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RFID Based Patient Monitoring System through Zigbee

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ABSTRACT:

Patient monitoring systems still suffer from problems such as loss of information, blur images, paper-based, and large number of patient with less staff in both local and foreign hospitals. This research paper is focusing on developing Electronic Patients Medical Records (EPRM) system that will help make patient monitoring more effective. A prototype of the proposed system is implemented using open source tools and technologies. Sample of implementation results are shown in this paper. It shows that EPRM offers suitable searching capabilities and assists doctors and nurses in managing patients' medical records as well as help doctors and nurses in making quick decision.

Index-Terms:

ARM11, Temperature Sensor, PULSE Sensor, Power supply ZIGBEE.

I.INTRODUCTION:

In this project, we are giving the complete description on the proposed system architecture. Here we are using Raspberry Pi board as our platform. It has an ARM-11 SOC with integrated peripherals like USB, Ethernet and serial etc. On this board we are installing Linux operating system with necessary drivers for all peripheral devices and user level software stack which includes a light weight GUI based on XServer, V4L2 API for interacting with video devices like cameras, TCP/IP stack to communicate with network devices and some standard system libraries for system level general IO operations. The Raspberry Pi board equipped with the above software stack is connected to the outside network and a camera is connected to the Raspberry Pi through USB bus.

The Respberry pi has 4 USB connector pins. The first USB connector is connected to the RFID. The second USB pin is connected to the zigbee. The third USB connector is connected to ARDUINO. The HDMI port is connected with HDMI to VGA converter to LCD. ARDUINO has six pins.The temperature sensor has three female connector pins. The voltage pin is connected to the +5V pin of ARDUINO .The data pin is connected to A5 pin and the Gnd pin is connected to gnd pin of ARDUINO. The heartbeat sensor has three female connector pins. The orange wire of heartbeat sensor indicate gnd pin which is connected to the gnd pin of ARDUINO. The red wire indicate the voltage pin which is connected to the +5V pin of ARDUINO. The brown wire indicates the data pin which is connected to the A0 pin of ARDUINO. All this pins are connected with the female connector. In the monitoring section, the laptop is connected to the zigbee with the help of USB connector.

II. PROJECT RELATED WORK:

2.1 EXISTING METHOD:

In the existing system the Lab monitoring system is design and controlled by using RF technology which can monitor and control the system inside the lab only in places where network availability is more. They are bit more costly because cost of components is increased. Not so easy to implement as you have to take great care of noise, Because of antennas it is bulkier.

2.2 PROPOSED METHOD:

The proposed method is used to overcome the drawbacks present in existing method. Here we are using ARM Intelligent Monitoring Center which uses Samsung's processor as its main controller.

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The environmental conditions present inside the lab can be monitored using sensors like temperature, gas and LDR. All the sensors are connected to sensor board. From the sensor board we are sending monitored values to control room (ARM board) through RS232 serial cable. The serial cable is connected to one of UART port of ARM board. Whenever a person is entered inside the lab, the person's image can be captured by camera and send it to controller. The controller transmits the data to remote PC through Ethernet by using FTP. FTP is a protocol through which users can upload files from their systems to server. Once data is placed at server we can view the data at remote PC (with internet) on web page with unique IP address. We can view continuous streaming of video as well as senor's data. If we want to control the devices based on sensor's information we can control through web page from remote location using HTTP protocol. HTTP protocol continuously requests the server for control (turn on or turn off) the devices. In this way we can monitor and control the devices through remote PC.

2.3 BLOCK DIAGRAM:

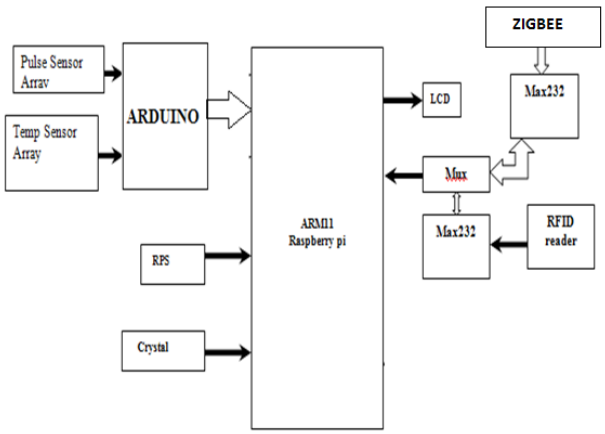

Figure-1: Block diagram of project

2.4 MONITORING SYSTEM:

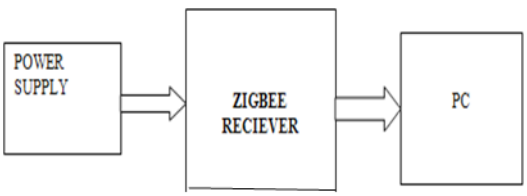

Figure-2: Receiver Section

2.3 RASPBERRY PI PROCESSOR:

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi is manufactured in two board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Ego man. These companies sell the Raspberry Pi online. Ego man produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and persistent storage. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux),C, Java and Perl.

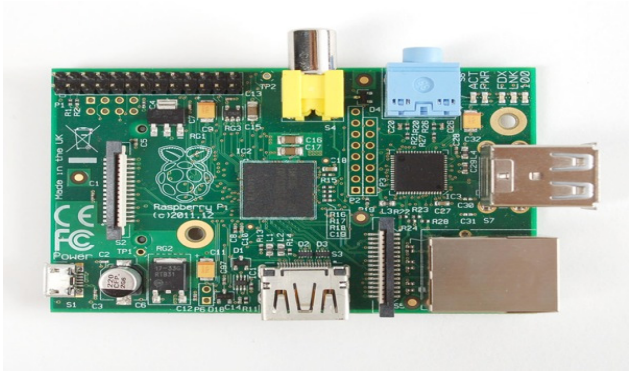

Figure-3: Raspberry Pi processor.

