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Real Time Patient Health Monitoring System Using IoT

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ABSTRACT:

Health monitoring system using WiFi (802.11 b/g/n) is used to monitor the different parameters of patients remotely and Real Time. In this system the doctor or any other can monitor different parameters of patients sitting in his room & even when he is far away from the patient. This system is developed using 8051 microcontroller along with ADC attached with sensors & the serial communication between the system and controller is achieved by means of RS232 protocol. C program is used to read the obtained values and is used to display these values on screen. This program by using Keil uploads the results to a particular website. Finally anyone with the known URL can obtain the values in his Mobile phone or PC. A mobile u-healthcare system with multiple physiological signs measurement capability in real time is designed and developed. This system performs local vital sign data analysis using a cellular phone and transmits data over a WAN. Parameters of the patients are continuously be monitored, processed and analyzed locally at cellular phone to produce useful medical information for diagnosis and tracking purposes. When any unknown or suspected patterns of signals are detected, cellular phone performs some simple data analysis first and then immediately transmits these signals to a hospital server for clinicians' careful diagnosis. Implementation of wireless technology in the diagnosis system enables patient can be monitored anywhere, anytime and would not be impeded by the physical constraints imposed by the cables. This feature could prove helpful in fulfilling the vision of "Pervasive Healthcare" by IoT.

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Keywords: ***Microcontroller, ADC, RS232, URL, WAN,IoT.***

I . INTRODUCTION:

In this paper explained clearly about the Real time patient Health monitoring system. Traditionally in existing system the parameters of a patient can be monitored in hospitals only and it is difficult to analyze since the data is in analog form. This requires number of labor operators and time to achieve the accuracy. For critically ill patients it is not much helpful because they should be in observation completely. In the proposed system Wi-Fi plays an important role for the above mentioned problems.

Advances in computer and communication technologies give electronic healthcare a great opportunity to design monitoring and alarming units that can be integrated with mobile phone[1]. Recently, wireless sensor networks have been adopted for real-time monitoring and alarming in healthcare applications.

Therefore, it is useful to integrate medical sensors, embedded systems and smart phone to design an embedded system to provide patient, doctor and medical center with real-time health information to save time, cost and life.[1].

Wireless communication technology is considered the best way to deal with emergency situations, especially those related to the human life, where patient's health records such as previous medication history, identification and other information are necessary[1].

Most mobile phones and personal computers are integrated with wireless network; therefore, it is useful to use these devices for medical data transfer. In this case, "the amount of time the doctors need to identify the problem, trace back the medication history of the patient and consult fellow doctors will be reduced significantly". Such a system requires to update the databases for patients by real-time sensing and monitoring of their health parameters. Using computers and wireless technology in healthcare monitoring will achieve many goals, such as diagnosis time, accuracy, number of patients, amount of paper work and many others. Applications of wireless sensor technology for healthcare monitoring enable doctors to monitor their patients anywhere and at any time without any physical constraints and without the need for the patient to stay in hospital.[2].

This paper is arranged into 6 sections, Firstly Introducrion, Methods (system design), Results, Conclusion, Future scope and finally with References.

II. METHODS

In previous days especially in medical field wireless sensors are not available.

These are with wires and their power consumption is more and they getting more costly. Every time the doctors or nurse should have to keep the record of patient‟s parameters manually. Therefore there is no allowance to patients to move freely etc. these things are very tedious.[3].

In early 1960‟s, Kadish used a system, which includes several things namely glucose sensor, a processor and a pump to control glycerin in patients with diabetes[5].

To manage complex situations, the pump will need several MEMS based sensors to monitor more parameters like glucose, heart rate, temperature and ECG etc.,. Optical methods developed pertaining to sensing purpose became advantageous in biomedical field. In medical field, the opportunities offered by optical fibers are always advantageous. Multi parameter constant vital signs monitors are available in intensive care setting since early 1960s. These medical devices are actually developed upon the introduction of microprocessor technologies in 1970s[6].

