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Design of Compact Multipurpose Mobile Based Health Care Device with Location Tracker Using Wearable Technology

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Abstract: ***The value of healthcare is increasing throughout the world. Without disruptive changes, a great section of the population in many developed states will no longer be able to pay for upkeep of health by 2040. A Part of the solution will come from concentrating on prevention. Having personal tools at everyone's distributes which will aid people to monitor their health and to change their reactions can enable disease prevention. Control of human weight and managing stress are two social relational challenges where a behavioural change can have huge value of savings. It is proposed that it is shown how wearable sensor devices are able to detect health parameters and reports to local owners utilize and remote utilizes such as doctors, home, etc. It is proposed that a system for remote monitoring the respiration of individuals that can presence at existence of respiration rate and a manner of breathing and identify coughing events, Temperature etc. The Shimmer platform having a MCU with few ADC inputs which are worn to connect the sensors, and Bluetooth. The data from the sensors is sent wirelessly to a utilize mobile via Bluetooth for local monitoring and then further transmitted to server for remote monitoring. The data can then be processed and analysed in real-time.***

Keywords: MCU-micro controller unit, LMHCS-Location-based mobile health care System

1. Introduction

The rising cost of in-bed hospitalization and the fresh technological advances in low-power integrated circuit sensors coupled with the introduction of resourceful power protocols such as Bluetooth and GPRS has attracted researchers to study the establishment and usage of wireless networks as a vehicle for transmitting patients' related information without the need to confine them to a foundation Wireless based non-confining monitoring systems improve the quality of life for the patients while helping as a cost effective solution to the problem of health care monitoring that is collapsed with the raise in the population elderly.

Wireless technology is an intelligent tracking system has become a popular research with the development of communication effect. People are utilizing the merits of embedded system into monitoring and control system for an intelligent healthcare system because of so many benefits. For many, the term 'wireless' is intimidating because it brings forth a whole lexicon of additional terms and acronyms such as Wi-Fi, 2G, 3G, GPRS and Bluetooth that are new and menacing. Healthcare service is furnished to continuously collect biomedical signals from multiple locations. To scrutinize and evaluate the Heart Beat Rate signals in immediate, here mobile device is used as a mobile monitoring terminal.

Monitoring parameters of temperature and humidity is an important means for obtaining high-quality environment. Health monitoring is an effective method in order to avoid interference environment and improve efficiency by remotely. Health data are being coordinated into the healthcare cloud handling service (Web server system and Web server dataset) to guarantee a faultless healthcare monitoring system and anytime and anywhere coverage of network connection is available. Together with a Web page application, check-up data are easily approached by medical professionals or relatives. The system demonstrates superior accessibility of off-site and up-to-the-minute patient data, which can facilitate detect health problems early and maintain elderly patients out of the emergency room, thus providing a better and additional widespread healthcare cloud handling service. GPRS is wireless network with special concurrence. It is elevated costs, hard to be developed and the coverage signal will be bounded. WSN hand out with the large costs of wiring, WSN technologies are most suitable for health care applications comparing with Wi-Fi and Bluetooth.

2. Proposed Model

The proposed system is a location-based mobile health care system (LMHCS) is to help out hospitals and doctors to monitor their respiration and heartbeat of patients. In the emergency situation, this proposed system can smooth the progress of heart beat and respiration of patients to locate the nearest healthcare points (HP).

LMHCS consists of three main subsystems:

1) A monitoring system for the heart beat and respiration of patient
2) A system to track the location of the heart beat and respiration of patients in emergency situations.
3) (3)Monitoring and guide them to the nearest hospital for Emergency Medical Services (EMS).

This involves a Bluetooth-enabled wireless network of various body parameter sensors [e.g. respiration, electrocardiogram (Heart Beat Rate) and temperature] that can communicate with the mobile device (cellular phone or PDA). The heart beat rate is from Bluetooth-compliant and transmits via mobile phone to the PAN, operating in a slave point-to-point configuration. Wearable jacket computed all sensors attached to human body with Battery 6v Ni-Cd 2500

mAh Size C, our proposed system is very small that is fixed into the wearable jackets.

