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BIOMEDICAL SENSORS BASED REMOTE MONITORING SYSTEM

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Abstract: Long-term medical devices (DMEs), such as respirators, washing machines and patient monitors, are life-sustaining machines that are widely used by patients at home. While convenient and cost effective, the use of DME's homes is especially vulnerable to outage, especially those caused by natural disasters that are often encountered. There is little technology that allows hospitals to monitor patients who rely on DME without the use of current infrastructure, such as parameter parameters, cables, electronics or the Internet. A new wireless system that uses live media to automatically read patient information and location, as well as DME information and status at a nearby hospital when power outages are reported.The system consists of two parts, a hospital-based telephone receiver called a local base and a transmitter called a user node which is connected to the DME in the patient's home. Base stations and user nodes are built with the Teensy® Microcontroller, GPRS Receiver Module and Xbee® Radio, which implement the ZigBee and an internal Ion battery attached to a charger. User nodes are programmed to receive GPRS monitors, DME contacts with nearby records, transmit data, and transmit information to a local station through a special network adapter, in case of power outages.

Keywords:*Microcontroller,ECG sensor, IOT, B.P., sensor.*

INTRODUCTION

The aging population of industrialized countries grows and this increases also among other things the health care costs. Transparently embedded remote health care can become a new cost effective paradigm, which can solve most of the problems primarily centralized Health Care system's have. Currently, there is a large number of enabling technologies to measure the patient's physiological signals remotely. With handheld and PC devices used as data acquisition (DAQ) systems we are able to collect vital information about the (elderly and demented) patients remotely. Due to the different - in most cases proprietary and incompatible- sensor technologies and solutions, it is a hard task to create generic, user friendly DAQ systems. There are already remote patient monitoring solutions available such as the Android based MyFitnessCompanion, which is able to support the following therapy fields: Fitness, Diabetes, Asthma, Obesity, Hypertension, CHD, or the iCare[which provides medical guidance,

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emergency alarm functionality and collects personal health information. Other example is the Microsoft HealthVault which supports care of elderly persons (e.g.: neurodegenerative diseases, stroke etc.), additionally it provides online web interface to manage (process and share) health information. [8] proposed a system about Efficient Sensor Network for Vehicle Security. Today vehicle theft rate is very high, greater challenges are coming from thieves thus tracking/ alarming systems are being deployed with an increasingly popularity .As per as security is concerned today most of the vehicles are running on the LPG so it is necessary to monitor any leakage or level of LPG in order to provide safety to passenger. Also in this fast running world everybody is in hurry so it is required to provide fully automated maintenance system to make the journey of the passenger safe, comfortable and economical. To make the system more intelligent and advanced it is required to introduce some important developments that can help to promote not only the luxurious but also safety drive to the owner. The system "Efficient Sensor Network for Vehicle Security", introduces a new trend in automobile industry.

PROPOSED SYSTEM

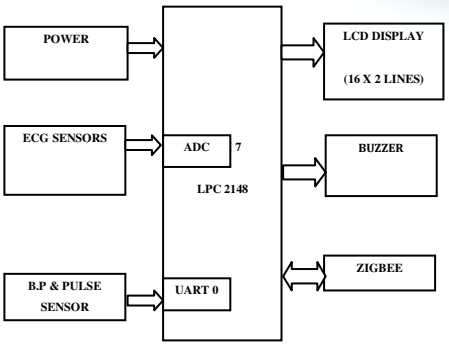

Fig.1.Block diagramTx section

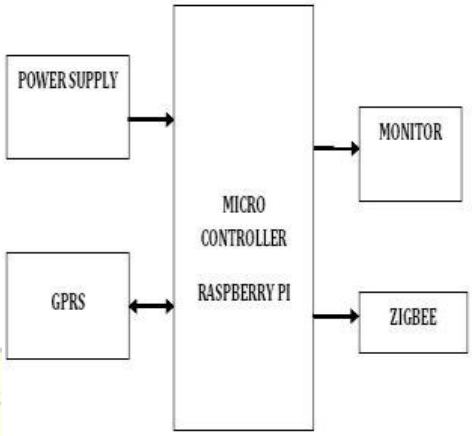

Fig.2.Block diagram Rx section

In the proposed system, the temperature sensor and ECG sensor are connected to microcontroller through switches. The Blood pressure sensor is connected through UART of the microcontroller providing serial data to microcontroller. The BP sensor provides the Systolic, Diastolic and Pulse readings to the controller. These values are displayed on the LCD by the microcontroller. If the temperature BP and ECG values exceed their threshold values an alert is given by buzzer. The data collected by controller is placed in the cloud. The data placed in the cloud can be accessed anywhere by the doctor and nurse.

