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A WIRELESS TRACKING SYSTEM FOR AT-HOME MEDICAL EQUIPMENT DURING NATURAL DISASTERS

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ABSTRACT

The proposed system is designed to enhance speedy communication between the patient and the doctor through ad hoc network. Care of critically ill patient requires spontaneous and accurate decisions so that life-protecting and 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 . In this paper real time patient monitoring system along with additional facility that aims to expand patient monitoring over a wider area such as a remote village or town. The vital patient parameters such as BP, pulse rate and temperature are measured via the wearable sensors on the patient, even as the patient is carrying out his normal duties at home. The measured parameters are transmitted in a wireless manner to the nearest node of the AdHoc network.The specialist at a distance can monitor the patient condition so that he can save the life.This system is to be available at reasonable prices.Embedded technology is to be use for monitoring the patient condition easily.The idea behind this is that remote places usually lack proper health care facilities and good doctors to treat various diseases. The patients could be scattered in various places including hilly terrain, where doctor's frequent availability is not practicable. An Ad-hoc sensor network based solution is provided along with real time patient monitoring system. The proposed technique is intended specifically for remote rural areas where the infrastructural facilities such as the internet, GSM/GPRS etc are not available.

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1 INTRODUCTION

In the field of health monitoring the current most important user groups are those aged 40 and more. The group of 40+ users shows more diversity in their health conditions than younger people. There are ring-type pulses monitoring sensor available in the market in which the measured data are displayed in the LCD and cannot be transmitted out of the ring. Thus, it is not possible to continuously monitor the vital parameters such as temperature, pressure and pulse from a distant location.

In a hospital either the nurse or the doctor has to move physically from one person to another for health check which may not be possible to monitor their conditions continuously.

Thus any critical situations cannot be found easily unless the nurse or doctor checks the person's health at that moment. This may be a strain for the doctors who have to take care of a lot number of people in the hospital.

In such situations remote patient monitoring using the bandwidthguaranteed internet services have been seen as a success factor in healthcare organizations. In order to keep in track of critical health conditions a real time health monitoring system of patient based on sensors, GSMand SMS along with ad-hoc is designed and developed in this project.

Wireless ad-hoc sensor networks (WSN) are a class of networks that are deployed for sensing processing and transferring a set of parameters in an infrastructure-less terrain within certain requirements such as accuracy, latency and network availability.

These networks consist of a large number of wireless nodes that monitor, understand and possibly control a set of parameters in the physical world.

2. LITERATURE SURVEY

There is healthcare monitoring system using WSN with ZIGBEE but main drawback of this system is that we can monitor the patients for 100 meter distance only. There is healthcare monitoring system using WSN with GSM we can monitor the patients any where across the world. During the early 1980's analog cellular telephone system was experiencing rapid growth in Europeparticularly in Scandinavia and United Kingdom but also in France and

Germany. Each country developed its own system which was incompatible with everyone else in equipment and operation. This was an undesirable situation because not only was the mobile equipment limited to operation within national boundaries which in a unified Europe were increasingly unimportant but there was also a very limited market for each type of equipment so economies of scale and the subsequent savings could not be realized. This early on in 1982 the conference of posts and telegraphs formed a study group called the group special mobile (GSM) to study and develop a pan- public land mobile system. The proposed system had to meet certain criteria. Good subjective speech quality. Low terminal and service cost supports for international roaming. Support for range of new services and facilities spectral efficiency and ISDN compatibility.

In 1989GSM responsibility was transferred to the telecommunication standards institute (ETSI) and phase of the GSM specifications were published in 1990. Commercial service was started in mid-1991 and by 1993 there were 36 GSM networks in 22 countries with 25 additional countries having already selected or considering GSM. Although standardized in EuropeGSM is not only a standardGSM networks are operational and planned in almost 60 countries in Europe the Middle East, the Far East,Africa, SouthAmerica, and Australia.

In the beginning of 1994 there were 1.3 million subscribers worldwide. By the beginning of 1995 there were over 5 million subscribers. The acronym GSM now aptly stands for global system for mobile communications.

The developers of GSM chose an unproven (at the time) digital system as opposed to the then-standard analog cellular systems like amps in the United States and Tacs in the United Kingdom. They had faiththose advancements in compression algorithms and digital Signalprocessors would allow the fulfillment of the original criteria and the continual improvement of the system in terms of quality and cost. The nearly 6000 pages of GSM recommendations try to allow edibility and competitive innovation among suppliers but provide enough standardization to guarantee the proper interworking

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between the components of the system. This is done by providing functional and interface descriptions for each of the functional entities defined in the system.