III. HARDWARE COMPONENTS:

3.1 ARDUINO:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

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The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

3.2 Ethernet:

Ethernet is a family of computer networking technologies for local area networks (LANs) commercially introduced in 1980. Standardized in IEEE 802.3, Ethernet has largely replaced competing wired LAN technologies. Systems communicating over Ethernet divide a stream of data into individual packets called frames. Each frame contains source and destination addresses and error-checking data so that damaged data can be detected and re-transmitted. The standards define several wiring and signaling variants. The original 10BASE5 Ethernet used coaxial cable as a shared medium. Later the coaxial cables were replaced by twisted pair and fiber optic links in conjunction with hubs or switches. Data rates were periodically increased from the original 10 megabits per second, to 100 gigabits per second.

Figure-4: Ethernet

3.3 ETHERNET CABLE RJ45:

Since its commercial release, Ethernet has retained a good degree of compatibility. Features such as the 48-bit MAC address and Ethernet frame format have influenced other networking protocols. Ethernet initially competed with two largely proprietary systems, Token Ring and Token Bus. Because Ethernet was able to adapt to market realities and shift to inexpensive and ubiquitous twisted pair wiring, these proprietary protocols soon found them competing in a market inundated by Ethernet products and by the end of the 1980s, Ethernet was clearly the dominant network technology. In the process, 3Com became a major company. 3Com shipped its first 10 Mbit/s Ethernet 3C100 transceiver in March 1981, and that year started selling adapters for PDP-11s and VAXes, as well as Multibus-based Intel and Sun Microsystems computers. This was followed quickly by DEC's Unibus to Ethernet adapter, which DEC sold and used internally to build its own corporate network, which reached over 10,000 nodes by 1986, making it one of the largest computer networks in the world at that time.

3.4 TEMPERATURE SENSOR (LM35):

LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to read-out or control circuitry especially easy. It can be used with single power supplies, or with plus and minus sup-plies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

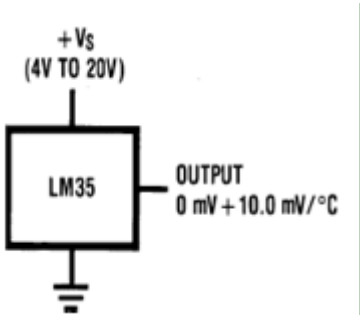

Figure-5: LM35 temperature sensor.

3.5 HEART BEAT SENSOR:

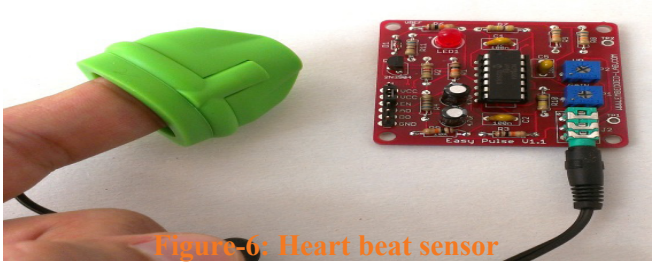

Figure-6: Heart beat sensor

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Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

IV. RESULTS:

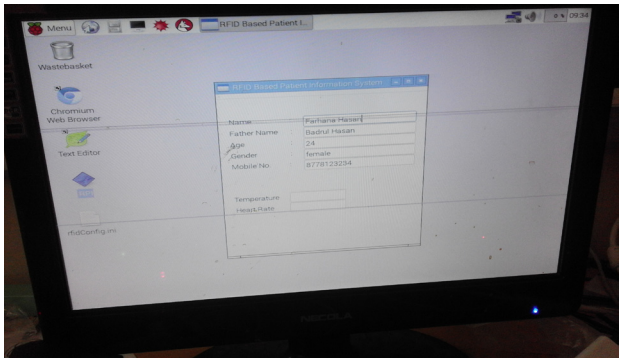

Figure-7: Raspberry Pi monitor with input data

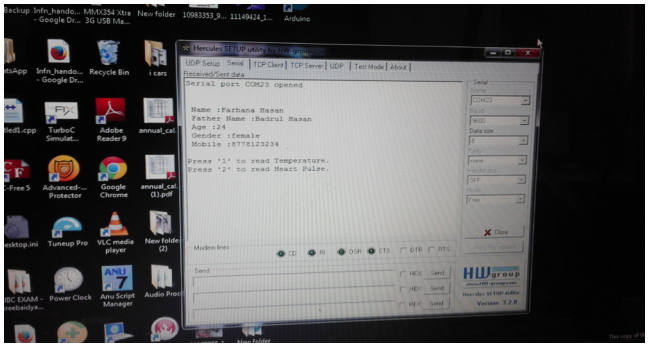

Figure-8: Output screen with monitoring section

V. FUTURE SCOPE:

» The cost of ARM11 is more that's why in future we can implement this system using ARM CORTEX A8, Beagle bone etc as well as updated processors with high frequencies will work fine.

» As the storage space is also less in future we can also record these live streaming data by connecting external memory storage.

» We can complete our project using wireless technology.

» In future we can provide more security to data by using encryption, decryption techniques.

» In future we can develop our project so that it can store the information of all the emergency patient along with the ward number together and so monitor them all together.

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» It can be further developed so that in case of any emergency the doctor in his/her mobile along with the medical staff will have the emergency message of any patient.

VI. CONCLUSION:

The project "RFID BASED PATIENT INFORMATION AND PARAMETRS MONITORING SYSTEM USING WSNs" has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used and tested. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM Cortex A8 Processor board and with the help of growing technology the project has been successfully implemented.

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