

Internet Connected Patient Healthcare Monitoring in Smart Phones using Raspberry Pi

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ABSTRACT: The advancement in technology today IOT makes all objects interconnected and it has been recognized as the next technical revolution. Health monitoring system using IOT describes the collection and interoperation of patient data collected from the sensors from the hospitals through IOT Technology. The collected sensor data will support the doctor in the emergency situation for the betterment and improvement of patient health. The hardware platform to implement the project consists of bio sensors and Raspberry Pi 3 Model-B equipped in a way to communicate with a doctor through the internet and smart phone. This proposed idea will help doctors to monitor the patient anywhere in the world and to know about the state of patient health. In this proposed idea the sensors gather the medical information of the patient that includes patient's body temperature and heart rate and a camera to lively monitor patient. After analyzing the data doctor can prescribe the medication based on the results. This prototype will minimize the burden on patients to visit the doctors every time for health check-up.

KEYWORDS: raspberry pi3, arduino, bio sensors.

I.INTRODUCTION

The beginning of the 21st century has witnessed great leaps in digital technology that are changing the landscape of healthcare system across the world. There is a gradual and systematic transformation in healthcare systems from paper based records to electronic records ushering in a revolution in the healthcare industry [1]. Such developments provide high efficiency and flexibility to healthcare services by providing a platform that efficaciously shares healthcare data among different stakeholders. This evolution converts paper based records into digitalized electronic records such as Electronic Medical Records (EMR), Electronic Health Records (EHR), Personal Health Records (PHR), and Electronic Health Data (EHD). EHR and EMR are health records of patients handled by healthcare professionals, whereas PHR carry personal data which is handled and monitored either by patient or their relatives on a regular basis. EHD as electronic health records or computerized patient records is a systematized collection of smart health records of patients [2]. These records are comprised of a wide variety of data, such as medical histories, demographics, medication, immunization status, laboratory test reports and other sensitive patient information. EHD systems have remarkable benefits over conventional paper based records. Unlike paper-based records, EHR incurs less manpower, time and physical storage [3]. The advantages of EHRs include easier and swift clinical data access, ability to maintain effective clinical workflows, mitigation of medical errors, enhanced patient safety, reduced medical costs and better and stronger support for clinical decision-making. Realizing the benefits offered by EHD systems more than 90% of healthcare institutions in Australia have adopted this system to facilitate effective medical resource allocation and efficient healthcare [3]. The ability of EHDs to provide better management of healthcare has been ascertained and testified by various users. However the transition from conventional healthcare systems to e-health care throws unique challenges with respect to privacy, confidentiality, and security of medical information. Cloud computing is a recent paradigm in digital technology and is being extensively used in the healthcare industry [4]. It not only provides convenient storage

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of medical information but also facilitates the easy exchange or transmission of medical data among various stakeholders.

II.LITERATURE REVIEW- STUDY SELECTION

This study performs a systematized review of security and privacy preserving approaches of EHRs in the cloud environment from different databases, including IEEE, Google scholar, Pub Med, ACM, Springer, Elsevier, Scopus and Science Direct. The detailed summary of the selected studies and the keywords used for searching is shown in Table 1. This work also involves an extensive review of significant review papers published between 2000 and 2018. This review limited its search to relevant papers published between 2000 and 2018 and found more than 200 articles. C.Nagarajan et al [16-18] has developed the power converter for the EHD systems.

III. PROPOSED SYSTEM

In this proposed system we are implementing an E-health monitoring system by using the camera module we are monitoring live health of the patient. By using temperature sensor we can sense the temperature of the human body at the same time the heart beat of the person can also be monitored. From both sensors input if a person gets abnormality temperature or heart rate message alert will accumulate through mail and also patient live images can be captured instantly and we can look up in the mail.