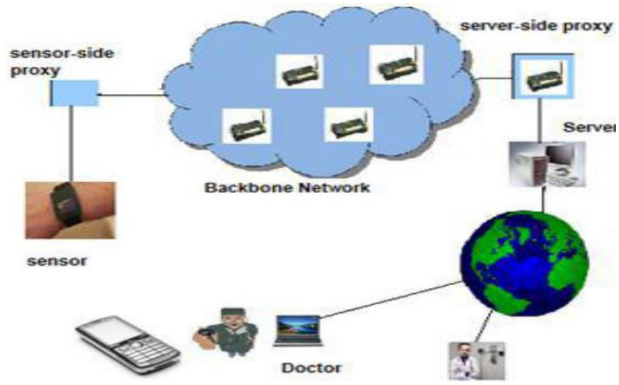

Figure 1 Ad-Hoc Sensor Network Based Remote Patient Monitoring System

3.1 PROBLEM STATEMENT

There are some shortcomings present in existing system. Currently there are number of health monitoring systems available for the ICU patients which can be used only when the patient is on bed. This system is wired everywhere. The patient is monitored in ICU and the data transferred to the pc is wired, such systems become difficult where the distance between system and pc is more. The available systems are huge in size. Regular monitoring of patient is not possible once he/she is discharged from hospitals. These systems cannot be used at individual level. The other problem with these systems is that it is not capable of transmitting data continuously also range limitations of different wireless technologies used in the systems so to overcome these limitations of systems I have proposed a new system. This system is able to transmit the parameters of patient continuously and over long distance wirelessly. Due to which we would be able attend the patient immediately. Therefore by developing a system that can constantly measure the important parameters of patient's body and which can alert the closed ones and the doctor on any time when the patient's condition gets bad. This can really provide quick service and be beneficial in saving a lot of lives.

Figure 2 Existing System

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3.2PROPOSED REAL TIME SYSTEM WITH AD-HOC SENSOR

The overall system components are depicted in the figure 3.2. The system which we proposed to develop shown in figure 3.1 would not only help in monitoring the patient when he is in the bed but also when he is not in the bed i.e. When he is mobile Such a system would constantly monitor important body parameters like temperature, heartbeat, ECG and would compare it against a predetermined value set and if these values cross a particular limit it would automatically alert the doctor and relatives of the patient via a SMS. In such case the patient will get a very quick medical help and also would save time and energy of the relatives who would not be with them all the time.

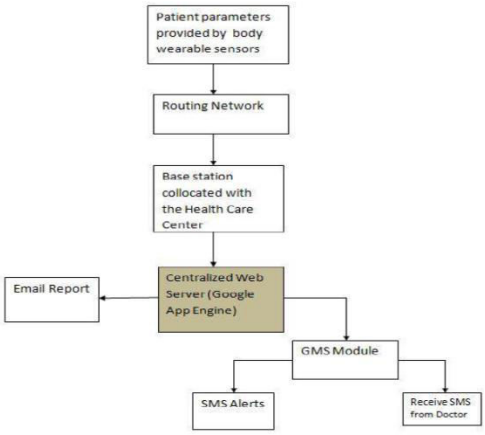
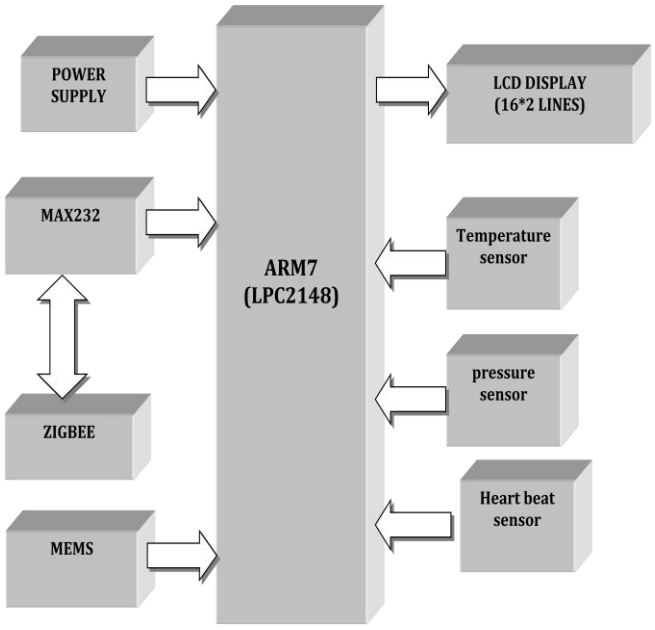


