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ONLINE PATIENT HEALTH MONITORING SYSTEM ON SMART PHONE USING IOT TECHNOLOGY

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Abstract— In past years, at rural areas the people die, due to lack of treatments and lack of availability of health monitoring devices and doctors, most of the countries in the world facing this type of problems. There are numbers of the system which can provide remote health care services but there have some limitation such as very costly, lack of patient data security and highly communicational and computational overhead. According to the World Health Organization, the probability of dying between 15 and 60 years of age in male/female (per 1000 population) in India is nearly 250/169. In present years, the chronic diseases and the civilization diseases are introduced in the world, due to the changes in the environment. In order to avoid existing problem, the proposed system introduced Integrated Health Monitoring System (IHMS) with low cost and take an advantages to continuously monitor patient physiological parameters.

Keywords— Integrated Health Monitoring *System (IHMS).*

I. Introduction

Health is one of the global challenges for humanity. According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an Individual. To keep individuals healthiness an effective and readily accessible modern healthcare system is a prerequisite. A modernized healthcare system should provide better healthcare services to people at any time and from anywhere in an economic and patient friendly manner. Recent advances in the design of Internet-of-Things (IoT) technologies are spurring the development of smart systems to support and improve healthcare- and biomedical-related processes.

In a health care monitoring system it is necessary to constantly monitor the patients physiological parameters. For example a pregnant woman parameters such as blood pressure (BP) and heart rate of the woman and heart rate and movements of fetal to control their health condition. This paper presents a monitoring system that has the capability to monitor physiological parameters from multiple patient bodies. In the proposed system, sensors has attached on patient body to collect all the signals and sends them to the base station. The attached sensors on patients body are able to sense the heart rate, blood pressure and so on. This system can detect the abnormal conditions, issue an alarm to the patient as well as physician.

II. OBJECTIVE

Today's healthcare systems in most countries are struggling with increased number of patients and increased costs of patient care per patient. This situation is aggravated by the current trends of unhealthy lifestyle habits, including stress and physical inactivity, which increasingly leads to chronic illnesses such as obesity, diabetes and heart disease, even in younger population. For such cases, early treatment, including physical exercise, could prevent negative outcomes as population ages. Such a treatment would be more likely to succeed if the healthcare system had access to facilities for continuous monitoring of the individual's physical fitness level, because it would allow monitoring compliance and providing feedback. Such facilities would ideally consist of simple, inexpensive and readily available equipment.

III. METHODOLOGY

To design and implement a portable patient monitoring system which will be useful for the elder people living at the remote places and to provide the uninterrupted monitoring of people under the serious condition during shifting process from local to the metropolitan cities. Patient health monitoring systems are gaining importance due to shortage of doctors. This project is based on remote monitoring of patients. We have designed and developed a reliable, energy efficient patient monitoring system. It is able to send parameters of patient in real time.

A. *Block diagram*

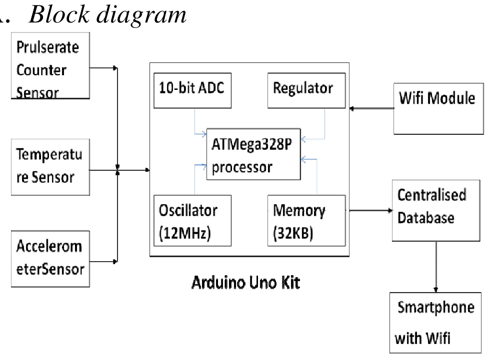

Fig 1: Block diagram of Health Monitoring System

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B. Hardware

1. THERMOCOUPLE SENSOR

The thermocouple sensor measures the popular thermals, which are composed of the two different metal alloy wires. By combining the two different metals will generates the strong voltage which is the same capacity as a temperature. In general, the thermocouple gives the vast measurement ranges and they are worked by using the Seebeck effect. The Seebeck effect invested for changing the temperature in the electrical circuit. The sensor reads the temperature by taking the measurement of voltage output.

Fig 2: Thermocouple Sensor

2. TEMPERATURE MODULE LM35:

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature Sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full − 55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 µ A from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a − 55°C to 150°C temperature range, while the LM35C device is rated for a − 40°C to 110°C range (− 10° with improved accuracy). The LM35-series devices are available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D devices are available in the plastic TO-92 transistor package. The LM35D device is available in an 8-lead surface-mount small-outline package and a plastic TO-220 package

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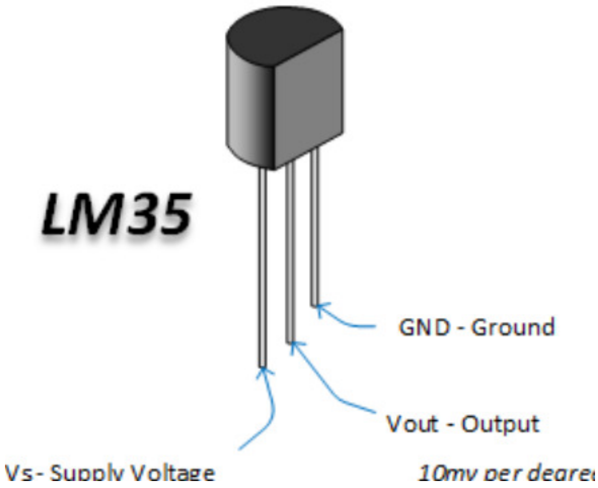

