

A Method to Monitor Patients Health Status Using Web Server

Rajeshwar Rao Arabelli¹, P.Anuradha², Alekhya Kamarapu³

¹Center for Embedded Systems and IoT, Department of ECE, S R Engineering College,
Warangal, Telangana, India

²Department of ECE, S R Engineering College, Warangal, Telangana, India

³M.Tech Student, Department of ECE, S R Engineering College, Warangal, Telangana, India

¹rajeshwarrao432@gmail.com

Abstract

The relentless development of information and communication Technologies (ICTs) has contributed to the introduction of the Internet of Things (IoT). IoT systems make doctors and patients confident in modern healthcare as they are used in a number of medical fields (such as real time surveillance, patient information management system and health care management system). Body Sensor Network (BSN) technology is a key technology in IoT healthcare system growth, where you can monitor your patient with small, light weight wireless nodes. However, the implementation of any new technology in health application leaves the patient vulnerable, without taking into account protection. In this project, we highlight the main security requirements for the BSN-based healthcare system. Next, we proposed a secure health system based on IoT that uses BSN, called BSN support, which can effectively meet these requirements. Here at BSN we use different types of sensors, i.e. the temperature sensor, the heart rate sensor. The main purpose of this automatic health system and e-monitoring of ECG using webserver is to monitor the body temperature, heartbeat rate and pulse rate of a patient and display the same to the doctor by using webserver and also send sms to the care taker of the patient.

Keywords: IoT, Body sensor networks, Heart rate sensor

1 Introduction:

Embedded system is a process of integrating the hardware with system specific software for the purpose of particular application which can be used in real time applications. Embedded applications can reduce the cost, increases the life cycle of the application. These microprocessors, working on basic assembly languages or high level languages that are supported by the processor like c, are the heart of the appliances [1].

India has a vast health care system, but the quality of service at hospitals will be different between rural and urban areas as well as between public and private health care system is different due to very less in number of doctors. Despite this, In future India will become as a popular destination for treatment for various diseases across the world because of low cost and high quality of its private hospitals. As the technology increases we are finding solution for the problems that we are having in medical health care system.

A recent report indicates that about 90% of the aged people want to live independently. However, the persons whose age crossed 60 are suffers from at least one chronic disease due to this many aged people to have difficulty in taking care of themselves. This will be taken as a social challenge by various

organizations as they are willing to work for these people. With the change in technology, many tools were developed in the field of Medical society [2]. Most powerful communication system, Internet of things had made a revolution in providing the information across the globe. It can able to interface the electronic devices with the internet so, IoT extends its service through internet and makes it more pervasive.

Using IoT we can able to connect devices and interact with sensor such as heartbeat sensor, Temperature sensor. Because of this reason IoT was used in health care system. In our project we use IoT and different wearable sensors which can able to get the information from our human organs and body and the processor used will calculate the information. We were used various sensors in health monitoring system, which will make the monitoring system more powerful anywhere, anytime, which improves the quality of life.

For the health care system we are using low power consumption and lightweight based wireless sensors. These sensors were be used to monitor the human body functions such as heartbeat and environment parameters like temperature. The collected information from sensors will be sensitive which will be used in emergency conditions. Which can also send the information to care taking persons, updates the data using IoT in webserver [3].

Webserver information can be monitored by the hospital staff like doctors and can able to take precautionary steps at the emergency level.

In this project, we were addressed several security requirements such as usage of wireless sensors in healthcare system, passing the information to webserver using IoT [4], e-monitor of ECG using webserver can work efficiently as per the medical standards and requirements.

2 Literature Survey

Recently advancement in the wireless sensor network (WSN) and embedded computing technologies were made the monitoring system of ECG using webserver feasible. This project provides the continuous monitoring and controlling by converting the parameters of the body sensors using processor into machine specific format to send the information using webserver. The main aim of this project is to monitor and control various parameters of patient using webserver. Most of the old age people were died because of few diseases. The main cause of death is cardiovascular i.e. heart attack. 40% people died because of heart attacks. Many number of people were died in the journey while travelling to hospital [2]. This heart attack will happen because of few reasons we don't have any facility to monitor the heart rate continuously. Currently, ECG monitoring is now a days become very popular to providing the cardiac services and we also need to record the data. They can also detect changes in heartbeat and give us a warning in about abnormal changes.

