

Review on Smart Hospital using Internet of things for Healthcare system

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Abstract- Now a day, the rapid use of internet and implementation is there as well as development of medical sensor are used for healthcare applications. All sensor and device are connected to each other so transmission and communication between those sensors can be done easily. In before research there was one disadvantage that if the server gets off then the communication problem can occur to overcome this we are using alarm which will indicate the server is down. Cloud computing is the most important thing in IT-health which consist of data that is required anytime anywhere. The cost of these smart hospital set up can be reduced by deploying Internet of Things (IoT). Thus, this project presents a system which is a combination of sensor technology and Internet of Things (IoT). Using this system one can control electricity equipment's and monitor level of the medication from a remote place and monitor entire process.

Key words: Internet of Things, Sensor, Smart Hospital, Cloud computing, Embedded, Healthcare system.

I. INTRODUCTION

Survey of health monitoring using Internet of things (Iot). Internet of things (Iot) is physical quantities the network of various physical quantities such as electronics software and sensors are embedded together have ability to collect data from world around us and share data across internet. Internet of things finds useful in various fields.[1] Review on - Iot based smart healthcare system this paper focus on review of IoT based Smart Healthcare System. The main objective of this proposed system is to transmitting the patient's health monitoring parameters through wireless communication.[2] In the latest technology , IOT is a recently growing technology for communication for short range which is aimed to augment existing near field technologies such as RFID(Radio Frequency Identification). In this paper, we have to propose a system which describes how an android application is used as our own IOT tag writer to write patient unique id in IOT tag.[3] In a design approach to smart system based on Internet of Thing (Iot) the hospitality efficiency and related issues have become one of the main focuses of the global world.[4] The main objective of hospital automation and security is to help handicapped and age people that will enable them to control home appliances and alert them in critical situations.[5] Internet of Medical Things (IoMT) enables machine to machine interaction and real time intervention solutions which will radically transform the healthcare delivery, affordability and reliability in near

future. Additionally, increased patient engagement in decision making will boost the healthcare service compliance.[6] The Internet of Things provides an efficient and new life to the healthcare field. It also has a rapid development of many fields. But the more important are real in the field of Medical. One of the better way the doctors are capable to certainly and quickly right to use the relevant patient information's and including the patient medical history. Through the Internet of Things, tremendously improves the quality of information and the patient care in the Medical field. So, Internet of Things offers an actual platform to interconnect the all the resources . [7] Through the Internet of Things, tremendously improves the quality of information and the patient care in the Medical field. So, Internet of Things offers an actual platform to interconnect the all the resources .Whenever a saline is fed to any patient, he/she needs to be constantly monitored by a nurse or any relatives. Most often due to negligence, inattentiveness and more number of patient's, the saline is totally consumed. When the level of saline dips below a certain level a red LED would glow along with a buzzer sound to alert the nurse.[8] We propose an architecture and a scheme of smart hospital based on Internet of Things (IOT) in order to overcome the disadvantages of the present hospital information system, such as the fixed information point, inflexible networking mode and so on.[9]



Figure 1. The smart hospital basic plan shows their features [3].

Health Monitoring and Management Using Internet - of - Things (IoT) Sensing with Cloud - based Processing: Opportunities and Challenges:

Among the panoply of applications enabled by the Internet of Things (IoT), smart and connected health care is a particularly important one. Networked sensors, either worn on the body or embedded in our living environments, make possible the gathering of rich information indicative of our physical and mental health.[10]

II. LITREATURE SURVEY

System is purely based on IOT and cloud computing We used cloud computing to store data, this data can be stored permanently and can be accessed anywhere. Cloud computing is also useful to keep update of patient. Doctors and care givers can immediately interface with patient and take a serious action in emergency cases and also provide medication depending on health parameters.[1] Internet of Things has many applications in different areas. IoT has been already designed for Wireless sensor network (WSN). It has been developed for health monitoring. This system presents the architecture of IoT and architecture of Smart health monitoring using IoT. There are some problems found in IoT and existing health monitoring. New technologies could to minimize them by achieving the better quality as well as web-based security concept. This system presents the problems and challenges that could come. The patient's status is automatically generated and stored in the cloud server and also alerts are generated if the patient is in a critical condition. [2] Currently it is possible to conclude that for providing a better solution to the m - healthcare hospital management system in many hospitals IOT promises appear to be credible. This paper presents a patient's care and monitoring system architecture to solve the problem of hospital monitoring

and controlling the weather . The proposed architecture employs key technologies: Internet of Things, RFID, wireless sensor network (WSN), GPS, cloud computing, agent and other advanced technologies to collect, store, manage and supervise traffic information.[3] This paper gives basic idea how we can control hospital appliances by computer technology. The main objective of this project is to help handicapped people. It provides security and saves energy. As we are accessing devices by website, we can access it even if we are far away from hospital where the Wi - Fi is available .[4] IOMT increases human - machine interaction which enhances the real time health monitoring solutions and patient engagement in decision making. IoT enables the real time health monitoring, data registration and health record maintenance to assist in the data driven decisions. These may provide the personalized health regime for the patient.[5] IoT is the universal occurrence of things and objects that are intersected and are capable to work together with each other to extent a common goal. IoT extents a set of technologies that enable a wide range of things to act together and communicate among themselves using networking knowledge.[6]

