IOT BASED HEALTH CARE MONITORING AND TRACKING SYSTEM USING GPS AND GSM TECHNOLOGIES

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Abstract: The Body Sensor Network(BSN) technology is one of the most imperative technologies used in IOT based modern health care system.IOT has now become the most powerful communication standard of the 21st century, by extending the concept of Internet and making it more pervasive, allowing seamless interaction among different types of devices. Because of that reason,IoT has now become more productive in several areas such as health care system. This paper proposes a system architecture for smart health care based on GPS and GSM Technologies, consisting of miniaturized body sensor units(Bsus), which can measure blood pressure, heartbeat rate and body temperature and communicate them in cases of extraordinary behaviours to supervision medical entities using GSM, GPS to deliver immediate actions to rescue patients life with potentiality in the future to add other vital factors measurements according to available sensor in the market which can achieve the objective of providing a reliable effective application for real time health monitoring and tracking.

IndexTerms: IoT , BSN, Bsus, sensors.

I.INTRODUCTION

According to last decade statistics of medical records, the death rates are due to hypertensive heart disease, showing that blood pressure is a risk factor, thus preventive measures should be taken against high blood pressure which should provide the ability to track and save patient's life at appropriate time.

In intensive care units, there are provisions for continuously monitoring of the patients. Heart rate,temperature, ECG etc. are to be continuously monitored. So in many cases, patients are released from hospital but still they are strongly advised to be under rest and observation for some period of time (from several days to several months). In these cases, this system can be quite handy.Patient's data (temperature, heart rate, bp, ECG etc.) will be frequently measured and sent .Period of sending (say every 3 min) can be set. Pulse rate can be sent every minute. But these can be parameterized to ensure that when a patient is normal,not many readings will be sent so that sensors have alonger life-time. But when the patient is ill, readingswill be taken frequently and sent. This system can transmit continuously data. Suppose a patient has come back home after cardiac surgery. If the patient's cardiac problems like arrhythmia, thenthere will be irregular variation of heart signal. This may occur only once or twice a day. But if system transmits continuous data, such variations will be immediately detected and alerts will be issued.Early detection and diagnosis of potentially fatal physiological conditions such as heart attack require continuous monitoring of patients health following transfer from hospital to home. Studies have shownthat 30% of patients with a discharge diagnosis of heart failure are re-admitted at least once within 90 days with readmission rates ranging from 25 to 54%within 3 – 6 months. In response to these types of needs, home based health monitoring systems are being proposed as a low cost solution. Such a system consists of physiological data that stores, process and communicate through a local manner such as smart phones, personal computers. Such systems should satisfy strict safety, security, reliability, and long term real-time operation requirements.

In the previous existing method PC devices used as data acquisition (DAQ) systems we are able to collect vital information about the elderly patients remotely. Existed system which monitors temperature & pulse rate of different patients and immediate action is taken using Bluetooth technology. The Mobile Hub

has many attractive features cheaper price, portable, location awareness, inbuilt touch screen , however on the other side it has also significant limitations compared to a full PC hardware like limited CPU power, memory, storage size and external interface connection support, The Mobile Hub is targeting different functionalities compared to the Home Hub solution due to the smaller screen size and fewer hardware interfaces, and it can extend the usability with additional special features, such as mobility, location awareness and small size. Mobile Hub software is capable to run almost all Bluetooth enabled and Android based Smartphone. In a sudden panic situation an alarm can be activated manually (by the patient) or automatically (by e.g. the accelerometer) with the mobile device. When an alarm signal initiated the central dispatcher is able to acquire location information (based on GSM/GPRS cell information) immediately.

II.RELATED WORK

David Niewolny in his paper describes,How the Internet of Things Is Revolutionizing Healthcare [1] is discussing about the reasons for emergence of IoT and designs of applications where IoT is used. The main issue is people have only limited time, awareness and accuracy, which means they won't be able to capture data about things networked in the real world consistently. The answer is empowering devices to collect information on their own, without any human interference.

A smart health monitoring chair is introduced by H. Baek, G. Chung, K. Kim, and K. Park for non-invasive bio-signal measurement. However, these solutions are almost exclusively implemented using off-the-shelf components. Its physical size, rigid nature, and short battery life become limiting factors for potential long-term use.

Remote monitoring[2] of medication uses Zigbee technology was proposed by A. J. Jara, M. A. Zamora-Izquierdo, and A. F. Skarmeta for getting sensor values. Zigbee can transfer sensor values effectively but when there is a need of continuous data transmission zigbee cannot be used. Reducing sampling rate solves the above problem but affects the quality of life.