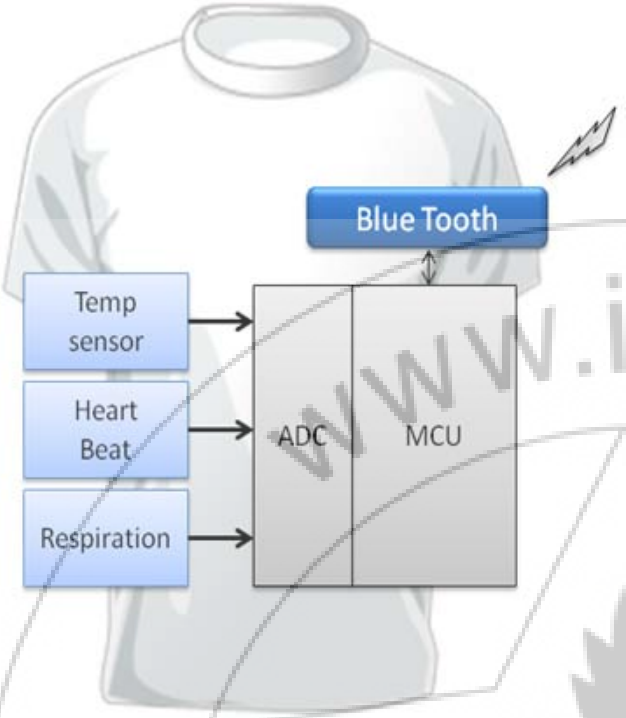

Figure 1: Represents the proposed model of LMHCS

3. System Description

The system is intended and built using the temperature sensor, heart beat monitor sensor, respiration sensor and Mems, ADC, PIC16F88 Micro controller. Architecture of LMHCS is expressed in Fig.2 consists of Sensors (the LMHCS Wearable Device and any additional devices), a mobile phone with the Mobile Patient Application (MPA) to convey data from the sensors to the server, a Server to take delivery and store the data and the doctor Application that displays the data to the caregiver. Both the Wearable device and the MPA are designed to trace health parameters over time and cushion them until they can be uploaded to the Server. This buffering emulsion enables the patient to use the Wearable device to trace data without having to dwell within range of the mobile phone. Temperature sensor is used to evaluate the surrounding area temperature. Beats per Minute (BPM). It Works using the principle of light modulation by blood run through the finger at each pulse. For determine the patient's activity and watching against the possibility of falling down, The accelerometer is used in order to determine whether the patient is stable and is in good position (standing or sitting) or has fallen drop (sudden vertical change of the position). Monitoring & transmitting as shown in Figure3.

Block diagram

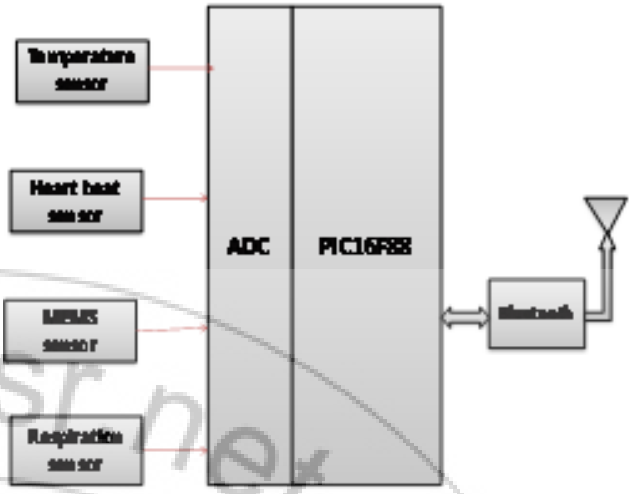

Figure 2: Represents architecture of LMHCS

Figure 3: Represents way of monitoring& transmitting of proposed system

4. Temperature Sensor

Temperature monitoring and control is significant in industrial surroundings. Sensors are broadly used for dimension of temperature. Usually, a temperature sensor alters the temperature into a corresponding voltage output of a sensor. Here we designate a simple temperature measurement and display system based on sensor and PIC16F88 microcontroller. The temperature in degrees Celsius is demonstrated on a smart mobile screen.

