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SMART PHONE ASSISTED PHYSIOLOGICAL MONITORING SYSTEM FOR ELDERLY PERSON

V.Jeyalakshmi ,Assistant professor/ECE
Electronics and communication engineering,
Kamaraj College Of Engineering and Technology,
Virudhunagar, Tamilnadu , India.

S.Gomathi,G.Divya,C.Durga devahi,S.Pavithra
Electronics and communication engineering,
Kamaraj College Of Engineering and Technology,
Virudhunagar,Tamilnadu,India.

***Abstract*—Telemedicine is a rapidly developing application of clinic medicine where medical information is transferred through the phone or internet or other networks for the purpose of consulting and performing remote medical procedures or examinations. This project monitors the respiration rate, pulse rate, temperature and sudden fall of the aged patient. If any abnormal changes occurs in this parameters, it sends the immediate alert message to the caretakers, thus preventing any undesired happenings. In our work, the patient's authentication is notified. Also, the patient's vital sign of pulse rate is captured and the values are entered into the database. It is then uploaded into the web based server and sent to the doctor's phone or their relative's phone using ANDROID technology. For this implementation, Arduino controller has chosen to monitor the status of the patient.**

Keywords—heart rate sensor,temperature sensor,respiration sensor,bluetooth,arduino (key words)

I. INTRODUCTION

The modern visionary of healthcare industry is to provide better healthcare to people anytime and anywhere in the world in a more economic and patient friendly manner. Therefore for increasing the patient care efficiency, there arises a need to improve the patient monitoring devices and make them more mobile. The medical world today faces two basic problems when it comes to patient monitoring. Firstly, the needs of health care's provider's presence near the bedside of the patient and secondly, the patient is restricted to bed and wired to large machines. In order to achieve better quality patient care, the above cited problems have to be solved. Falls of the elderly always lead to serious health issues as the decline of their physical fitness. At most fall situations, the fall process is the main source of injury because of the high impact. A single tri axial accelerometer can provide object's accelerations in three directions which include the influence of gravity. A coordinate will be built when the accelerometer is fixed on human's body.MEMS (micro electro mechanical systems) sensors have simplified the design and implementation of sensor system. Location based service (LBS) makes it more convenient to locate the elderly in health monitoring. Beside these, mobile computing makes remote health monitoring easier to realize. Several kinds of fall detection methods have been developed or applied in our life.

II. DESCRIPTION

A. Wearable Based Method

Wearable based methods often rely on smart sensors with embedded processing a smartphone based fall detection system with consideration of the acceleration signal produced by fall-like activities of daily lives. Bai, Wu and Tsai [13] illustrated a system based on a 3-axis accelerometer embedded in a smart phone which had a GPS function for the user. However, due to the relatively high energy consumption of current smart phones, their system could only be active for 40 hours with foreground execution or at most 44 hours in background execution, which means continuation of this system is the most significant problem

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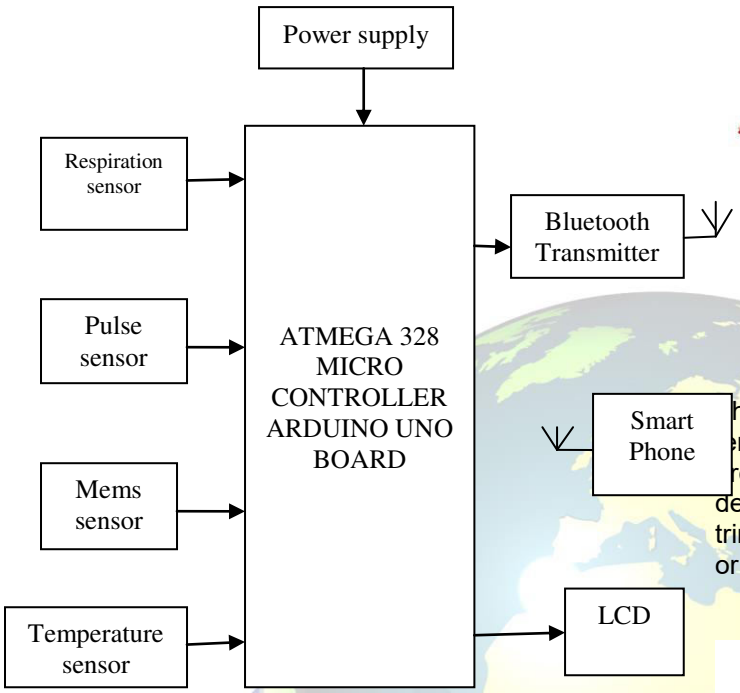
B. Block diagram



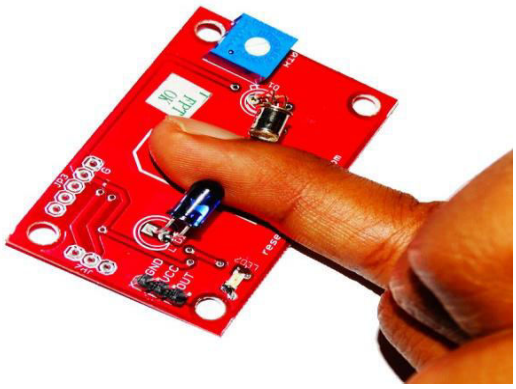


Fig 1: Heart beat sensor

C. Sensors used

A sensor is an electronic component whose purpose is to detect events or changes in its environment information to other electronics. The sensors used here are
(1) heart beat sensor (2) temperature sensor
(3) mems sensor (4) Respiration sensor

1) Heart beat sensor

Heart beats are important for the health of patient. Heartbeat sensor works on a principle that blood in human body pumps with every heartbeat. We have used a Red LED and LDR. Patient needs to place his/her finger between these two components. Red light will be reflected from patient's finger to LDR. And blood will pump with every heartbeat. This will cause fluctuations in the light intensity. Heart beat sensor used in this project works on the above principle. It gives out high pulses with every heartbeat. It works on pure 5 volt DC. It works on the principle of light modulation by blood flow through finger t each pulse. Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it.