CodeBlue[3] a wireless infrastructure intended for deployment in emergency medical care, integrating low-power, wireless vital sign sensors, PDAs, and PC-class systems. CodeBlue will enhance first responders' ability to assess patients on scene, ensure seamless transfer of data among caregivers, and facilitate efficient allocation of hospital resources. Besides, CodeBlue's authors acknowledge the need of security in medical applications, but until now security is still pending or they intentionally left the security aspects for future work.

Another BSN based healthcare system UbiMon[4] was proposed in the department of computing, Imperial College, London. The aim of this project was to address the issues related to usage of wearable and implantable sensors for distributed mobile monitoring. Although Ng et al. proposed and demonstrated the ubiquitous healthcare monitoring architecture, it is widely accepted that without considering the security for wireless healthcare monitoring, which is a paramount requirement of healthcare applications, according to government laws

III.PROPOSED SYSTEM

(1).SYSTEM ARCHITECTURE

System interface can comprise of system components, the externally visible properties of those components, the relationships between them.The components in this project are:

1.ARM7Processor

2.LPC2148 Microprocessor

3.GSM/GPRS Modem

4.GPS Modem

5.Temperature Sensor

6.Blood Pressure Sensor

7.Pulse Sensor.

8.ECG Sensor.

9.MEMS Sensor

10.Mobile phone with internet connectivity.

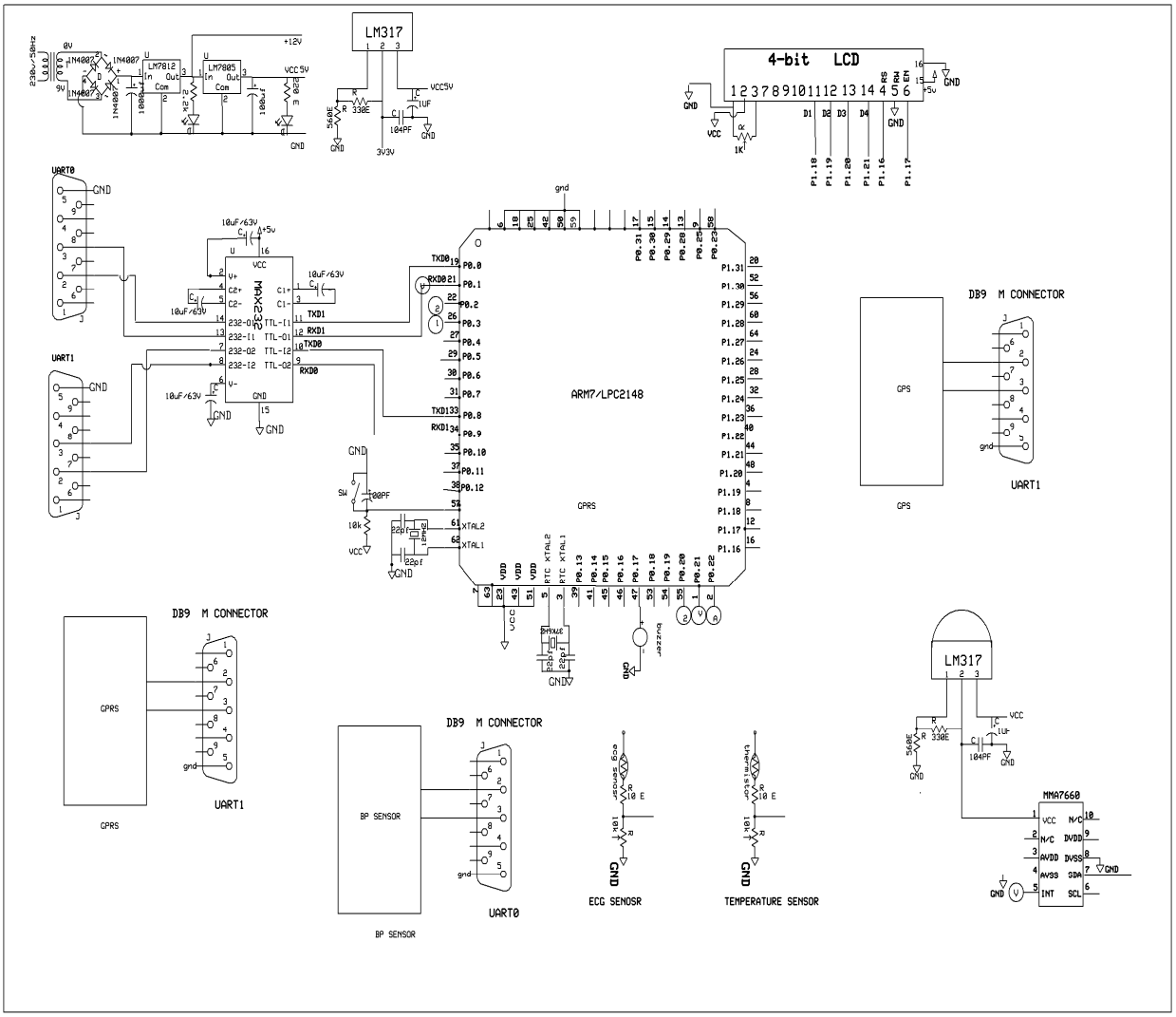

Fig.1.System Architecture

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer(CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties .

Temperature sensor: A thermistor is a type of resistor. The TMP103 is a digital output temperature sensor in a four-ball wafer chip-scale package (WCSP). The TMP103 is capable of reading temperatures to a resolution of 1°C.

Pulse sensor: Attach to finger and get Analog out from the sensor based on heart beat pulse. You can read the analog output with microcontroller ADC and

then plot it or calculate readings like heart beat per minute. It is simple to use and accurate results.

GSM: Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service.

GPS: Global Positioning System (GPS) technology is the technology used to provide location details.

ECG Sensor: The electrocardiogram (ECG or EKG) is a diagnostic tool that is routinely used to assess the electrical and muscular functions of the heart.

B.P.Sensor: This sensor measures the blood pressure(i.e; systolic, diastolic values).It has the following features:

- Intelligent automatic compression and decompression
- Easy to operate, switching button to start measuring
- 60 store groups memory measurements
- Can read single or all measures
- Local tests for : wrist circumference as 135-195mm
- Large-scale digital liquid crystal display screen, Easy to Read Display
- Fully Automatic, Clinical Accuracy, High-accuracy
- Power by External +5V DC
- Serial output data for external circuit processing or display.

(2).SYSTEM IMPLEMENTATION

The required operating voltage for ARM controller board is 12V. Hence the 12V D.C. power supply is needed for the ARM board. This regulated 12V is generated by stepping down the voltage from 230V to 18V now the step downed a.c voltage is being rectified by the Bridge Rectifier using 1N4007 diodes. The rectified a.c voltage is now filtered using a 'C' filter. Now the rectified, filtered D.C. voltage is fed to the Voltage Regulator. This voltage regulator provides/allows us to have a Regulated constant Voltage which is of +12V. The rectified; filtered and regulated voltage is again filtered for ripples using an electrolytic capacitor 100µF. Now the output from this section is fed to microcontroller board to supply operating voltage.

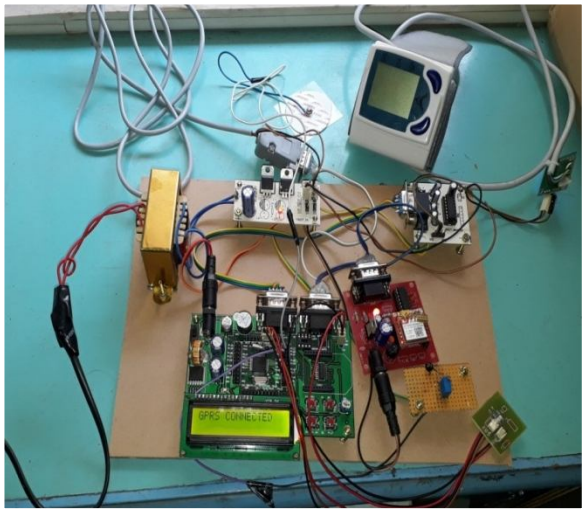

Fig.2 System Development kit

Then comes the initialization process of GSM,GPS. GPS is initialized by keeping the modem in the view of sky, for about 15-30 minutes.GSM needs a SIM(Subscriber's Identity Module) to be inserted.

The sensors are then initialized, and then by giving the messages over LCD, sensors collect the data from the patient and then compares the collected data with the threshold values, upon abnormality an alert is generated, displayed on LCD, and furthermore a message is sent to mobile phone describing about the condition of the patient, and then the location details are also provided.

IV.CONCLUSION

Healthcare field is one of most delicate and important fields to be developed and enhanced. The system designed experimented and shown in the paper grantee to improve the quality of health services and to reduce the total cost in healthcare by avoiding unnecessary hospitalizations and ensuring that those who need urgent care get it sooner.

It is a system which can measure heartbeat rate and body temperature and communicate them in cases of extraordinary behaviours to supervision medical entities using GSM, GPS and web technologies to deliver immediate actions to rescue patients life with potentiality in the future to add other vital factors measurements according to available sensor in the market which can achieve the objective of providing a reliable effective application for real time health monitoring and tracking

This system reduce costs by enabling in homemonitoring of patients, eliminating the need forutilization of expensive facilities, and reducing theneed for transportation of patients to physicians andMedical centers.

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