Fortunately Moore‟s law concentrates on constant improvements in miniaturization and the low power needs of microprocessor that allows on body wireless sensors.

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In the year 2004, Yuan-Hsiang Lin proposed a system which is a combination of PDA (Personal Digital Assistant) and WLAN (Wireless Local Area Network) for mobile patient monitoring. In present days, every Medicare wireless system uses Bluetooth or Wi-Fi to communicate between sensors and monitor. These systems cannot work as network and the data collected from a sensor could be transferred to a monitor.[5]. In complicated medicare conditions, such as disaster, it is critical to gather medicare data to anyone device namely PDA, Laptop or PC. To overcome the above problems, in the year of 2009, Wu Suyu and Yi Weidong proposed a system in which the information from number of nodes can be routed to a single receiving device. Two medicare sensors namely heart beat sensors and pulse oximeter are interconnected in a network. The parameters like heart beat and pulse oximetermonitoring devices uses a MSP430 microcontroller and is displayed on LCD screen, which are connected to WSN node via RS232 serial communication port.[4].

The IEEE 802.11 (ISO/CEI 8802-11) is an international standard describing the characteristics of a wireless local network (WLAN). The name WiFi (short for Wireless Fidelity) is originally the name given to the certification granted by the WECA (Wireless Ethernet Compatibility Alliance), the institution responsible for maintaining interoperability between devices under the 802.11 standard. By abuse of language (and for marketing reasons) the name of the standard is the same as the name of the certification. De facto a WiFi network is actually a network operating under the 802.11 standard.

WiFi allows us to create wireless local area networks at high speed. In practice, the WiFi can connect laptops, desktops, PDAs or other devices (printers, game consoles) to a broadband connection (300 Mbps) over a radius of several meters indoors (usually between 20 and 50 meters). In an open environment, the range can reach over several hundred of meters in optimal conditions.

ISPs are starting to equip areas with high concentrations of internet users (stations, airports, hotels, trains, etc.) with wireless internet access.

2.1 SYSTEM DESIGN

The electronics usually uses either a microprocessor or a microcontroller. Some large or old systems use general-purpose mainframes computers or minicomputers.[1],[2].

2.1.1. START-UP:

All embedded systems have start-up code. Usually it disables interrupts, sets up the electronics, tests the computer (RAM, CPU and software), and then starts the application code. Many embedded systems recover from short-term power failures by restarting (without recent self-tests). Restart times under a tenth of a second are common.[6].

2.1.2 THE CONTROL LOOP:

In this design, the software has a loop. The loop calls subroutines. Each subroutine manages a part of the hardware or software. Interrupts generally set flags, or update counters that are read by the rest of the software. A simple API disables and enables interrupts. Done right, it handles nested calls in nested subroutines, and restores the preceding interrupt state in the outermost enable. This is one of the simplest methods of creating an exocrine.[8].

2.1.3.USER INTERFACES:

Interface designers at PARC, Apple Computer, Boeing and HP minimize the number of types of user actions. For example, use two buttons (the absolute minimum) to control a menu system (just to be clear, one button should be "next menu entry" the other button should be "select this menu entry"). A touch-screen or screen-edge buttons also minimize the types of user actions.

Another basic trick is to minimize and simplify the type of output. Designs should consider using a status light for each interface plug, or failure condition, to tell what failed. A cheap variation is to have two light bars with a printed matrix of errors that they select- the user

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can glue on the labels for the language that she speaks.[2],[9].

2.1. 4.Block diagram.

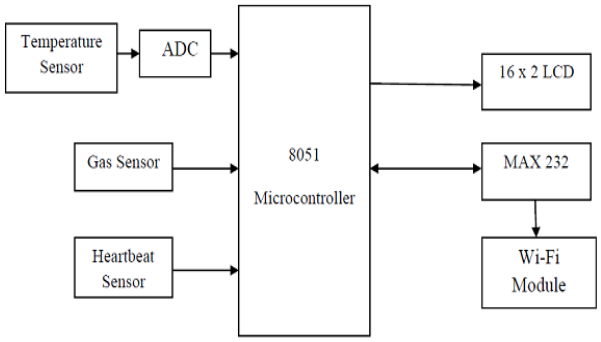

Fig.1.Block Diagram.