Cardiac patients regular observation will be done using of wireless sensor networks (WSN) will making as per the popular research. For example, number of wearable systems have been proposed with wireless transmission through Wi-Fi [5], and local processing by using a controller along with LCD display. This sensor includes accelerometers, temperature sensors are also integrated to the BSN node.

It was predicted that the service and private care wireless mechatronic systems will end up increasingly more ubiquitous at home soon and will also be very helpful in assistive in control the devices automatically.

3 Methodology

We will consider the primary application of heartbeat sensor as wireless health monitoring system for patients. In hospitals, staff regularly monitors the data like body temperature and heartbeat rates and the data can be saved for a period of 24 hours and the same can be sent to doctors. This e-monitoring of ECG using webserver project includes an LPC2148 microcontroller along with sensors such as heartbeat sensor, temperature sensor and communication modules to interact with processor are used. These communication modules such as WI-FI Transceiver, GSM module used to connect to the mobile and internet using the technology named as IoT and a LCD display used to display the data. The LPC2148 is a family of ARM7 which is used to process the instructions that supports the applications of the project.

E-monitor of ECG using webserver used to monitor the heartbeat, pulse rate, and temperature of patients. Working can be explained based on block diagram which will be having various blocks such as a temperature can be calculates by using LM35 temperature sensor and a heartbeat sensor for monitoring heartbeats of the patients as shown in figure 1.

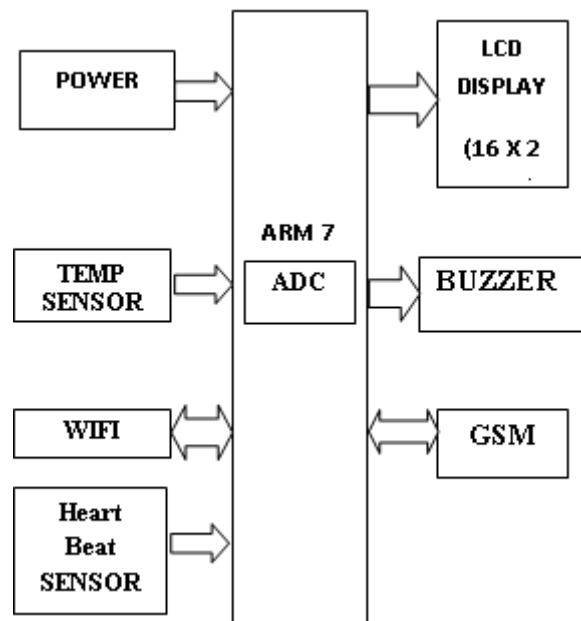


Fig.1. Block Diagram

In this Project ARM7 is used to communicate the Input and Output devices. LPC2148 processor is used to process the inputs according to the requirements. The resulted values passed to the LCD and also to the webserver using WIFI. If the sensed values were exceeded then information will be sent to Mobile phone using GSM.

Hardware Tools:

LPC 2148 Processor

The LPC2148 architecture that supports 32 bit data supports both data and address using Von-Neumann architecture. Here the data can be processed in 8-bit, 16-bit and 32 bit formats. It can be used as 16 bit or 32 bit processor based on the mode of operation used. Thumb state used for 16-bit operation which is a half word-aligned instructions. ARM state is used as 32-bit, word-aligned instructions.

The LPC2148 processor supports a three-stage pipelining i.e. fetch, decode and execute. The use of pipelining is to increase the speed of operation by executing multiple instructions over a same time period. LPC2148 supports little and big-endian formats. The instruction set of ARM allows you to write optimized code with less number of instructions.

LPC2148 processor included with in-circuit Emulator, JTAG interface which is used to load the instructions into the processor. Internal state of LPC2148 will have debugging features. Processor core implements Instruction Set Architecture (ISA) [6].

The LPC2148 is provided with in-built features for wireless communications. The performance of every Wireless Networks comprises of its practical design and transmission for communication. The major benefits of wireless communication are eliminating infrastructural complexities and central control [7].

