Health Monitoring System Using GSM and RFID

Mr. Khilari Vijay, Mr. Kolhe Pratik, Mr.Pathare Vikas, Prof. Mane A.B.

Abstract— **Care of critically ill patient, requires spontaneous & accurate decisions so that life-protecting &lifesaving therapy can be properly applied. Statistics reveal that every minute a human is losing his/her life across the globe. More close in India, everyday many lives are affected by heart attacks and more importantly because the patients did not get timely and proper help .This paper is based on 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. It enables the doctors to monitor patient's health parameters (temp, heartbeat, ECG, position) in real time. Here the parameters of patient are measured continuously (temp, heartbeat, ECG) and wirelessly transmitted using RFID. This project provides a solution for enhancing the reliability and flexibility by improving the performance and power management of the patient monitoring system. In the current proposed system the patient health is continuously monitored and the acquired data is analyzed at a centralized ARM microcontroller. If a particular patient's health parameter falls below the threshold value, an automated SMS is sent to the pre-configured Doctor's mobile number using a standard GSM module interfaced to the ARM microcontroller. Here, we are using RFID for wireless transmission. The Doctor can get a record of a particular patient's information by just accessing the database of the patient on his PC which is continuously updated through RFID receiver module.**

I. INTRODUCTION

The proposed patient monitoring system would be beneficial for medical practitioners to do proper and better treatment; also it would be useful for health care providers to improve diseases management. The patient is monitored from ICU and the data transferred to the PC is wired. Recent work includes using Bluetooth technology coupled with the GSM technology to report signs to PDAs held by the patient or his doctor. Monitoring based on ultra wideband-based personal area networks. Compared to Bluetooth, RFID provides higher network flexibility and a larger number of nodes, and a better transmission range with low power consumption. Recently, RFID-based wireless networks were tested in various applications. The authors investigate the use of RFID and mobile phones in monitoring elderly patients with diabetes mellitus or heart diseases. In the proposed system, patient's parameters such as ECG, Temperature and Heart Beat will be continuously transmitted and monitored through wireless technology RFID . This system do not require the patient to be confined to his bed and allows him to move freely in his room within a specific distance from the doctor's monitor. Depending on the size of the hospital, several such nodes

might be required resulting in a much higher system infrastructure cost. Secondly, a typical Bluetooth Personal Area Network (PAN) has a limitation of 8 Nodes per PAN which will limit the expansion of such systems. A RFID node is connected to every patient monitor system that consumes very low power and is extremely small in size. These slave nodes are specifically designed for low power consumption, with minimal circuit components. Moreover,such protocols are meant for moderate to high bandwidth applications where relatively large packets of data need to be transmitted and received. In the case of patient vital sign monitoring, the data packet size is much smaller and could be in tens of hundreds of bytes, which seems to suggest that networks using such protocols might seem impractical and it's obvious that we need a low power, low cost network nodes for such applications.

To improve the accuracy and to increase the efficiency of the above processes a real time patient monitoring system based on Wireless Sensor Networks (using IEEE 802. 15a) and a central ARM microcontroller is used. The data exchanged between the patient monitoring system and the microcontroller will be of a string format containing individual vital patient parameters like heart beat etc. separated by a delimiter. The typical format a SEP includes character string followed by related parameter value separated by delimiter. The response includes the complete patient record of the requested patient. The technology defined by the RFID specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. RFID is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. RFID has a defined rate of 250 kbps best suited for periodic or impenitent data or a single signal transmission from a sensor or input device.

II. LITERATURE SURVEY

A. Sagahyroon et al.
This system presents the research of applied nature done to monitor physiological parameters such as skin temperature, heart rate, and body impact. The monitoring of athletes whilst exercising would-be possible if the sensitivity to movement was decreased. A Low-power operational amplifier, the design of the IR sensors could be improved to decrease its susceptibility to noise, to a point where it could be moved onto The wrist unit, RFID, communication protocol.

U. Varshney et al.
This system presents an architectural framework for a system that utilizes mobile techniques to wirelessly monitor the ECG of cardiac patients.

A.Nagarkar and M.N.Kakatkar et al.
The design of a wireless sensor network based on RFID technology using master and slave communication by. It is mainly used for collecting and transferring the various

monitoring information about the patients in hospitals or in their homes. To implement a Master and slave ad hoc wireless network by the cooperative communication technique.