2.1.5.Circuit Diagram:

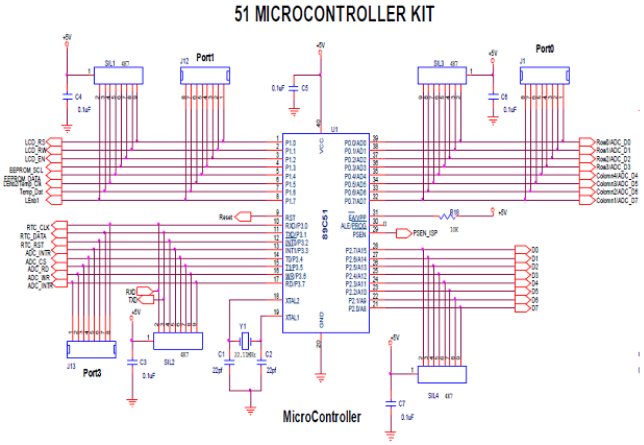

Fig.2. Circuit Diagram.

2.1.6.CRITERIA FOR SELECTION OF A MICROCONTROLLER IN EMBEDDED SYSTEM

Criteria for selection of microcontroller in any embedded system is as following:

(a) Meeting the computing needs of task at hand efficiently and cost effectively

- Speed of operation
- Packing
- Power consumption
- Amount of RAM and ROM on chip
- No. of I/O pins and timers on chip
- Cost

(b) Availability of software development tools such as compiler, assembler and debugger.

III .RESULTS

3.1KEIL

Keil uvision4 Software provides you with software development tools for the ARM7TDMI family of microprocessors. With the Keil tools, you can generate embedded applications for multitude of ARM7TDMI derivatives. Throughout this project we refer to these tools as the ARM7TDMI development tools. However, they support all derivatives and variants of the ARM7TDMIimicrocontrollerFamily.

The Keil Software ARMD7TDMI development tools listed below are the programs used to compile your C code, assemble your assembler source files, link your Program together, create HEX files, and debug your target program.

How to create a Project in keil?

Step 1: Double click on the **KeiluVision 2/3/4** icon at desktop.

Step 2: At Menu Bar, click on Project >>New Project>> Project

Step 3: Take New file, give some name and save it with respective extension either .asm or .c.

Step 4: On project window, right click on Source Group>>Add file to source group „Source Group1".

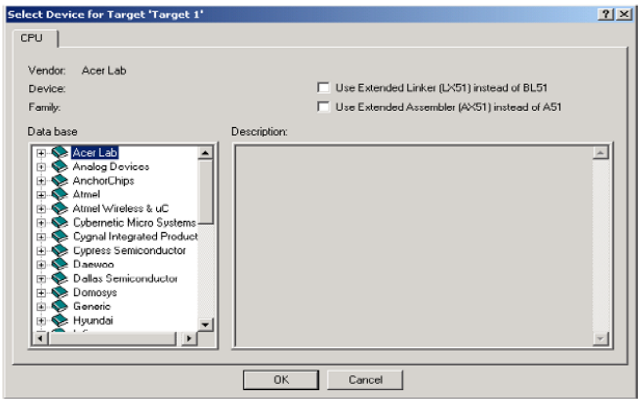

Fig .3. KEIL SOFTWARE.