2) Tempreature Sensor

he LM35 series are precision integrated-circuit emperature devices with an output voltage linearly roportional to the Centigrade temperature. The LM35 device does not require any external calibration or trimming. The device is used with single power supplies, or with plus and minus supplies.

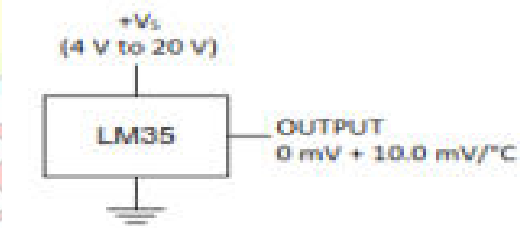


Fig 2: Tempreature Sensor

3) Mems sensor

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 *g*.It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. A wearable device is placed on human's waist. The system can detect the elderly's falling by acceleration analysis. Then it will get the elderly's geographic position and send fall alarm short message to caregivers. So the elderly who has fallen can get timely help to minimize the negative influence.

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Fig 3:MEMS sensor

4) Respiration Rate Measurement

The respiration rate is the number of breaths a person takes per minute. The rate is usually measured when a person is at rest and simply involves counting the number of breaths for one minute by counting how many times the chest rises. Respiration rates may increase with fever, illness, and with other medical conditions. When checking respiration, it is important to also note whether a person has any difficulty breathing.Normal respiration rates for an adult person at rest range from 12 to 16 breaths per minute.Digital Respiration Rate Meter uses a displacement transducer for sensing the respiration rate using IR transmitter and receiver as shown in the physical assembly. Inhaling and exhaling the air during respiration causes a light ball to move up and down in a capillary glass tube. This movement is sensed with the help of an IR transmitter-receiver assembly of the sensing circuit and converted into pulses through the pulse generator. These pulses are counted for a minute using a counter. The respiration rate is displayed on a 3-digit display through the seven segment decoder/driver.Respiration sensor makes use of acoustic level changes in the nasal region during inhalation and exhalation.A high fidelity micro phone is used to detect the inhale/exhale process.

III. SYSTEM ARCHITECHTURE AND DESIGN

1)APPLICATION

The app for establishing connection with the Bluetooth module as well as for constant updation of data in IoT has been developed using the MIT App Inventor. Bluetooth module HC-05 has been used. Whenever connection needs to be established with HC05, the user sends signal. If any critical situations occurs the alert message from the mobile is send to nearby caretakers.

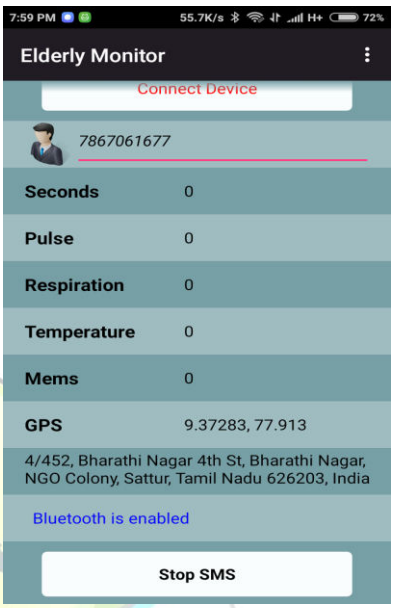

Fig:Application layout

On reception of the signal, the connection is established with the Bluetooth module and the module responds back with a signal indicating connection established. Once connected, the user can make contact with the intended hospital by making a call and start updating the parameters of the patient in the thingspeak which can be viewed in real time by the concerned doctor by logging using the patient's ID number in Thingspeak.

Fig: Alert message

IV. CONCLUSION

This project model is to develop a smart health care monitoring system using Bluetooth Transmitter and Receiver

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.Both the hardware and software tools are developed successfully by means of Arduino Software. The results are in line with the expected output.

In this work LCD, Arduino controller, Pulse sensor, Respiration sensor, Accelero meter, Temperature sensor along with Mobile phone with Bluetooth Transmitter and Receiver are chosen are proved to be more appropriate for the intended application. The project is having enough avenues for future enhancement. The project is a prototype model that fulfills all the logical requirements. The project with minimal improvements can be directly applicable for real time applications. The project is further adaptive towards continuous performance and peripheral up gradations. This work can be applied to variety of industrial and commercial applications

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Future Enhancement

In our next module we propose to extend our work to measure the sensor signal in the real time environment using wireless sensor network and developing an android application for continuous monitoring in PC and android mobile devices. Thus the problem of hospitality monitoring of patient can be solved and can be monitored from remote location. Patients after an operation usually go through the rehabilitation process where they follow a strict routine . It can be monitoring hole activity the hospitalized peoples.

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