III. IMPLEMENTATION DESIGN

System Architecture

The implementation of the system has been described using block diagram. This project provides a solution for enhancing the reliability and flexibility by improving the performance and power management of the patient monitoring system. In the current proposed system the patient health is continuously monitored and the acquired data is analyzed at a centralized ARM microcontroller. If a particular patient's health parameter falls below the threshold value, an automated SMS is sent to the pre-configured Doctor's mobile number using a standard GSM module interfaced to the ARM microcontroller

1.Sensors:

Blood Pressure

The Blood Pressure Play important role in daily life because BP high & low BP has causes effect on human body. Blood pressure readings have two numbers, for example 140/90mmHg.The top number is your systolic blood pressure. (The highest pressure when your heart beats and pushes the blood round your body.) The bottom one is your diastolic blood pressure. (The lowest pressure when your heart relaxes between beats.) The blood pressure sensor used to measure systolic and diastolic pressur..Depends On Systolic & Diastolic Reading shows the patient health whenever the reading less than 120&less than 80 this condition shows normal blood pressure category. When the systolic $120 – 139$ or diastolic $80 – 89$ this condition shows pre hypertension.
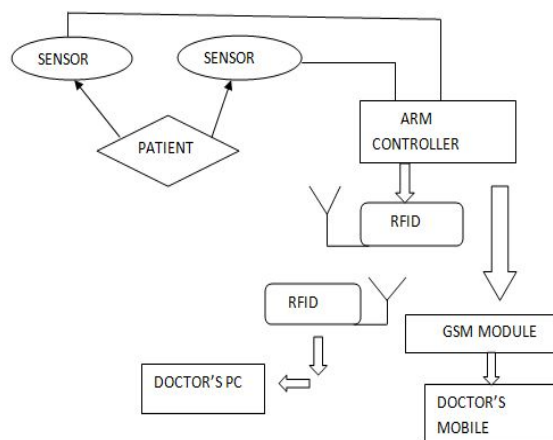
Body temperature:

A LM35 series are precision integration-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 does not require any external calibration or trimming to provide typical accuracies. This is three legs IC that directly gives analog output. This unit requires +5V DC for it proper operation. For the measurement of body temperature a sensor is as shown in figure, generally it is regularly used for treatment of dieses like malaria, typhoid, dengue. If the patient suffering from any one of the dieses the regular reading of patient body temperature is necessary.

Heart Beat Rate

Heart rate is the number of heartbeats per unit of time, typically expressed as beats per minute (bpm). Heart rate can vary as the body's need to absorb oxygen and excrete carbon dioxide changes, such as during exercise or sleep.

Heart rate is measured by finding the pulse of the body. This pulse rate can be measured at any point on the body where the artery's pulsation is transmitted to the surface by pressuring it with the index and middle fingers; often it is compressed against an underlying structure like bone.

The new born baby to 20 years age person the heart beat range is 140-170 .21 years 30 years age gives the reading 133-162. 31 years 40 years age gives the reading 126-153.41years 50 years age gives the reading 119-145.51 years 60 years age gives the reading 112-136.61 years 70 years age gives the reading 105-128.71 years 80years age gives the reading 98-119.81 years 90 years age gives the reading 91-110.

2.ARM Microcontroller:

It collects output of the sensors and analyses it. Then sends it to the doctor's pc through RFID transmitter and to the doctor's mobile through GSM module.The ARM microcontroller is a load store reducing instruction set computer architecture means the core cannot directly operate with the memory.The data operation must be done by the registers and the information is stored in the memory by an address.

Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer.

3.RFID Module:

It consists of a transmitter and a receiver for communicating data from microcontroller to the doctor's pc. In a basic RFID system, tags are attached to all items that are to be tracked. These tags are made from a tiny tag-chip, sometimes called an integrated circuit (IC), that is connected to an antenna that can be built into many different kinds of tags. The tag chip contains memory which stores the product's electronic product code(EPC) and other variable information so that it can be read and tracked by RFID readers anywhere .An RFID reader is a network connected device (fixed or mobile) with an antenna that sends power as well as data and commands to tags.

4.GSM Modem:

GSM module is used to establish communication between a computer and a GSM system. GSM module consists of a GSM modem assembled together with power supply circuit and communication interfaces (like RS- 232, USB, etc) for computer. GSM MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM network. It requires aSIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they. have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification.

Proposed system

In the proposed system, patient's parameters such as ECG, Temperature and Heart Beat will be continuously transmitted and monitored through wireless technology RFID. This system do not require the patient to be confined to his bed and allows him to move freely in his room within a specific distance from the doctor's monitor.

