Wireless Heartbeat Monitoring System Using Android

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Abstract -- This paper gives us the development of a microcontroller-based system for wireless heartbeat and temperature monitoring using Wi-Fi module. By this we can easily provide real time information available for many users and can send them alert in critical conditions over internet. In India many patients are dying because of heart attacks and reason behind this factor is that they are not getting proper help during the period. To give them timely and proper help first we want to continuous monitoring of patient health. The fixed monitoring system can be used only when the patient is lying on bed and these systems are huge and only available in the hospitals in ICU. The system is developed for home use by patients that are not in a critical condition but need to be timely monitored by doctor or family. In any critical condition the SMS is send to the doctor or any family member. So that we can easily save many lives by providing them quick service.

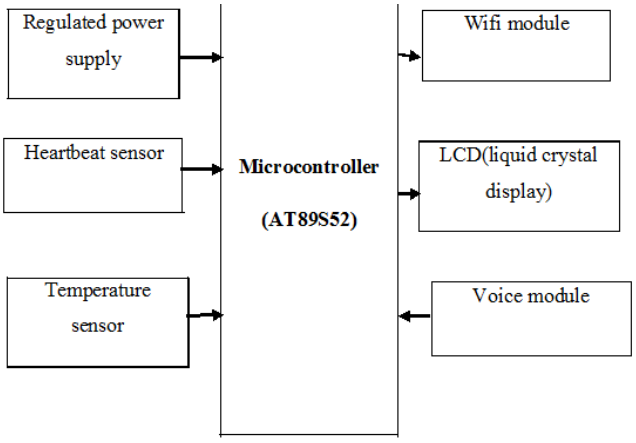
Indexed Terms - heartbeat, temperature, monitoring of patient health, Wifi module.

I. INTRODUCTION

In today's era, health problems are increasing day-by-day at a high pace. The death rate of 55.3 million people dying each year or 151,600 people dying each day or 6316 people dying each hour is a big issue for all over the world. Hence it is the need of hour to overcome such problems. We, therefore, proposing a change in wireless sensors technology by designing a system which included different wireless sensors to receive information with respective human body temperature, blood pressure, saline level, heart rate etc. that will be undoubtedly further transmitted on an IoT platform which is accessible by the user via internet. An accessible database is created about patient's health history which can be further monitored & analyzed by the doctor if necessary. The data storage can be saved on the server permanently or can be reset via the software. This paper proposes a health monitoring system which is capable of detecting multiple parameters of our body such as temperature, heart rate. Also, in case of emergency, automatically generating alerts will be sent to doctors and family members if any unusual activity is detected by or near the patient.

II. DETAILED DESCRIPTION

The implementation of the system has been described below



III. BLOCK DIAGRAM

This system consists of Microcontroller, heart beat sensor, WIFI modem, temperature sensor.

For measuring Heartbeat, input is taken from figure of human. Heart beat sensor will generate digital pulse corresponding to each beat. This pulse is counted by interfacing heart beat sensor to microcontroller to pin no. 15(T1CKL) and programming the microcontroller in counter mode. After counting of pulse for one minute, value of heart beat will be displayed on LCD and if value is beyond the normal range then it will alert. and patient data will transfer to receiver section using WIFI module The aggregator unit has the responsibility of collecting each sensor data following strict sampling rate, it forms the Body In our design we have used an AT89S52 microcontroller as an aggregation. hospital computer used as a processing

unit for our health monitoring system. The data received from the aggregator unit processed on the data processing unit, i.e. on the computer. The data can be used for drawing graphs and charts. Sensors are connected to micro controller by using WIFI module we can transmit data to IOT server, if patient will be in abnormal condition voice module will activate and give alerts.

IV. METHODOLOGY

HARDWARE IMPLEMENTED

1. Power supply(7805): This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12V for various applications.

In this section we have Transformer, Bridge rectifier, are connected serially and voltage regulators for +5V and +12V (7805 and 7812) via a capacitor (1000µF) in parallel are connected parallel as shown in the circuit diagram below. Each voltage regulator output is again is connected to the capacitors of values (100µF, 10µF, 1 µF, 0.1 µF) are connected parallel through which the corresponding output(+5V or +12V) are taken into consideration.

MICROCONTROLLER (AT89S52)

The AT89S52 is a low power, high performance CMOS 8 –bit microcontroller with 8k bytes of in system programmable flash memory. The device is manufactured using Atmel's. High density non volatile memory technology and is compatible with the industry standard 80C51 instruction set and pin out. the on chip flash allows the program memory to be reprogrammed ion system or by a conventional non volatile memory programmer. By combining a versatile 8 bit CPU within system programmable flash on a monolithic chip, the Atmel's AT89S52 is a powerful microcontroller which provides a highly flexible and cost effective solution to many embedded controlled applications

3. HEARTBEAT SENSOR

Heart Beat can be measured based on optical power variation as light is scattered or absorbed during its path through the blood as the heart beat changes.