The LPC2148 is provided with 32-bit data bus and associated control bus. The data bus provides path to specific registers to perform programmable operations.

The LPC2148 processor contains two UARTs, which are UART0 and UART1. The UART0 is communicating through P0.0 (TxD) and P0.1 (RxD) pins and UART1 is communicating through P0.8 (TxD) and P0.9 (RxD) pins. It works with a standard baud rate such as 9600, 19200 and up to 115200 by using crystal frequency above 2 MHz.

Heartbeat Sensor

The heartbeat sensor circuit diagram comprises of LDR and an LED as shown in figure 2. The heartbeat sensor used to indicate the heartbeat by using a LED. When finger placed the maximum light passes and spreads, it detected by the detector as shown in figure 3.

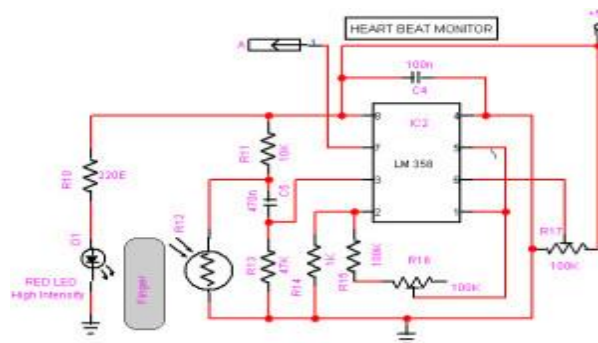


Fig.2. Heartbeat Sensor Circuit Diagram

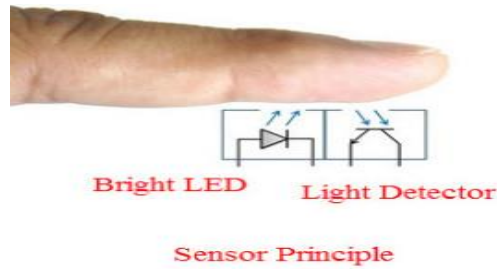


Fig.3.Heartbeat Sensor Working

4 Implementation and Results

Project circuit can be connected to 230 AC supply. Here in our project we will be using the Microcontroller and other DC oriented peripherals. To connect these we will be converting the AC voltage levels to DC by using Step down Transformers and then combination of diodes in the form of bridge rectifier along with capacitors as filters to remove the unwanted AC components. LM7805 Regulator was used to provide the constant power supply i.e. +5V DC supply as shown in figure 4.

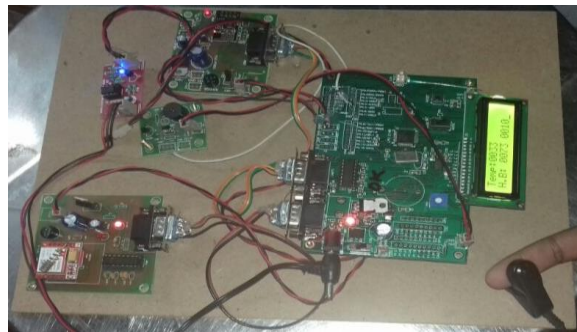


Fig.4. Hardware Circuit

IoT links of the designed project

<https://thingspeak.com/channels/274186/charts/1>

<https://thingspeak.com/channels/274186/charts/2>



Fig.5.Screenshot of Temperature display in Web



Fig.6. Screenshot of heartbeat display in Web

Applications

- E-monitor of ECG using webserver can be used to get the information about patient heartbeat and temperature conditions anywhere from the world.
- This can also send and receive the information using GSM network.
- By implementing the project we can able to increase the life time of patient's or old age people.
- We can alert the care taker automatically by using this project

5 Conclusion & Future Scope

In this project, we have described the security in medical applications using body sensor network (BSN). As we are facing lot problems in security issues we had designed in that aspect only. Finally, we proposed a e-monitor of ECG using webserver can follow various security requirements and connected to different sensors that can gather information and provide the output.

The existing healthcare system with IoT technology using BSN will also be implementing now for only single patient. The proposed system can be implementable for multi patients. It is also very much useful to preserve the data in both online as well as offline.

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