IV. ALGORITHM

Different sensors are connected to the patient's body at appropriate positions to collect real time data about his health.

- These data are then compared to standard threshold values to check if the patient is in normal condition.
- Accordingly, the information about the patient is updated in the database on doctor's Pc.
- Continuous monitoring of health parameters of the patient is being achieved by wireless transmission of sensors output through Zigbee technology.
- In case of any emergency condition, an alarm is also sent to the doctor's mobile in the form of a SMS alert,through GSM modem which describes that an immediate visit is required by the doctor.

V. RESULT

As a result Health Monitoring system using GSM And RFID, this system check the patients temperature, Heartbeat , Blood Pressure using RFID.By using GSM the data or report of patients health is transferred to doctor,s mobile.Thus immediate action will be taken for serious patients and save life and time.The following Graph shows the observations of each patient for different measured parameters:
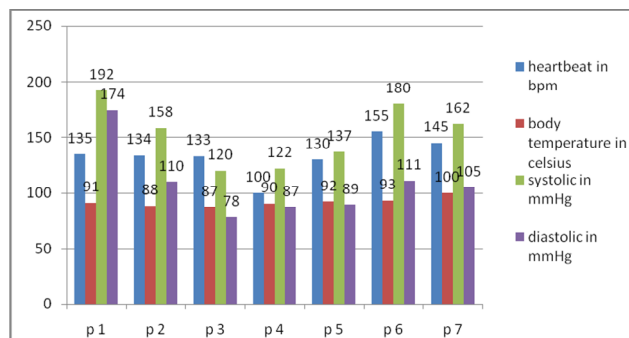
Graph . Observation Of Each Patient For Different Measured Parameters.

CONCLUSION

In this system, patient's parameters such as ECG, Temperature and Heart Beat will be continuously transmitted and monitored through RFID. This system do not require the patient to be confined to his bed and allows him to move freely in his room within a specific distance from the doctor's monitor. This project provides a solution for enhancing the reliability and flexibility by improving the performance and power management of the patient monitoring system.

FUTURE WORK

Future work Smoke sensor can be used. Patients suffering from diseases like asthma are more sensitive to any gas present in their surrounding area. In such cases smoke sensor is highly beneficial and helps in reducing the worst conditions for the asthmatic patients.
Using GPS, the location of remote patient can be detected so that help can be provided in case of emergency from nearest hospital.

ACKNOWLEDGMENT

REFERENCES

1. F. Tay, D. Guo, L. Xu, M. Nyan, and K. Yap, "MEMS Wearbiomonitoring System for Remote Vital Signs Monitoring," in Journal of the Franklin Institute, 346(6), 531-542, August 2009.
2. A. Sagahyroon, H. Raddy, A. Ghazy, and U. Suleman, "Design and Implementation of a Healthcare Monitoring System," in International. Journal of Electronic Healthcare, 5(1), 68-86, 2009.
3. K. Takizawa, Huan-Bang, L. Kiyoshi, H. Kohno, "Wireless Vital Sign Monitoring using Ultra Wideband-Based Personal Area Networks," in Proc. of the International Conference of the IEEE Engineering Medicine in Biology Society, 1798-1801, August 2007.
4. S. Sneha and U. Varshney, "A Wireless ECG Monitoring System for Pervasive Healthcare," in International Journal of Electronic Healthcare, 3(1),32-50,2007.
5. Y. Zhang and H. Xiao, "Bluetooth-Based Sensor Network for Remotely Monitoring the Physiological Signals of Patient," in IEEE Trans. On Information Technology in Biomedicine, 13(6), 1040-1048, November 2009.
6. H. Lee, S. Lee, K. Ha, H. Jang, W. Chung, J. Kim, Y. Chang, and D. Hoo, "Ubiquitous Healthcare Service Using RFID and Mobile for Elderly Patients," in International Journal of Medical Informatics, 78(3), 193-198, March 2009.
7. Sahandi, R., Noroozi, S., Roushanbakhti, G., Heaslip,V. & Liu, Y., 20 I O. "Wireless technology in the evolution of patient monitoring on general hospital wards ". Journal of Medical Engineering and Technology, 34(1), 51-63.
8. Aliaksei Kerhet, Michele .M,Francesco .L, Andrea. B, Luca. B. "A lowpower wireless video sensor node for distributedobject detection," RealTime Image Proc (2007) 2: 331-342.