Fig 3: Temperature Module LM35

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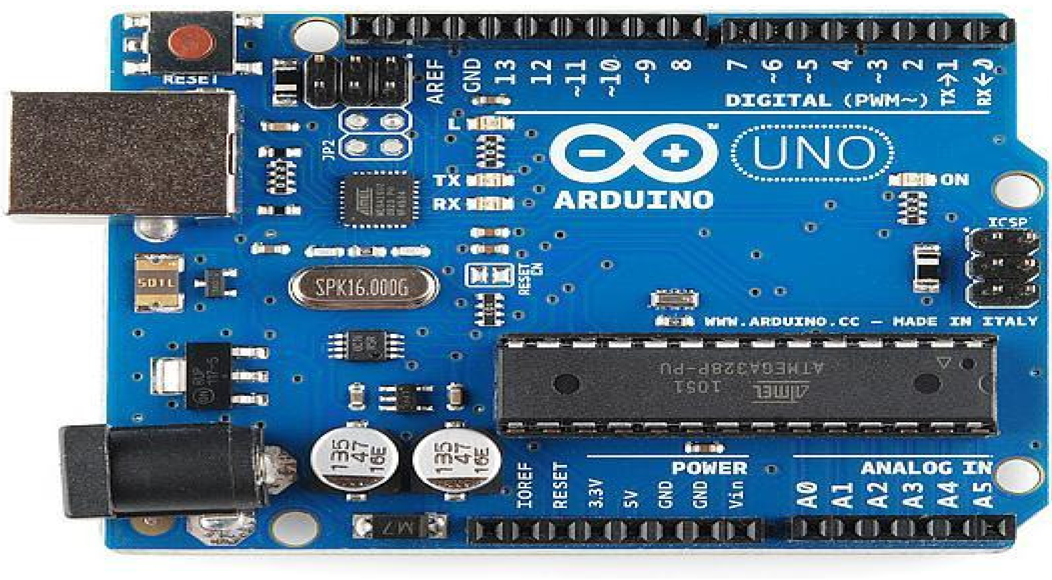
3. ARDUINO BOARD:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 programmed as a USB-to-serial converter. With the help of this we can directly communicate with the PC or computer. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. in our implementation we use Arduino board since it has inbuilt ADC so we no need to interface external ADC to connect with sensor, since most of the sensor gives their output in analog form. This board is also simple for programming it does not need any external programmer or burner to burn the program in microcontroller. Since it has 32kb flash memory so we can save our program as well as we can change the program according to our requirement.

Feature of Arduino Uno board

- Microcontroller ATmega168 or 328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader

Fig 4:- Arduino Uno Board



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4. LCD:

A liquid crystal display, or LCD, is a video display that utilizes the light modulating properties of liquid crystals to display pictures or text on a screen. Since their invention in 1964, LCD screens have grown to be used in a very wide variety of applications, including computer monitors, televisions, and instrument panels. One way to utilize an LCD is with an Arduino microcontroller. By wiring an Arduino microcontroller to the pins of an LCD display it is possible to program the microcontroller to display a desired text string or image on the screen. An LCD display is composed of pixels made up of liquid crystals. Liquid crystals exist in a state that's between a solid and a liquid. At any time liquid crystals can be in a variety of phases, most notably the nematic phase or the smectic phase. In the nematic phase the crystals act more like a liquid, allowing the molecules of the crystals to rearrange themselves while remaining oriented in a uniform direction. In the smectic phase, the molecules can form into layers that can move past one another relatively easily. Molecules of a certain layer can move freely within that layer, but cannot move to adjacent layers.

Fig 5 : Liquid Crystal Display

5 HEARTBEAT SENSOR

The Heart Beat sensor is based on the principle of photoplethysmography (PPG) which is a non-invasive method of measuring the variation in blood volume in tissues using alight source and a detector. Since the change in blood volume is synchronous to the heart beat, this technique can be used to calculate the heart rate. Transmittance and reflectance are two basic types of photoplethysmography. For the transmittance PPG, a light source is emitted in to the tissue and a light detector is placed in the opposite side of the tissue to measure the resultant light. Because of the limited penetration depth of the light through organ tissue, the transmittance PPG is applicable to a restricted body part, such as the finger or the ear lobe. However, in the reflectance PPG, the light source and the light detector are both placed on the same side of a body part. The light is emitted into the tissue and the reflected light is measured by the detector. As the light doesn't have to penetrate the body, the reflectance PPG can be applied to any parts of human body. In either case, the detected light reflected from or transmitted through the body part will fluctuate according to the pulsatile blood flow caused by the beating of the heart.