The heartbeat sensor is based on the principle of photo plethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

BPM(Beats per minute) = 60*f

Where f is the pulse frequency

Practical Heartbeat Sensor

Practical heartbeat Sensor examples are Heart Rate Sensor (Product No PC-3147). It consists of an infrared led and an LDR embedded onto a clip like structure. The clip is attached to the organ (earlobe or the finger) with the detector part on the flesh

Fig.1 heartbeat sensor

TEMPERATURE SENSOR(LM-35)

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies

of ±1/4°C at room temperature and ±3/4°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the water level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies.

WIFI MODULE

Devices that connect to WiFi network are called stations (STA). Connection to Wi-Fi is provided by an access point (AP), that acts as a hub for one or more stations. The access point on the other end is connected to a wired network. An access point is usually integrated with a router to provide access from Wi-Fi network to the internet. Each access point is recognized by a SSID (**S**ervice **S**et **Id**entifier),that essentially is the name of network you select when connecting a device (station) to the WiFi.

Each ESP8266 module can operate as a station, so we can connect it to the WiFi network. It can also operate as a soft access point (soft-AP), to establish its own WiFi network. Therefore, we can connect other stations to such modules. Third, ESP8266 is also able to operate both in station and soft access point mode *at the same time*. This offers the possibility of building e.g. mesh networks.

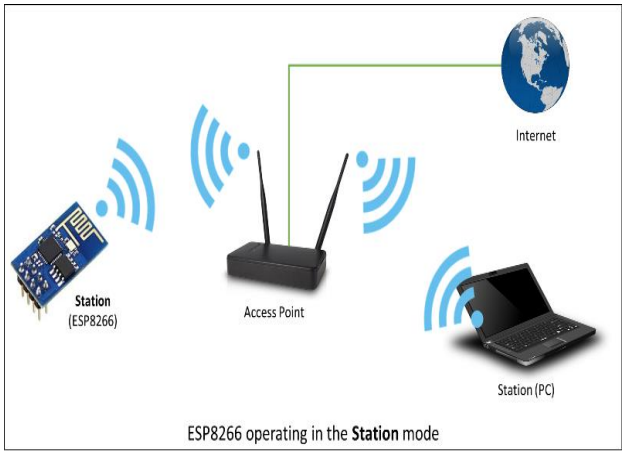


Fig.2: wifi module operating system

LCD(liquid crystal display)

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

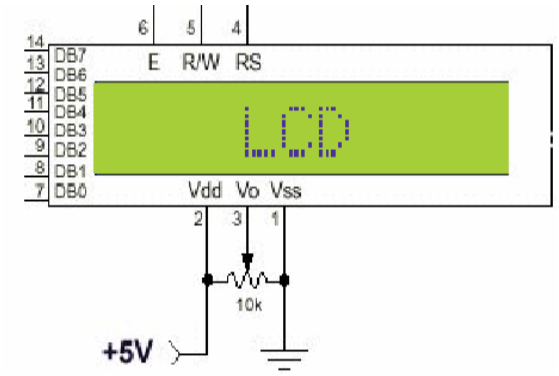


Fig.3:1x16 lines LCD

VOICE MODULE

It is based on ISD1820, which a multiple-message record/playback device. It can offer true single-chip voice recording, no-volatile storage, and playback capability for 8 to 20 seconds. The sample is 3.2k and the total 20s for the Recorder.

This module use is very easy which you could direct control by push button on board or by Microcontroller such as Arduino, STM32, Chip Kit etc. From these, you can easy control record, playback and repeat and so on.

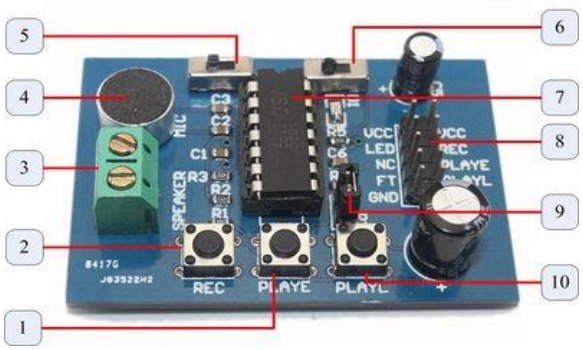


Fig.4: voice module

V. SOFTWARE IMPLEMENTED

KEIL SOFTWARE:

This is an IDE (Integrated Development Environment) that helps you write, compile, and debug embedded programs. It encapsulates the following components:

- A project manager
- A make facility
- Tool configuration
- Editor
- A powerful debugger

To get start here are some several example programs .
Building an Application in MicroVision2

To build (compile, assemble, and link) an application in uVision2, you must:

➢ Select Project–Open Project

(For example,\ C166 \ EXAMPLES \ HELLO \ HELLO.UV2)

➢ Select Project - Rebuild all target files or Build target. UVision2 compiles, assembles, and links the files in your project.