IoT is the universal occurrence of things and objects that are intersected and are capable to work together with each other to extent a common goal. IoT extents a set of technologies that enable a wide range of things to act together and communicate among themselves using networking knowledge.[7] Smart Saline level indicator for patient safety is a low cost, low power consuming and highly efficient device that can be used for monitoring the amount of saline present in the bottle. It is often noted that there is someone present constantly to monitor the patient fed to a saline as a slight carelessness can cause fatal accidents.[8] The sufficient analysis of smart hospital's connotation, architecture, key technology and construction, combine d with the implementation about smart hospital project of First Affiliated Hospital of Anhui University of Traditional Chinese Medicine, we propose a concrete application scheme and it changes the existing hospital clinic model, having achieved satisfactory result. In this paper, we reviewed the current state and projected future directions for integration of remote health monitoring technologies into the clinical practice of medicine. Wear able sensors, particularly those equipped with IoT intelligence, offer attractive options for enabling observation and recording of data in home and work environments, over much longer durations than are currently done at office and laboratory visits .

III. PROPOSED SYSTEM

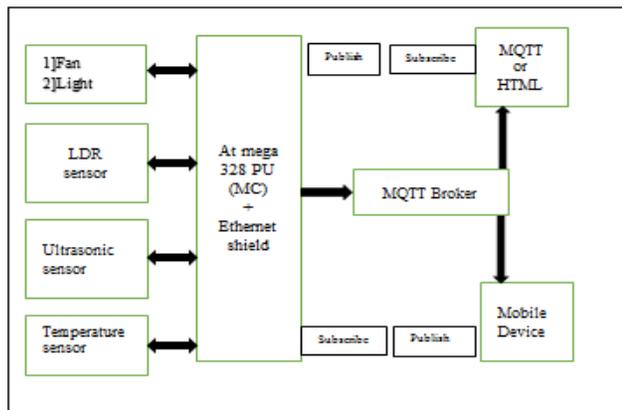


Fig: Block Diagram of Iot based hospital.

In the above block diagram, there are three parts which as follows:

1. Back End which includes fan, light, ultrasonic sensor etc.
2. Arduino mega (ATMEGA Atmel328PU)+Ethernet shield(W5100)
3. MQTT broker as a cloud server
4. Front end which includes html page or mobile device having MQTT lens application which includes switch controller for fan and light.

In this system, ultrasonic sensor, light dependent resistor and temperature sensor is interfaced with Arduino mega board(AT mega Atmel 328PU). This Arduino mega board is connected to MQTT server via Ethernet cable. This will provide connectivity to the server to transmit the data on to the internet. This data then monitored arbitrarily using mobile device or by using MQTT lens application.

In the above system sensor will capture the data from the surrounding that is temperature sensor will constantly monitor the temperature of the patient's room, ultrasonic sensor will monitor the level of saline bottle and LDR(Light Dependent Resistor) will monitor the illumination of a light on it in terms of resistance value.

Data acquire by all of the sensors will be transmitted by USB (Universal Serial Bus) which is used for the data transfer to the Arduino mega board. This data is then published to the MQTT broker server via Ethernet cable.

Whenever one wants to acquire this data then that person has to subscribe to the MQTT server and then hospital staff

he/she can monitor the data received. MQTT platform is used to control to the switch which will ultimately control electrical appliances(fan ,light etc.).

Whenever temperature of the patient's room increases above predefined level, it will send the data to the page and then from the webpage or from the mobile device. In case of saline bottle, level of the saline bottle continuously sends on to the server so that hospital staff need not to go to each and every patient's room to monitor it. As soon as the level of liquid in a saline bottle falls below predefined value then nurse can go to the patient's room and change that bottle.

IV. METHODOLOGY

1] Internet of Things:

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities.

2] Arduino at mega:

The Arduino ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves

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throughput approaching 1 MIPS per MHz As of 2013 the ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno and Arduino Nano models.

