IOT based Patient health monitoring system using Arduino

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Abstract **- Internet of Things (IOT) is the emerging technology, which contains huge amount of smart object and smart devices connected to the internet for communicating with each other. In this project to analyze and compute the patient health we are using Arduino, which is the heart of this project. Arduino controls the output devices like buzzer, relay and GSM modem. These smart devices are used to collect temperature, blood pressure, sugar level, heartbeat, lung and respiration information etc. which are used to evaluate the health condition of the patient. The final results are displayed on the LCD display, on web server and also the results are sent to the user through SMS. As health care services are important part of our society, automating these services eases the measuring process. To simplify the hardware and reduce wiring we can use wireless sensors.**

Also the transparency of this system helps patients to trust it. When threshold value is reached, the alarm system that consists of buzzer and LED alerts the doctors and he can act more quickly. The biometric information of the patient which is stored and published online can be given to scientists and researchers of medical fields to analyze the value and find patterns or for other research work.

Index Terms **- Arduino, GSM Modem, GSM Module, Internet of Things, LCD Display, Sensors.**

I.INTRODUCTION

Today, the advanced universe of science and innovation, Transportation framework is an essential piece of living. Health is one of the global challenges for humanity. In the last decade the healthcare has drawn considerable amount of attention. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor the patients, who are either hospitalized or executing their normal daily life activities. Recently, the patient monitoring systems is one of the major advancements because of its improved technology. Currently, there is need for a modernized approach. In the traditional approach the healthcare professionals play the major role. They need to visit the patient's ward for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available patient monitoring system (PMS) is required. In order to improve the above condition, we can make use of technology in a smarter way. In recent years, health care sensors along with Arduino play a vital role. Wearable sensors are in contact with the human body and monitor his or her physiological parameters. We can buy variety of sensors in the market today such as ECG sensors, temperature sensors, pulse monitors etc. The cost of the sensors varies according to their size, flexibility and accuracy.

The Arduino which is a cheap, flexible, fully customizable and programmable small microcontroller board brings the advantages of an embedded system to the domain of sensor network. In our system we are measuring patient's parameters (temperature, heart rate, and humidity level) with different available sensors. These sensors collected data i.e. biometric information is given to Arduino and then it is transferred to IOT server.

The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure.

II. LITERATURE SURVEY

In traditional method, doctors play an important role in health checkup. For this process requires a lot of time for registration, appointment and then checkup. Also reports are generated later. Due to this lengthy process working people tend to ignore the checkups or postpone it. This modern approach reduces time consumption in the process.

In rural hospitals, the facilities for health caring are limited. The poor quality of health management enables issues in health care system Everyone should get the knowledge of own health as easy and early as possible. Also it should be worth for each. Latest report of The India Spend analysis of data says that the 500,000 doctor's shortage in India. WHO defines the doctor patient ratio will be 1:1000 which has been failed in India.

In developing countries there is lack of resources and management to reach out the problems of individuals. A common man cannot afford the expensive and daily checkup for his health. For this purpose, various systems which give easy and assured caring unit has been developed. Theses system reduces time with safely handled equipment.

III. BLOCK DIAGRAM

In this project, Arduino is used for controlling the whole process with a GSM module. The Arduino is responsible for reading data from input devices like sensor.

Components used in this project are:

1) Arduino Uno 2) LCD Display
3) Buzzer 4) Relay
5) GSM Modem

Sensors used in our project:

1) Heartbeat sensor
2) Temperature sensor
3) Humidity sensor

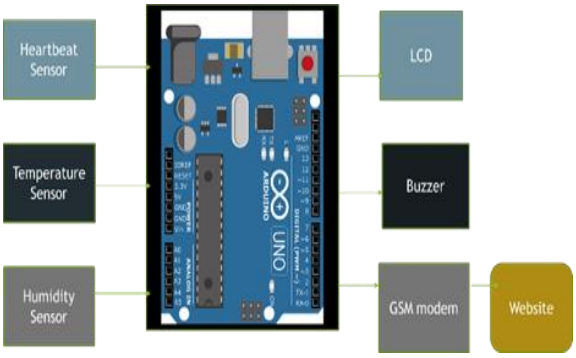


Fig 1 Block Diagram

IV. HARDWARE IMPLEMENTATION

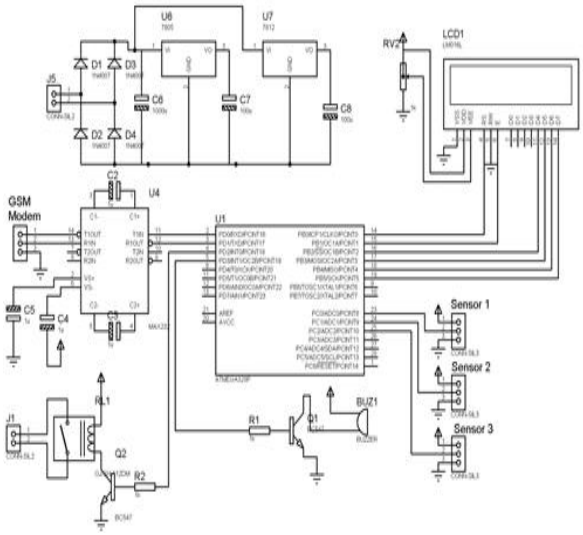


Fig 2 Circuit Diagram

Circuit Description

In this project we have used 3 pin analog sensors.
Sensor 1 is temperature sensor,
Sensor 2 is humidity sensor
Sensor 3 is heartbeat sensor