The key features of this system are:

1) Continuous monitoring of temperature with 1-second update interval (which can be varied in the program)
2) Temperature measurement using precision integrated-circuit sensor
3) Precise analogue-to-digital conversion using inbuilt 10-bit analogue- to-digital converter (ADC) of PIC16F88 microcontroller.

5. Respiration Sensor

Whereas the respiration sensor is habitually called a strain gauge, the Thought Technology sensor does not utilize an actual strain gauge to evaluate respiration. The Respiration sensor is sensitive to enlarge. When strapped around a client's chest or belly, it will renovate the expansion and contraction

of the rib cage or abdominal area, to escalate and drop of the signal on the screen. The respiration signal is a relative evaluate of chest expansion, so there are no standard units of evaluating for breath. From the original signal gesture form, the software is capable to estimate the respiration rate and relative breath amplitude.

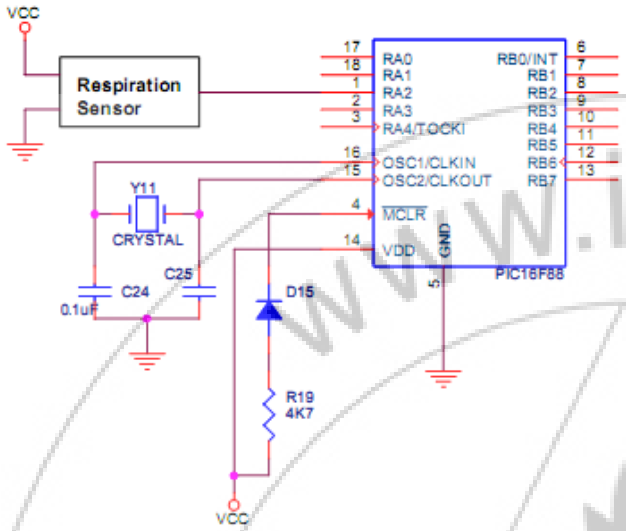

Figure 4: Represents Respiration sensor

6. Bluetooth

The speedy growth in the telecom field and fluid technology has sped up the introduction of telemedicine as a feasible and reliable opportunity. Recent work includes using Bluetooth technology coupled with the GPRS technology to detail symbols to PDAs held by the patient or his physician. Observing based on ultra wideband-based personal area networks was presented an architectural framework for a system that utilizes mobile techniques to wirelessly observe the Heart Beat Rate of cardiac patients. The performance matter, and describes the overall system architecture of a Bluetooth sensor network for patient monitoring, compared to Bluetooth (HC-05), GPRS provides higher network flexibility and a better transmission range with low power consumption. Recently, GPRS-based wireless networks were examined in several applications. The usage of GPRS and mobile telephones are in monitoring elderly patients with diabetes mellitus or heart diseases. A GPRS, Wi-Fi nursery system for patient monitoring was proposed. The study presented here simply attempts to probe into the applicability, usefulness, and practicality of using wireless-GPRS based network in monitoring the cipher of patients on a hospital floor and surrounding area without incarcerate them to a layer. The obtainable resolution is intended to be both stylish, cost efficient and hopefully causes minimal intrusion with the patient's mobility and placate. A wearable sensor unit, attached to the patient's body, reads and sends out the patient's fatal signals to a portable GPRS-based receiver carried around by a nurse or doctor or to a hospital server. Further features include the warehousing of these interpretations in a central database or access via the net.

