Automatic Health Monitoring System using GSM
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Abstract:
HEALTH MONITORING SYSTEMS have rapidly evolved recently, and smart systems have been proposed to monitor comatose patients current health conditions and abnormalities, in our proposed and implemented system, we focus on monitoring the patient’s heart beat rate and his body temperature. The objective of this work providing effective applications for real time health monitoring and tracking. The system uses GSM for communicating the abnormalities. Embedded processor supports for analyzing the input from the patient or elderly person and the results of all the parameters are stored in the database. If any abnormality felt by the patient automatic alarm sound will arrive. The implementation of the system is achieved by the advanced processor and simulation results are obtained.

Keywords: Temperature sensor, Heart beat sensor, Flux sensor, GSM, Arduino, LCD display, Buzzer

I. INTRODUCTION
In recent years the great innovations brings advanced technologies in Medicinal ground. Most of the Health Care – Hospitals are trying to make available and uphold the effective enduring treatment with more alert and preventions. Such an effective treatment requires a professional Patient Monitoring System. The Patient Monitoring System is a greatly developed technology for controlling and monitoring the situation of various Human-health parameters. Some of our Human health parameters include temperature, heartbeat, etc. needs a continuous monitoring. To overcome these limitations a device use to keep track on heartbeat count of patient should be easy to use, portable, light weighted, small size etc. so that it give freedom of mobility for patient. The devices which can be carried everywhere to keep track on patient’s health. This device that is a heartbeat sensor would help them to keep track on heartbeat counts of a patient and check for any abnormalities. There are various instruments available in market to keep track on internal body changes. But there are many limitations regarding their maintenance due their heavy cost, size of instruments, and mobility of patients. If any varied change takes place it is notified. This notification would help to take an appropriate action at an instance of a time. This would save patients from the future health problem which would arise. This would also help patient’s concern doctor to take an appropriate action at proper time.

II. EXISTING MODEL USING ZIGBEE
The human activity monitoring system is represented by block diagrams. There are different types of sensors are used. These types of simple wearable devices are used by normal people while jogging, running and other applications where the users look at the display to notice the measured values of the sensors. If the device has the feature of wireless data transmitting capability, the data can be sent to a central station through a transceiver. The block diagram representation of a simple wearable wireless device. The data may or may not be completely processed at the sensing end but most of the data are stored, processed in the computer. The block diagram representation of the Human Activity Monitoring (HAM) system. Picture of the developed wearable physiological parameters monitoring system. Extensive display is possible either in a graphical format and/or as a numerical value. Depending on the complexity, the results may be available through an access of a website from a remote place. The block diagram representation of a developed physiological monitoring system is shown. The monitoring system may consists of many sensors to measure physiological parameters such as body temperature, heart-rate etc.

Figure 1. The block diagram representation of the Human Activity Monitoring (HAM) system

Mikhail St-Denis, designed Life line project that can monitor heart rate, blood sugar levels, human’s body temperature, and by using a wireless communication technologies to synchronize and display these information into a smart mobile phone or a standard computer. Such device gathers data from user and display some related graphs in order to encourage users to remain aware of their health conditions by providing a week to week feedback. Eli Hariton designed Gluco (M) wristband which monitors the blood glucose levels. LUMO Body Tech (2011), created a platform for tracking human biomechanics, starting with a unique sensor-based solution for posture and back pain. This solution is comprised of a discreet biomechanics-monitoring sensor, an engaging mobile app, and intelligent algorithms for a personalized user experience. Patent-pending solution harnesses the power of human movement data to provide real time actionable feedback and to enable healthy behaviors. Dr. Sailesh Chutani(2009), founded a Mobisante for ultra sound imaging that will be displayed. Health care workers in remote locations can check pregnant women, monitor a baby’s health, examine patients for heart and lung problems, and triage other problems. Their phone can then transmit the images to a hospital for consultation. In this
paper, a tracking system will be designed and implemented for monitoring heart rate and body temperature. This paper builds an independent system that automatically logs vital parameters of patients for easy access. The data is accessible to doctors through mobile device for convenience. Data of all patients is stored in a common database. A system to monitor the overall health of welfare facility, which needs constant care, has been reported. The host computer stores the data, which can be used to analyze the patient’s overall health condition. When the patient is in an emergency situation, such as falling or in an inactive state for more that the allotted time, the host computer automatically alerts the situation to the care staff by an alarm sound and also the message has been send to doctor through GSM module. These facts show an increasing demand for long-term health monitoring which is affordable, continuous, and unobtrusive, which will result in considerable impact on annual medical costs and health management. Wearable systems for continuous health monitoring are a key technology in helping the transition to more practical and affordable healthcare. But also provides feedback to help maintain an optimal health status.