LM 35 is used as Temperature sensor, SYHS220 is used as humidity sensor as pulse sensor is used as heartbeat sensor. All sensors give 0 to 5V analog output. Arduino has 6 analog input pins. Out of these, we have used 3 pins. Output pin of sensor 1 is connected to pin 23 of Arduino. Output pin of sensor 2 is connected to pin 24 of Arduino. Output pin of sensor 3 is connected to pin 25 of Arduino.

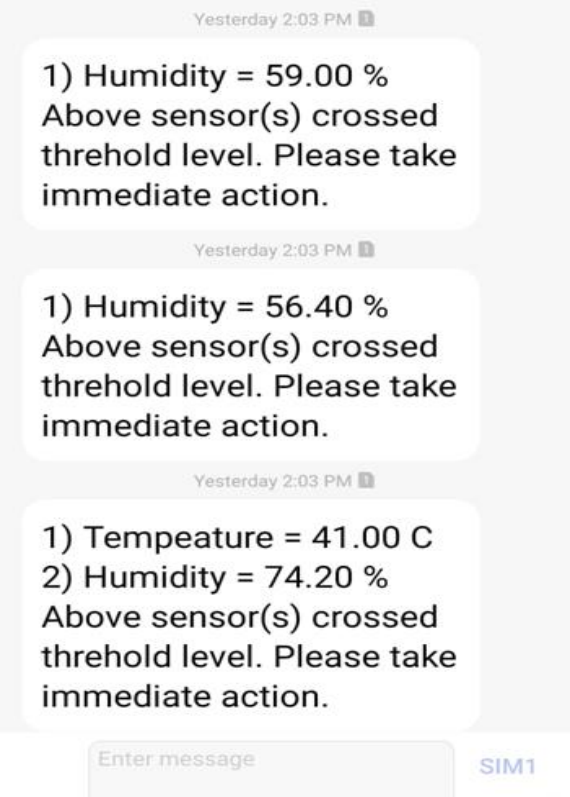
Here GSM Modem is used to send SMS and data to Arduino. We have allowed serial communication as transmission protocol. There is voltage level difference between GSM modem and Arduino i.e. 12V and 5V respectively. That is why we have used MAX 232 IC to make communication between GSM modem and Arduino. Pin 1 and 2 of GSM Modem is connected to pin 14 and 13 of MAX 232 IC respectively. Pin 11 and 12 of MAX 232 is directly connected to pin 2 and 3 of Arduino. MAX 232 has 4 capacitors each of 1 micro farade. MAX 232 generates voltage doubler circuit. We have used AT commands to interact with Arduino.

We have used 16x2 alpha numeric display it means that it can display alphabets, numbers as well as special symbols. On this display, we can display 2

lines with maximum of 16 characters in one line. The always write LCD not read. RS 1 pin is used for data and RS 0 pin is used for command. Data (a, b,c,d,#,@,1,2,etc). Commands (clear, cursor on, cursor off). There are 4 data pins used in LCD. We have used ASCII codes to display.

Relay and buzzer is having 12 V voltage level, so that we cannot connect replay and buzzer directly to Arduino. So that to connect buzzer and relay to Arduino, we have used BC547 transistors.

V. RESULT



VI. CONCLUSION

A] Conclusion

This project has built in us confidence that any problem can be solved with sheer determination, hard work and optimism. We feel that our product serves something good to this world and we like to present it before this prosperous world. By doing this project, we were better able to understand the various facets of doing an embedded system project which is emerging as one of the most 'in demand' technologies right now. With the knowledge of new techniques in 'Electronics' we are able to make our life more comfortable. One such application of electronics is used in "IOT based Patient health monitoring system using Arduino" The approach we followed and which is explained in this project report is novel and has achieved the target of "IOT based Patient health monitoring system using Arduino" satisfying user needs and requirements

B] Future Scope

According to the availability of sensors or development in biomedical trend more parameter can be sensed and monitored which will drastically improve the efficiency of the wireless monitoring system in biomedical field. A graphical LCD can be used to display a graph of rate of change of health parameters over time. The whole health monitoring system which we have framed can be integrated into a small compact unit as small as a cell phone or a wrist watch. This will help the patients to easily carry this device with them wherever they go.

In addition, with medical application we can use our system in industrial and agricultural application by using sensors like humidity sensors, fertility check sensors, etc.

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