3] MQTT Server:

MQTT stands for MQ Telemetry Transport. It is a publish/subscribe, extremely simple and lightweight messaging protocol, designed for constrained devices and low-bandwidth, high-latency or unreliable networks. The design principles are to minimise network bandwidth and device resource requirements whilst also attempting to ensure reliability and some degree of assurance of delivery. These principles also turn out to make the protocol ideal of the emerging “machine-to-machine” (M2M) or “Internet of Things” world of connected devices, and for mobile applications where bandwidth and battery power are at a premium. The MQTT messages are delivered asynchronously (“push”) through publish subscribe architecture. The MQTT protocol works by exchanging a series of MQTT control packets in a defined way. Each control packet has a specific purpose and every bit in the packet is carefully crafted to reduce the data transmitted over the network. A MQTT topology has a MQTT server and a MQTT client. MQTT client and server communicate through different control packets. MQTT control packet headers are kept as small as possible. Each MQTT control packet consist of three parts, a fixed header, variable header and payload. Each MQTT control packet has a 2 byte Fixed header. Not all the control packet have the variable headers and payload. A variable header contains the packet identifier if used by the control packet. A payload up to 256 MB could be attached in the packets. Having a small header overhead makes this protocol appropriate for IoT by lowering the amount of data transmitted over constrained networks.

V. KEY TECHNOLOGIES

IOT will gradually become the main body of the next generation of information network, and it is the internet based on the integration of multiple technologies integrated application, the following describes what the IOT some of the key technologies involved in.

A. Internet Technology

IOT, the internet of next generation, is essentially a network, so internet is basic precondition of IOT in order to communicate with any person and object at any time and place.

B. Sensor Network Technology

The sensing layer mainly solves the data collection problem from devices. In this layer, there are two main parts. One is the basic sensors, such like RFID tags and readers, various sensors, cameras, GPS, two - dimensional code labels and readers and other basic identification and sensor components). The other one is the sensor network. Both networks could be used to recognize the mark on the item and collect information intelligently. Therefore, this layer is the most basic and core layer in IoT.

Sensor nodes are tiny devices; they are self - organizing wireless communications. They use wireless communication technology for data forwarding. Each node has both data acquisition and data fusion forwarding functions.

Due to different manufacturing features, there are different types of sensor. Most of them have the function of detecting temperature, light, sound and vibration. There are also some components for the wireless sensors, which are processor, memory, RF transceiver, power source and sensor.

C. Wireless Communication Technology

Internet of Thing is a new trend. In order to achieve the goal of ubiquitous computing system, several technologies work effectively in Internet of Things. They are RFID, wireless sensor network and cloud computing. Among all the technologies, these three are playing an important role in the Internet of Things.

D. Embedded Technology

In essence, IOT is an embedded system based on internet. Just because more and more intelligent terminal products have the requirements to network, it hasten the production of IOT concept [6], so IOT is the inevitable outcome of embedded technology development and it cannot do extensive use without embedded technology supporting.

VI. RESULT & CONCLUSION

Smart hospital has been successfully designed using IoT. This project is highly energy efficient as it uses Arduino board having AT mega chip Atmel 328PU microcontroller chip, which has low power utilization. It also uses MQTT networking standards. This protocol is a light weight protocol and helps in power saving. It is possible to control the electrical appliances from a webpage or from the

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mobile application. It is user friendly system. Maintenance of this project is not costly.

1] Reduction in number of human errors:

Accurate collection of data, automated workflows combined with data driven decisions are an excellent We have seen how we can build and implement IoT based system to assist in various functions of healthcare industry.

2] Decreased cost of the system:

Healthcare solution provider have seamless connectivity to healthcare solutions; thus, patient observation can be carried out in real time basis, thus drastically reducing number of unnecessary visits by doctors. Such home care facilities also help to reduce number of hospital stays.

3] Enhanced Treatment Results :

Connectivity of health care solutions through cloud computing or other virtual infrastructure gives caregivers the ability to access real time information that enables them to make informed decisions as well as offer treatment that is evidence based. This ensures health care provision is timely and treatment outcomes are improved.

VII. FUTURE SCOPE

Deeply integrating IoT in healthcare system is finally turning into reality. It is projected that the global healthcare industry will invest about \$410 billion into procure IoT devices, services, and software in the year 2022, according to a report generated by research firm Grand View Research. Hospitals need to provide patients with efficient treatment with cost effective treatment. To meet these demands, hospitals are using IOT based solutions to capture obtain through various functions and examine that data to help hospitals to make smarter decisions that can help them in providing excellent and cost-effective treatment to patients. Hospitals need to provide patients with efficient treatment 8 with cost effective treatment. To meet these demands, hospitals are using IOT based solutions to capture obtain through various functions and examine that data to help hospitals to make smarter decisions that can help them in providing excellent and cost-effective treatment to patients.

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