for blood pressure. This information i.e. the Heart Rate, the Body Temperature& the blood pressure is then transmitted wirelessly to the doctor which in not in the vicinity of the patient through GSM technique.

In this project, the sensors measure the information and transmit it through GSM Modem on the same frequency as on which cell phones work. And we can get continues measurement of the vitals in our android Smartphone using an application which is pre-installed in the mobile the data to the mobile is transmitted using the Bluetooth module.Wearable sensors have diagnostic, as well as monitoring applications. Their current capabilities include physiological and biochemical sensing, as well as motion sensing. It is hard to overstate the magnitude of the problems that these technologies might help solve. Physiological monitoring could help in both diagnosis and ongoing treatment of a vast number of individuals.

II. BLOCK DIAGRAM OF THE PROPOSED MODEL

The block diagram of Detecting vital signs with wearable wireless sensors consists of following blocks:

1. PIC Micro Controller(16F877A)
2. Regulated Power Supply
3. 16x2 LCD Display
4. Buzzer (piezo electric)
5. Temperature sensor (DS18B20)
6. Blood Pressure sensor(MP3V5050)
7. Heart Beat sensor(HRM2511E)
8. GSM module (SIM 900A)

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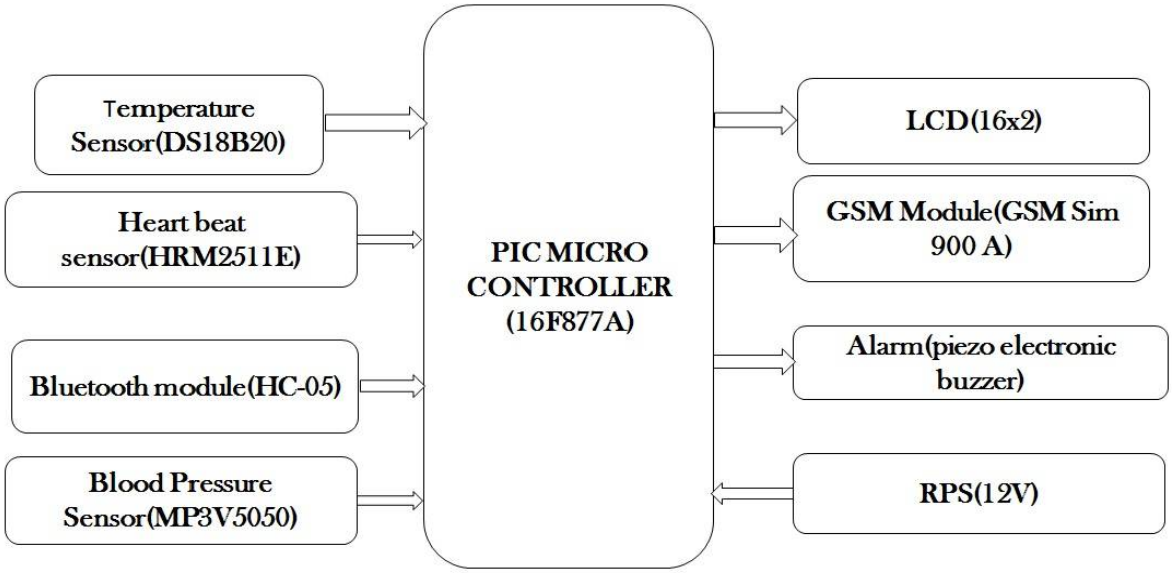
9. Bluetooth Module (HC-05)
10. Start and Stop buttons



1.BLOOD PRESSURE SENSOR: Portable blood pressure monitors are a common medical device used for clinical and home monitoring purposes. The oscillometric method is the most common method for measuring blood pressure. In the oscillometric method, the intra-arterial pulsation is transmitted via cuff to transducer while systolic and diastolic pressure are estimated from the amplitudes of the oscillation by using an empirical algorithm. Modern blood pressure monitors typically include a pressure sensor that transmits a signal that must be amplified and filtered before being sent into an ADC. Typical blood pressure monitors will also include a heart rate timer, a safety timer, and a display. In this project we are using the oscillometric method to take the blood pressure reading from the sensor MP3V5050. Blood pressure (BP) is the pressure exerted by circulating blood upon the walls of blood vessels and is one of the principal vital signs. When used without further specification, "blood pressure" usually refers to the arterial pressure of the systemic circulation, usually measured at a person's upper arm. A person's blood pressure is usually expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimetres of mercury (mm Hg). Normal resting blood pressure for an adult is approximately 120/80 mm Hg.

2.TEMPERATURE SENSOR: The DS18B20 digital thermometer provides 9-bit to 12-bit Celsius temperature measurements and has an alarm function with non-volatile user-programmable upper and lower trigger points. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor. It has an operating temperature range of -55°C to +125°C and is accurate to ±0.5°C over the range of -10°C to +85°C. In addition, the DS18B20 can derive power directly from the data line ("parasite power"), eliminating the need for an external power supply. Each DS18B20 has a unique 64-bit serial code, which allows multiple DS18B20s to function on the same 1-Wire bus. Thus, it is simple to use one microprocessor to control many DS18B20s distributed over a large area. Applications that can benefit from this feature include HVAC environmental controls, temperature monitoring systems inside buildings, equipment, or machinery, and process monitoring and control systems. It is generally accepted that normal body temperature ranges between 36.1C (97F) to 37.2C (99F).