III. SENSORS FOR HUMAN ACTIVITY MONITORING

In this section we will review a few sensors which are commonly used for monitoring different human activities. Sensors are fundamental elements of the whole monitoring system and should measure the physiological parameters of interest accurately and reliably over a long duration. The rapid development of microelectronics, micromechanics, integrated optics and other related technologies has enabled the development of various kinds of smart sensors to sense and measure data more efficiently and faster, with lower energy consumption and less processing resources. Body temperature is one of the common physiological parameters measured by wearable sensors for human activity monitoring. The variation in temperature measured on the skin can give an indication of what is happening with the person’s body temperature and can be used to detect the symptoms of medical stress that might lead to various health conditions, including stroke, heart attacks and shock. The measurement of body temperature is extremely useful for determining the physiological condition as well as for other things such as activity classification or even harvesting energy from body heat. The most common physiological parameter is the heart rate of the person under monitoring. Heart rate is a precisely regulated variable, which plays a critical role in health and disease of human. There are many methods available to measure heart rate of a person; Photoplethysmography (PPG) based technology, sound based, based on changes on brightness of person’s face, and so on. Accelerometers are very commonly used in monitoring of human activity and basically are used to measure acceleration along a sensitive axis and over a particular range of frequencies.

IV. PROPOSED MODEL

Health monitoring systems have rapidly evolved recently, and smart systems have been proposed to monitor patient current health conditions, in our proposed and implemented system, we focus on monitoring the patient’s heart beat rate, and his body temperature. Based on last decade statistics of medical records, death rates due to hypertensive heart disease, shows that the blood pressure is a crucial risk factor for atherosclerosis and ischemic heart diseases; thus, preventive measures should be taken against high blood pressure which provide the ability to track, trace and save patient’s life at appropriate time is an essential need for mankind. Nowadays, Globalization demands Smart cities, which involves many attributes and services, such as government services, Intelligent Transportation Systems (ITS), energy, health care, water and waste. This paper proposes system architecture for smart healthcare based on GSM technologies. The objective of this work is providing an effective application for Real Time Health Monitoring and Tracking. The system will track, trace, monitors patients and facilitate taking care of their health; so efficient medical services could be provide data appropriate time. By using specific sensors, the data will be captured and compared with a configurable threshold via micro controller which is defined by a specialized doctor who follows the patient; in any case of emergency a short message service (SMS) will be sent to the Doctor’s mobile number along with the measured values through GSM module. Furthermore, the GPS provides the position information of the monitored person who is under surveillance all the time. Moreover, the paper demonstrates the feasibility of realizing a complete end-to-end smart health system responding to the real health system design requirements by taking in consideration wider vital human health parameters such as respiration rate, nerves signs etc. The system will be able to bridge the gap between patients -in dramatic health change occasions- and health entities who respond and take actions in real time fashion.