METHODOLOGY

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. The Microcontroller forms the heart of the project because it controls the

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devices being interfaced and communicates with the devices according to the program being written.

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 of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

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. The electrocardiogram (ECG) has grown to be one of the most commonly used medical tests in modern medicine. Its utility in the diagnosis of a myriad of cardiac pathologies ranging from myocardial ischemia and infarction to syncope and palpitations has been invaluable to clinicians for decades.

Fig 3: ECG Sensor

Buzzer:A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave ovens, & game shows. The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.The "Piezoelectric sound components" introduced herein operate on an innovative principle utilizing natural oscillation of piezoelectric ceramics. These buzzers are offered in lightweight compact sizes from the smallest diameter of 12mm to large Piezo electric sounders. Today, piezoelectric sound components are used in many ways such as home appliances, OA equipment, audio equipment telephones, etc. And they are applied widely, for example, in alarms, speakers, telephone ringers, receivers, transmitters, beep sounds, etc.

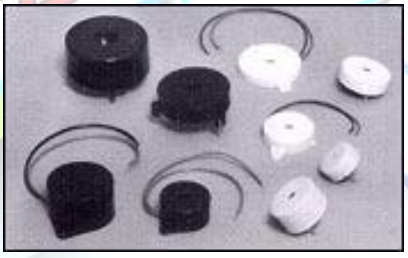

Fig4: Types of Buzzers

GPRS:GPRS (general packet radio service) is a packet-based data bearer service for wireless communication services that is delivered as a network overlay for GSM, CDMA and TDMA (ANSI-I36) networks. GPRS applies a packet radio principle to transfer user data packets in an efficient way between GSM mobile stations and external

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packet data networks. Packet switching is where data is split into packets that are transmitted separately and then reassembled at the receiving end. GPRS supports the world's leading packet-based Internet communication protocols, Internet protocol (IP) and X.25, a protocol that is used mainly in Europe. GPRS enables any existing IP or X.25 application to operate over a GSM cellular connection. Cellular networks with GPRS capabilities are wireless extensions of the Internet and X.25 networks.

Fig 5: GPRS module

B.P.Sensor: Intelligent automatic compression and decompression

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

Specification

- Working Voltage: +5V, 200mA regulated
- Output Format: Serial Data at 9600 baud rate(8 bits data, No parity, 1 stop bits). Outputs three parameters in ASCII.
- Sensing unit wire length is 2 meters

Fig 6: B.P. Sensor

ZIGBEE:

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this caseis ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The X-Bee RF Modules interface to a host device through a logic-level asynchronous Serial port. Through its serial port, the module can communicate with any

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logic and voltage Compatible UART; or through a level translator to any serial device.

Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.

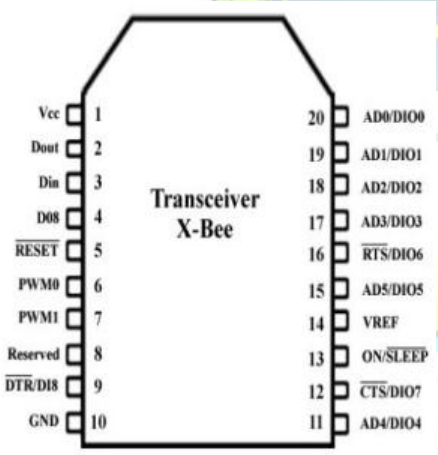

Fig:7: ZIGBEE pin diagram

CONCLUSION

This current designed system provides low complexity, low power consumptions and highly portable for health care monitoring of patient's and it can eliminates the need of utilization of expensive facilities. The doctor can easily access the patient's information at anywhere with the help of android web server.

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