3.HEART RATE SENSOR: Pulse sensor HRM2511E works on the principle of photoplethysmography (PPG) as a non-invasive optical technique for detecting cardio-vascular pulse wave from a fingertip. It uses an infrared light source to illuminate the finger on one side, and a photo detector placed on the other side measures the small variations in the transmitted light intensity. The variations in the photo detector signal are related to changes in blood volume inside the tissue. The signal is filtered and amplified to obtain a nice and clean PPG waveform, which is synchronous with the

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heartbeat.The pulse rate is a measurement of the heart rate, or the number of times the heart beats per minute. As the heart pushes blood through the arteries, the arteries expand and contract with the flow of the blood. Taking a pulse not only measures the heart rate, but also can indicate Heart rhythm, Strength of the pulse. The normal pulse for healthy adults ranges from 60 to 100 beats per minute. The pulse rate may fluctuate and increase with exercise, illness, injury, and emotions. Females ages 12 and older, in general, tend to have faster heart rates than do males. Athletes, such as runners, who do a lot of cardiovascular conditioning, may have heart rates near 40 beats per minute and experience no problems.

DESCRIPTION OF THE MODEL:Our project using PIC16F877A microcontroller, which one of the power full microcontroller nowadays, which use RISC architecture having many inbuilt feature than normal 8051 MUC like in built ADC, CAN ,SPI, I2C communications etc. When we switch on the power supply first the initialization of GSM taken place after initialization the LCD will show GSM Test OK. We have to place the sensors in our body. To start project we need to press start button, as soon as start button is pressed it will start to get heart rate value and body temperature value and compares with references values, which is for temp 98-10, heart rate 60 -120 BPM.Reading values are taken continues every 2secs, if reading values cross than the limit then SMS is sent to person which is pre-programmed in MUC while coding.To take BP readings, BP button need to press for 5sec,after which MUC while taking to BP mode, where we need to wear BP kit to wrist and press start button, after which BP values are displayed on LCD and compares with the reference value, which is systolic 120mmHg and diastolic 80mmHg if the value goes abnormal an SMS is sent through GSM.Now again above same process begins, and we have provided to store and acqiure data and save in PC through bluetooth. Every reading are recorded in PC using bluetooth.

III.EXPERIMENTAL RESULTS AND SETUP

Fig: 2 Photograph of proposed model

The four main vital signs Body temperature, Heart rate, Respiration rate, Blood pressure are measured using this model and the results are stored. In case of abnormalities a message will be sent to mobile number which is stored in the microcontroller.

VI.ADVANTAGES

1. The wireless alert system using WAP notifies physicians of critical results on their Display (Cellular Phones can also be used as a display).
2. With online recording of medical parameters, the workload of the case providers and the nursing staff is reduced.
3. The clinical information database contains all data regarding the patients in electronic form.
4. The patient call switches help emergency situations to be handled quickly.

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V. CONCLUSION

This Project which demonstrates an automated patient monitoring system has its own merits which are discussed above. We have presented some applications of how people could benefit from living in homes that have wireless sensor technologies for improving the quality of life. The first decade of research in the field of wearable technology was marked by an emphasis on the engineering work needed to develop wearable sensors and systems, recent studies have been focused on the application of such technology toward monitoring health and wellness. This consideration was the basis for this project review. This project summarized enabling technologies developed over the past decade and put a great deal of emphasis on surveying studies focused on the deployment of wearable sensors and systems in the context of a concrete clinical applications, with main focus on rehabilitation.This wearable module can transmit the data continuously over a fiber optic link or through an internet digital radio. The received data can be stored in separate memory and be processed by a microcontroller.

VI. FUTURE SCOPE

This enhancement will enable monitoring of patients to be more flexible and strain-free. In addition to above the following enhancement can also be made:

- A graphical LCD can be used to display a graph of the change of heart rate over time.
- Sound can be added to the device so that a sound is output each time a pulse is received.
- The maximum and minimum heart rates over a period of time can be displayed.
- Serial output can be attached to the device so that the heart rates can be sent to a PC for further online or offline analysis.

REFERENCES

[1]. a b c d e Fraser, C. G.; Fogarty, Y. (1989). "Interpreting laboratory results". BMJ (Clinical research ed.) 298 (6689): 1659–1660. doi:10.1136/bmj.298.6689.1659. PMC 1836738.PMID 2503170.
[2] C-reactive protein (serum, plasma) from The Association for Clinical Biochemistry and Laboratory Medicine. Author: Brona Roberts. Copyrighted 2012
[3] "Healthcare 2030: disease-free life with home monitoring nanomedince". Positivefuturist.com.
[4]"Nanosensors for Medical Monitoring.". Technologyreview.com.
[5]"Brain Damage Caused by Neuroleptic Psychiatric Drugs". Mindfreedom.org.
[6] "Medications That Can Cause Nerve Damage". Livestrong.com.
[7]a b Hyman, Mark (December 2008). The UltraMind Solution: Fix Your Broken Brain by Healing Your Body First. Scribner.ISBN 978-1-4165-4971-0.
[8]"Blood glucose testing and primary prevention of diabetes mellitus type 2 - evaluation of the effect of evidence based patient information.".BMC Public health. "
[9]"Stress monitoring using a distributed wireless intelligent sensor system.". IEEE.
[10] "Using biosensors to detect the release of serotonin from taste buds during taste stimulation.".Archives Italiennes de Biologie.
[11]Kamel JT, Christensen B, Odell MS, D'Souza WJ, Cook MJ (December 2010). "Evaluating the use of prolonged video-EEG monitoring to assess future seizure risk and fitness to drive.". Epilepsy Behav 19 (4): 608–doi:10.1016/j.yebeh.2010.09.026. PMID 21035403.
[12] "Multiarray Biosensors for Toxicity Monitoring and Bacterial Pathogens". CRC.