V. ARCHITECTURE AND IMPLEMENTATIONS

This section provides insights structure of the proposed system and explains the main building blocks and the interconnection relationships among the system blocks. Mainly, the proposed system aims to cover an end-to-end smart health application that can be building up from two functional building blocks. However the main function of the first building block is to gather all sensory data that are related to the monitored persons, whereas the second block functions are to store, process and present the resulted information of this stage to the doctors and nursery staff that are following the case of the monitored person. As depicted in Figure 4, which illustrates the overall model, when the patient’s heartbeat rate changes badly, the Arduino which recorded Pulse and Lily Pad Temperature Sensors readings, orders GSM shield to send an SMS message containing these readings, patient ID and the location of the patient which has been taken via GPS shield, to his doctor’s mobile phone, who -by his turn- send an ambulance to the patient’s location. A Smart Embedded Board (SEB) This subsection provides the hardware components details used to compose a smart board attached to the human body. Periodically, the Smart board senses the human health conditions using several dedicated sensor devices and then the broad conveys the raw sensed data to the back-end server application using GSM SMS.

Microcontroller: It is the core part of the SEB design; the microcontroller acts as the brain of the smart board that is holding the main board flow chart logic. However, there are many microcontrollers available in market and can perform well the main board logic such as PIC, Beagle-Bone, and Arduino. For the sake of demonstration proposes the choice falls on Arduino Uno according to its specifications and simplicity of use. Arduino Uno as depicted in Figure this board is based on ATmega32 microcontroller, which has a set of 14 input/output digital pins, where 6 out of 14 can be used as a PWM output pins, also, the microcontroller board has 6 analog inputs, a ceramic resonant of 16 MHz, an USB
interface, a DC power jack, a reset button, and ICSP header. The USB interface simplifies the connection of the microcontroller with the computer, also the USB can be a power supplier for the microcontroller board.

![Image](image-url)

**Figure 2. Interfacing Arduino with GSM**

**GSM**: GSM is a globally accepted standard for digital cellular communications. GSM uses narrowband Time Division Multiple Access (TDMA) for voice and Short Messaging Service (SMS). The GSM system is the most widely used cellular technology in use in the world today. It has been a particularly successful cellular phone technology for a variety of reasons including the ability to roam worldwide with the certainty of being able to be able to operate on GSM networks in exactly the same way - provided billing agreements are in place. The letters GSM originally stood for the words Group Special Mobile, but as it became clear this cellular technology was being used worldwide the meaning of GSM was changed to Global System for Mobile Communications.

**VI. RESULTS AND DISCUSSION**

The problem faces by the elderly people/patient as quoted earlier is tried to solve in the proposed system. This system has to demonstrate its functional feasibility with GSM connectivity for simulated biomedical parameter monitoring and intimation of medical emergencies. It was intended to allow the biomedical parameters of a person to be automatically measured from anywhere, without the limitation of distance and make use of GSM mobile technology for communication and thus to extend the range of biomedical parameters to unlimited range. The patient himself can ask for the help by pressing a button or a micro-switch attached to the instrument whenever he is uncomfortable. If there is nobody to help the person, the microcontroller prepares a concise SMS and sends the information through the GSM modem to the mobile phone of the doctor/care giver of the affected person. Hence helps such people to get the critical help in time. Thus it can assist the aged people. Also serves as a life saving instrument for critically ill patients.

![Image](image-url)

**Figure 3. Photograph of a Mobile phone with SMS sent by the designed system**

**VII. CONCLUSION**

Health monitoring systems have rapidly evolved recently, and smart systems have been proposed to monitor patient current health conditions, in our proposed and implemented system, we focus on monitoring the patient’s heart beat rate, reactions and his body temperature. In India many patients are dying because of heart attacks and reason behind that they are not getting timely and proper help. 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 on bed and this system 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 constant or periodically monitored by clinician 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. Embedded systems are widely used in monitoring & control of various physical parameters. The GSM (Global System for Mobile Communication) which offers worldwide communication. The system unit, which has a microcontroller, collects the data & compares for any abnormal deviations from their set values. In case of deviations it sends an SMS to the care giver’s cell phone along with values of biomedical parameters.

**VIII. REFERENCES**