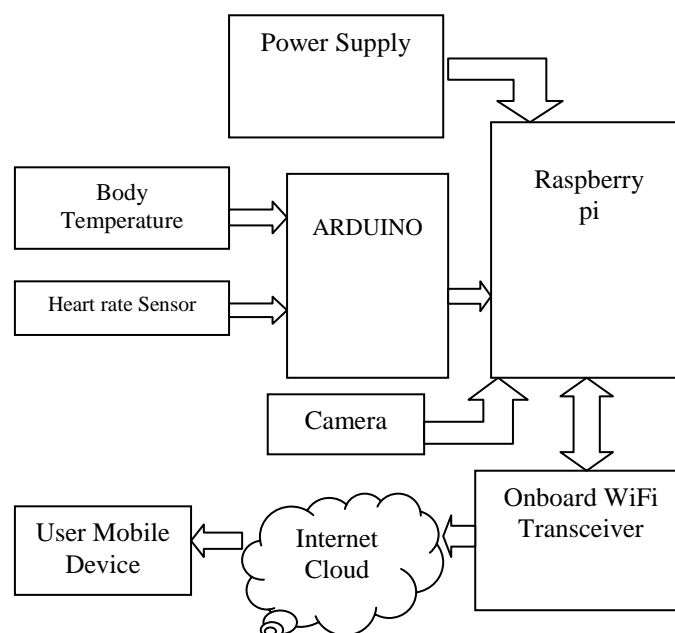


Fig : 1 ARDUINO UNO

Arduino is an open source hardware and software company, project and user community that designs and manufactures single board microcontrollers and microcontroller kits for building digital devices. Its products are licensed under the GNU Lesser General Public License (LGPL) permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that

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may be interfaced to various expansion boards ('shields') or breadboards for prototyping and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers can be programmed using C and C++ programming languages. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the processing language project.

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of the Arduino UNO is the optibootbootloader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. It is open source and the Arduino Uno is widely used open source micro controller board based on the microchip ATmega 328p microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits. The board features 14 Digital pins and 6 Analog pins. Operating Voltage at 5 Volts, Input Voltage at 7 to 20 Volts, Clock Speed at 16 MHz, in that 32 KB flash memory, 2 KB SRAM and 1 KB EEPROM.



Figure B: Arduino Uno

Arduino IDE where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go. Arduino IDE is open source software that is mainly used for writing and compiling the code into the Arduino Module.

It is official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.

It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module. This environment supports both C and C++ languages.

III. RASPBERRY PI

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE

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capability via a separate PoE HAT The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.



Fig 3 Raspberry Pi 3 Model B+

The basic heartbeat sensor consists of a light emitting diode and a detector like a light detecting resistor or a photodiode. The heart beat pulses causes a variation in the flow of blood to different regions of the body. When a tissue is illuminated with the light source, i.e. light emitted by the led, it either reflects (a finger tissue) or transmits the light (earlobe). Some of the light is absorbed by the blood and the transmitted or the reflected light is received by the light detector. The amount of light absorbed depends on the blood volume in that tissue. The detector output is in form of electrical signal and is proportional to the heart beat rate. This signal is actually a DC signal relating to the tissues and the blood volume and the AC component synchronous with the heart beat and caused by pulsatile changes in arterial blood volume is superimposed on the DC signal. Thus the major requirement is to isolate that AC component as it is of prime importance.

The most commonly measured physical parameter is temperature whether in process industry applications or in laboratory settings. Exact measurements are critical part of success. Exact measurements are needed for many applications such as medical applications, materials research in labs, studies of electronic or electrical components, biological research, and geological studies. Most commonly, temperature sensors are used to measure temperature in circuits which control a variety of equipment's. There are different types of temperature sensors used in the market today including resistance temperature detectors (RTDs), thermocouples, thermistors, infrared sensor, and semiconductor sensors. Each of them has a particular operating parameters. These sensors come in different varieties, but have one common thing: they all measure temperature by sensing a change in the physical characteristic.

A temperature sensor is a device, usually an RTD (resistance temperature detector) or a thermocouple, that collects the data about temperature from a particular source and converts the data into understandable form for a device or an observer. Temperature sensors are used in many applications like HV and AC system environmental controls, food processing units, medical devices, chemical handling and automotive under the hood monitoring and controlling systems, etc. The most common type of temperature sensor is a thermometer, which is used to measure temperature of solids, liquids and gases. It is also a common type of temperature sensor mostly used for non-scientific purposes because it is not so accurate.

IV. CONCLUSION

Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. The term is generally used to describe data centers available to

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many users over the Internet. Large clouds, predominant today, often have functions distributed over multiple locations from central servers. If the connection to the user is relatively close, it may be designated an edge server. Clouds may be limited to a single organization (enterprise clouds), or be available to many organizations (public cloud).

Cloud computing relies on sharing of resources to achieve coherence and economies of scale. Advocates of public and hybrid clouds note that cloud computing allow companies to avoid or minimize up-front IT infrastructure costs. Proponents also claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and that it enables IT teams to more rapidly adjust resources to meet fluctuating and unpredictable demand. Cloud providers typically use a "pay-as-you-go" model, which can lead to unexpected operating expenses if administrators are not familiarized with cloud-pricing models. Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party, and either hosted internally or externally. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized. Many challenges arise from this type of infrastructure, because of the volatility of the resources used to build it and the dynamic environment it operates in. It can also be called peer-to-peer clouds, or ad-hoc clouds. An interesting effort in such direction is Cloud@Home, it aims to implement a cloud computing infrastructure using volunteered resources providing a business-model to incentivize contributions through financial restitution

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