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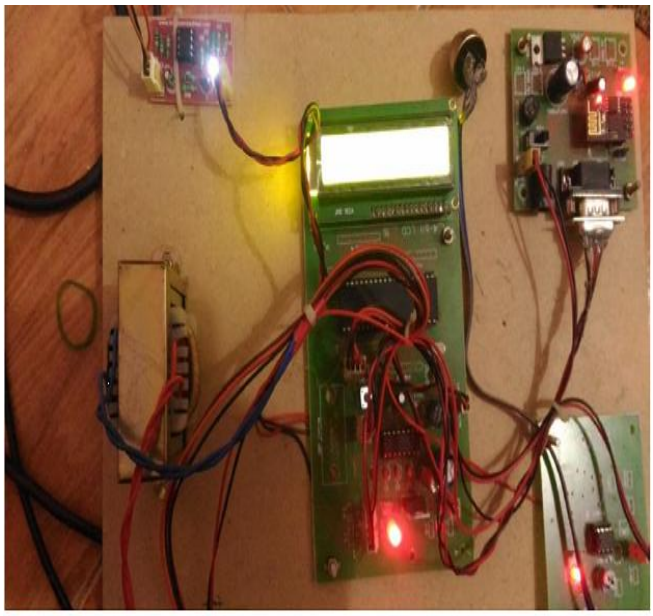

Fig.4.Hardware

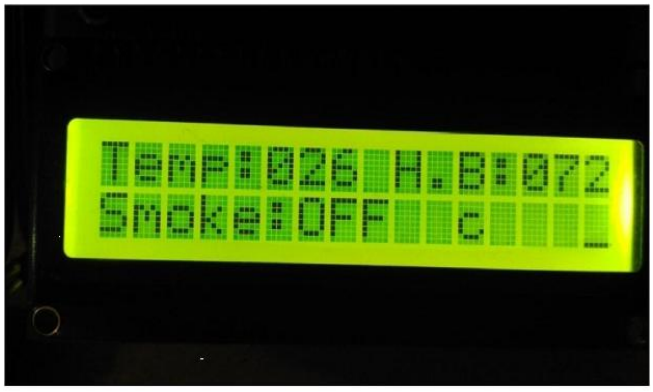

Fig.5.Output.

As shown in the above figure, Temperature, Heartbeat and Smoke (CO2 level) of a patient can be monitored by using this system.

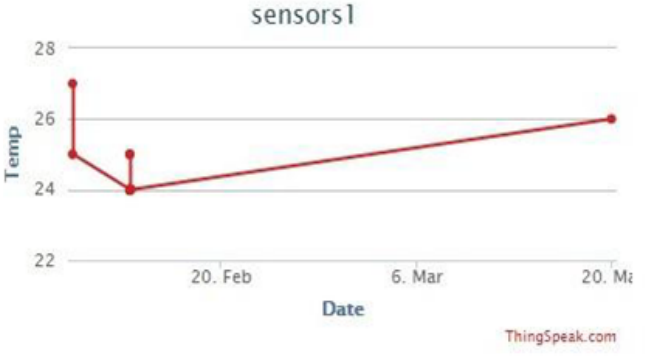

Fig.6.Temperature

Fig.7.Heartbeat.

Fig.8.SMOKE (CO_2).

IV.Conclusion

The availability of low-cost single-chip microcontrollers, and advances in wireless communication technology has encouraged engineers to design low-cost embedded systems for healthcare monitoring applications. Such systems have ability to process real-time signals generated from biosensors and transmit the measured signals through the patient's phone to the medical center's server. This thesis has presented a remote patient monitoring system architecture using wireless sensor nodes capable of monitoring several different environments: hospitals, home, and ambulatory. The system implemented is a real-time patient monitoring system, which enables medical doctors to watch their patients on a remote site, to monitor their vital signs and to give them some advice for first-aid treatments.

The system developed has the facilities added to have a positive impact on time-saving and cost effectiveness

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by preventing the patients from rehospitalization and monitoring multiple patients‟ health status simultaneously.

V.Future scope

The Future work of the project is very essential in order to make the design system more advanced. In the designed system the enhancement would be connecting more sensors to internet which measures various other health parameters and would be beneficial for patient monitoring i.e. connecting all the objects to internet for quick and easy access. Establishing a Wi-Fi mesh type network to increase in the communication range.

VI.References

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