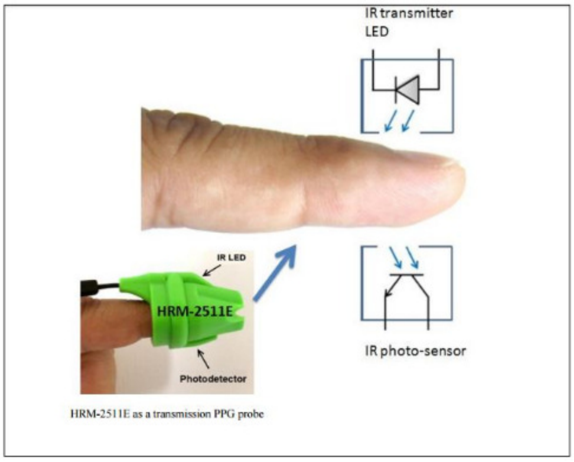

Fig 6 : Heartbeat sensor

6 WIFI SENSOR

Low-power, low-cost Wi-Fi modules have changed the landscape of wireless sensor networks. Autonomous, Wi-Fi sensors connect to common, widely available wireless network infrastructure. They send sensor data over standard TCP/IP making their information anywhere in the world from any computer or smart phone.Previously, wireless sensors networks have been built on top of proprietary protocols running on sub-gigahertz radios. These systems have the benefit of covering long distances however they are closed systems. Likewise sensors networks based Zigbee radios are also closed system. Both of these wireless sensor networks require additional gateway hardware devices to get sensor data onto the internet or users LAN. Gateways introduce a single point of failure and additional cost.

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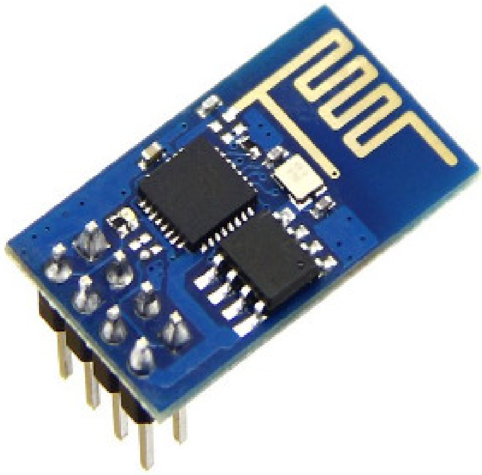

fig 7 : WiFi sensor

C. *Software*

1. Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow to verify and upload programs, create, open, and save sketches, and open the serial monitor.

IV. RESULTS AND DISCUSSION

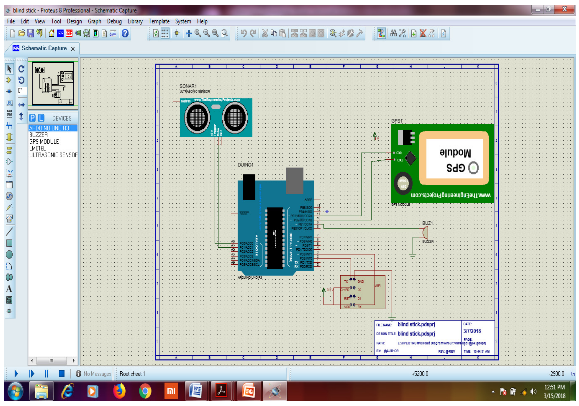

Fig 8 : Circuit Connection for Health Monitoring System

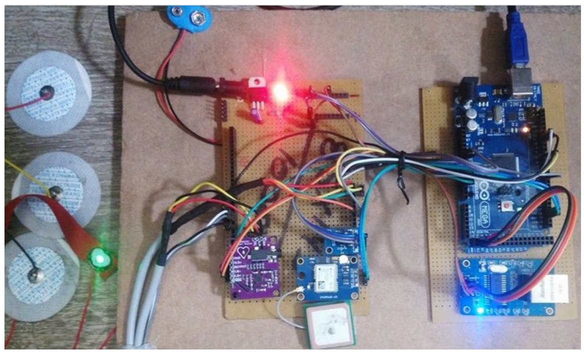

Fig 9 : Implementation of Health Monitoring System

IV. CONCLUSION

Thus, we have designed a Portable Health Monitoring System which is less cost and can be accessed from anywhere by the authorised persons thereby the immediate actions are possible in order to save the lives of poor people living in remote places. It is also possible for a single doctor can monitor many patients status in his own room with many display units simultaneously. There by we can compensate the shortage of Doctors in Government hospitals. With which we will extend this work in to a wearable device to provide continuous monitoring of all the people irrespective of their health conditions to trace out the root cause of any possibility of disease in near future and we will take necessary precaution measures to avoid the same

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