To create a new project in uVision2, you must:

- ➢ Select Project - Targets, Groups, and Files. Add/Files, select Source Group1, and add the source files to the project.
- ➢ Select Project - Options and set the tool options. Note when you select the target device from the Device Database all-special options are set automatically. You only need to configure the memory map of your target hardware. Default memory model settings are optimal for most.

Debugging an Application in MicroVision2
To debug an application created using uVision2, you must:

- ➢ Select Debug - Start/Stop Debug Session.
- ➢ Use the Step toolbar buttons to single-step through your program. You may enter G, main in the Output Window to execute to the main C function.
- ➢ Open the Serial Window using the Serial #1 button on the toolbar

EMBEDDED C

Embedded C Programming is the soul of the processor functioning inside each and every embedded system we come across in our daily life, such as mobile phone, washing machine, and digital camera.

Each processor is associated with embedded software. The first and foremost thing is the embedded software that decides functioning of the embedded system. Embedded C language is most frequently used to program the microcontroller.

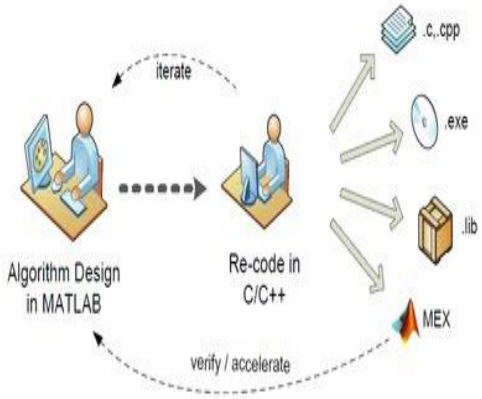


Fig.5.embedded c programming

ADVANTAGES

- Best to be used in rural areas.
- Bridging the gap between the doctor and patient.

- It is a multipurpose so that overall conditions are easily measured.
- Compare with compact sensor it gives better performance.

DISADVANTAGES

- The system is not portable.
- The patient can't be able to understand the analog signals.
- Complex system and difficult to operate.

VI. RESULT AND CONCLUSION

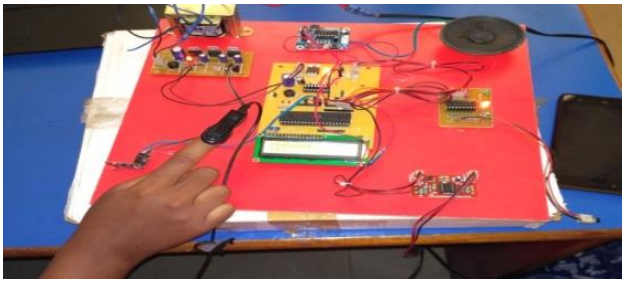


Fig.6 working model

Here developed an an android application for receiving the medical parameters and displayed on android mobile with the help of wifi Module and at a time uploaded on to the android web server. After opening the

Android app in mobile it shows the list of wifi modules then connected the required wifi module that is connected with the system hardware. After connecting the required wifi Module shows Android app received data from system. At a time received data from android phone is upload on to android server then the doctor can easily access the patient's information for that purpose we can developed another app shows the reading that are From the server.

Fig.7 shows the graph analysis of temperature and heartbeat.

The research and design of embedded pulse monitoring instrument overcome the shortcoming of traditional pulse diagnosis system. The instrument has simple structure stable and reliable operation, high Accuracy, low power consumption, good portability full featured function, and extensive application occasion. The real time monitoring system for cardiac patient physical state is based on wireless transceiver module technology. It can be taken by patient and keep the patient moment intact because it is miniature and portable . The system can monitor and record the physical states and moment parameters real time, and the provide auxiliary means for the correct diagnosis of doctor. With intelligent trans receiver module , the sign of acute disease for patient can be found early, and then the patient can be helped in time, the sudden death of patient can be avoided. The wireless transceiver module technology can be suited for short distance communication, and the transmission distance is limited only about 10 meters, and then It can be suitable for in- patient monitoring. The system is important to be applied to patient care.

VII. FUTURE SCOPE

- EEG, ECG and other parameters can also be monitored.
- Continuous monitoring and future diagnosis can be performed via same system.

- More than a single patient at different places can be monitored using single system.

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