Figure 3 System Components

3.3 BLOCK DIAGRAM

(A). Patient Node



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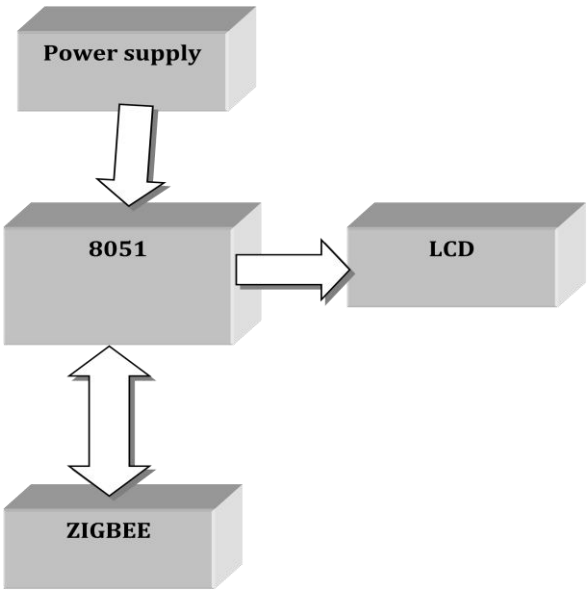
(B). Retransmission Node



(C). Central/Monitoring Node

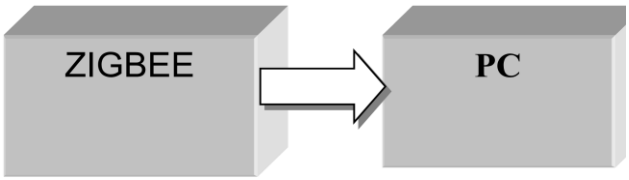


Figure 3 Block Diagram

3.4 Working

There are two sections

1. Patient Mode
2. Monitoring or controlling section

Here the patient section consists of different sensors, ZIGBEE module, lcd display. Here the sensor will sense the corresponding parameters and fed to the arm7 microcontroller, then the controller process the data and send it to the monitoring node through ZIGBEE module.

The ARM7 microcontroller also reads the commands from controlling node through ZIGBEE. In the proposed system we are using a android mobile with installed App as a monitoring node.

RESULT ANALYSIS

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness. The screenshots of the smart home app developed has been presented in figure bellow.

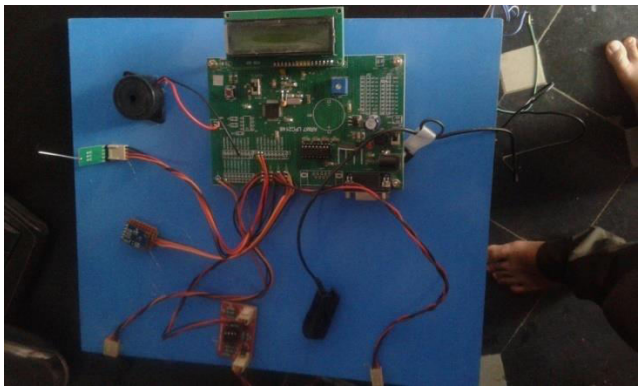


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Figure 3 Kit photo

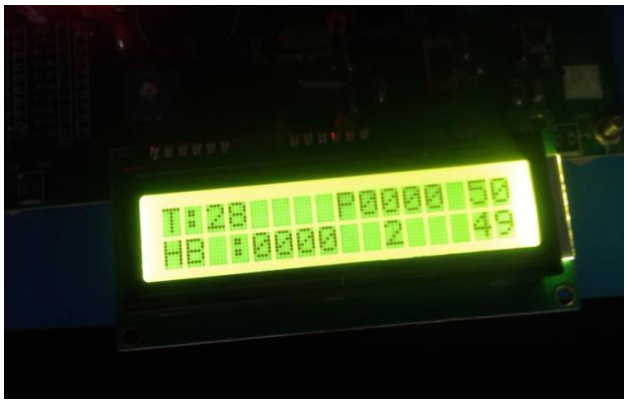

Figure 4 Kit results

5. CONCLUSION AND FUTURE ENHANCEMENT

In this proposed system, the system developed provides a remote patient health monitoring where the patient is located in a far off inaccessible location. Using AD-HOC sensor network environment patient monitoring can be expanded to remote rural areas where internet, GPRS and GSM facilities not available. There is always chance to improve any system as research & development is an endless process. Our system is no exception to this phenomenon. The following future enhancement can be done in the existing project.

- Portable and easy to use.
- Prevention is better than cure.
- Modern technologies have developed that promotes comfortable and better life which is disease free.
- Multiple parameters like Blood pressure, retinal size, age and weight can be included as controlling parameters in the future.
- This system also developed by using advanced GSM and GPRS technology along with ad-hoc network in future.

Future

- The following measurements can be done in future: blood pressure, oxygen saturation and, galvanic-skinresistance AMENIA.
- Using GPS the exact location of the patient can be detected so that help can be provided in case of emergency from nearest hospital.
- Using GPRS module range of data transmission can be increased provided internet facility available.
- Bridging the gap between the doctor and the patients.
- Best to be used on rural areas.

- It is a multipurpose so that overall conditions are easily measured.
- Easy to operate.
- Compare with compact sensor it gives better performance.
- It is not depends on network like gsm or internet

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