7. PIC16F88 Micro Controller

PIC is a family of modified Harvard architecture microcontrollers prepared by Microchip Technology, derived from the PIC1650 in the beginning developed by General Instrument's Microelectronics classification. The call PIC initially populated to "Peripheral Interface Controller'" now it is "PIC'" only. PICs are popular with both industrial developers and hobbyists alike due to their low value, wide avail facility, large consume base, extensive collection of application notes, avail facility of low value or free development tools, and serial programming (and re-programming with flash memory) cap facility.

Performance:-The architectural judgment is directed at the maximization of speed-to-value ratio. The PIC architecture was among the first scalar CPU designs and is still among the simplest and economical. . An example of this is a video sync pulse generator. This is no longer true in the innovativeness PIC models; because they have a synchronous interrupt latency of three or four cycles.

Advantages:

1. Easy to learn because of Small instruction set
2. RISC architecture
3. Oscillators are in built with selectable speeds
4. Entry level is very easy, in-circuit programming plus in-circuit debugging PICK
5. Microcontrollers are expensively very high
6. Wide range of interfaces it includes I²C, SPI, USB, USART, A/D and comparators are programmed, PWM, LIN, CAN, PSP, and Ethernet
7. Easy to handle for hobby utilize due to Avail facility of processors in DIL package

Restrictions: One accumulator

i. Schedule-bank switching is needed to access the entire RAM of many devices
ii. Operations and schedules are not orthogonal; some instructions can address RAM and/or immediate constants, while others can utilize the accumulator only.

8. Conclusion

The project "Design of compact multipurpose mobile based health care device with Location tracker using wearable technology" has been designed successfully and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented. The above modified kit in which a PIC Micro controller (i.e. PIC16F88) by using the software tools such as IAR embedded work bench used to develop the firmware for the PIC16F88 and embedded c program is done using IAR compiler to interface the devices and sensors with the microcontroller. Thus an application oriented project is modified.

9. Future Scope

An ambulatory and uncontrolled measurement system for Mobile based Health Care Device with Location Tracker using wearable technology has been proposed. The wireless attribute enables the uncontrolled psychological parameters of the human body as resist to a wired monitoring device and makes the system rightly transferable. This allows the system to be organized in a muddled home environment. The small form factor and lightweight aspect of the sensor nodes also allow easy attachment to the extremity. As balanced with other existing advances, the innovative system is convenient and easy to use. It allows the patients to be monitored without restraint, and rehabilitation can be carried out in a home environment instead of a specialized laboratory in the hospital. For future work, experiments conducted with stroke patients in cooperation with a hospital are being planned using the developed system. More tests can also be conducted to investigate the effect of Bluetooth interference from other patient monitoring devices and wireless systems.

10. Result

Figure 5: Health care monitoring system

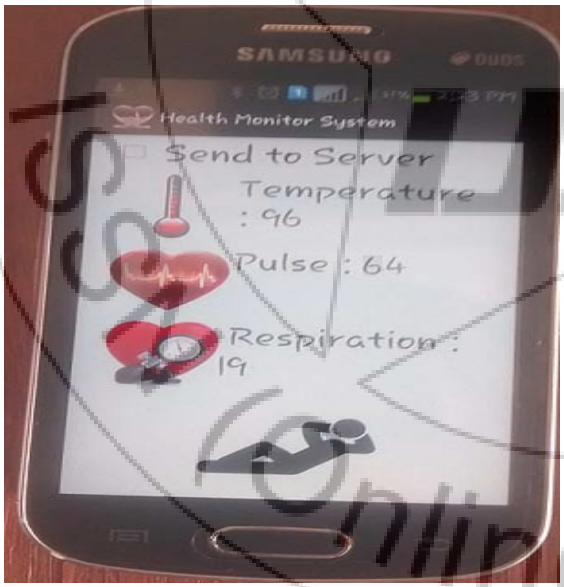

Figure 6: Health monitoring report through Android smart phone

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