

Smart Healthcare Monitoring System Using IOT

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ABSTRACT:

In Healthcare Environment there are many challenges and one of the major challenges is continuous monitoring of the patient. Though the industry Invest a lot in Automation to collect the data on patient yet they fail to get good results. Still various departments in Healthcare operate on Paper works which increases the cost of maintenance and provide very less security to the patient information. Many steps were taken in this field and one of them is IoT. IoT will be short for web for things. The web for things (IoT) alludes all the of the ever-growing system for physical Questions that characteristic a ip address to web connectivity, and the correspondence that happens between these Questions Also other Internet-enabled gadgets Furthermore frameworks. Eventually Tom's perusing the utilization about IoT information might make gathered thick, as not difficult from the tolerant gadget Also camwood a chance to be monitored anyplace in the universe Eventually Tom's perusing those commissioned representative for those help of a specified IP address.

1. INTRODUCTION:

Internet of Things gains its full potential by utilizing the key role playing objects i.e. "Smart" objects which use various sensors and actuators that are able to perceive their context, and via built in networking capabilities they could communicate to each other, access the open source Internet services and interact with the human world. This not only makes the world connected but also robust and comfortable. The Internet of things in the field of healthcare also plays a major role in providing ease to patients and doctors.

It consists of a system that communicates between network connected systems, apps and devices that can help patients and doctors to monitor, track and record patients' vital data and medical information. Some of the devices include smart meters, wearable health bands, fitness shoes, RFID based smart watches and smart video cameras. Also, apps for smart phones also help in keeping a medical record with real time alert and emergency services. The IOT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring.^[1] But this definition was referred only to part of IOT evolution considering the machine to machine market today. But actual definition of IOT is creating a brilliant, invisible network which can be sensed, controlled and programmed.

The products developed based on IOT include embedded technology which allows them to exchange information, with each other or the Internet and it is assessed that about 8 to 50 billion devices will be connected by 2020. Since these devices come online, they provide better life style, create safer and more engaged communities and revolutionized healthcare. The entire concept of IOT stands on sensors, gateway and wireless network which enable users to communicate and access the application/information.

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Be that as it may, among all the regions no place does the IOT offer more prominent guarantee than in the field of health awareness. Today Internet has become one of the important part of our daily life. It has changed how people live, work, play and learn. Internet serves for many purpose educations, finance, Business, Industries, Entertainment, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet of Things (IOT). These interconnected IoT devices produce large amounts of information and data that should be dealt efficiently by the providers and so is a big challenge. To overcome this challenge of storing and analyzing large data, the technique of Internet of Things Analytics (IoTA) is implemented. The raw data is converted into a useful and medically relevant data using the techniques like data extraction and data analytics. In fact, it has been predicted that by 2020, more than 50-55 percent of techniques used to analyze raw data will make a better use of this influx of data which is generated from instrumented machines and applications.^[2]

In order to make our health care services robust and vast, the IOT relies on several enabling technologies. Collection of real-time data from various sources, in this case, unlimited number of patients for a large period of time has become very easy and fast using the potential of IOT. The power of IOT for health and medical services are harnessed by smart sensors (sensor and a microcontroller) which accurately measures, monitors and analyze a variety of health status indicators. These can include basic vital health signs such as pulse rate and blood pressure, oxygen and glucose level in blood and heart rate. Smart sensors can be incorporated into medicines and pill bottles that are connected to a network and can generate alerts about whether the patient has taken a scheduled dose of medication. Consequently it is obliged to add to an IOT framework which gives secure health awareness checking. So outlining a savvy medicinal services framework where client information is gotten by the sensor and sent to the

cloud through Wi-Fi and permitting just approved clients to get to the information. To take the full advantage of revolutionizing IOT in healthcare, the consumers, patients and other health experts need to think of some innovative and more reliable methods. And with the help of IoT's potential they are now able to collect realtime raw data from unlimited number of patients for a continuous period of time through smart devices connected on an interconnected network. It will take time to fully realize the technology's capabilities. We will be able to see medical experts carrying out diagnosis and critical tasks in a more better and reliable way. This will ensure them not only with reliable results but also time saving which will be of maximum benefit. The possibilities of IOT are truly unlimited and ever growing. This paper proposes an IoT based health monitoring system which would collect all the medical data of a patient including his heart rate, blood pressure and ECG and would send alerts to the patient's doctor regarding his/her full medical information, providing a fast and reliable healthcare service.^[3]

Moreover, in today's world everyone is busy neglecting their small healthcare problems like high blood pressure, low pulse rate etc. The paper helps to find a better and robust solution to this challenge. the field of IOT healthcare. The way of interacting and communicating with humans and other devices is changing and getting better day by day. Management of healthcare results and reduction of healthcare costs is enabled by the ever growing information and communication solutions. The healthcare services are getting better and less costly by collecting, recording, analyzing and sharing new data packets in real time and efficiently. Also, as the world is adopting this ever growing technology of IOT, many of the inefficiencies in healthcare will be reduced. For example, various medical devices like fitness bands, health monitoring systems, medication boxes has smart sensors embedded into them that allows to collect the raw data, store it, analyze it, and conduct tests which are further used by medical experts to take proper decisions.^[4]

2. EXISTING METHOD:

The human services speak to a standout amongst the Main tests that each country will be confronting today. In spite of the fact that human services industry contribute intensely to IT, yet those guaranteed change in tolerant safety Also benefit need not been figured it out up to those measures much today associations still depend on paper restorative records & hand profit notes on illuminate hand decide. Advanced data may be siloed the middle of divisions and requisitions. Offering from claiming tolerant information Around clinicians, divisions & much patients will be extraordinary Furthermore perplexing.^[5] Grasping IoT geek. Clinched alongside medicinal services might make a solution for empowering social insurance association will concentrate their exertions around clinical important benefits Also tolerant conclusions which will aggravate wellbeing observing diagnostics medicine in that's only the tip of the iceberg auspicious & helpful way for those diminished expense.

PROPOSED METHOD:

Those IOT can achieve numerous reductions with social insurance through the utilization for sensors, canny equipment's, and so forth throughout this way, observing and stock arrangement of all instrumentation. The web of things (IoT) may be another idea that permits clients will interface Different sensors and keen gadgets on gather information ongoing information from nature. However, it need been watched that a thorough stage will be still absent in the e-Health Also m-Health architectures to utilize smartphone sensors will feeling What's more transmit significant information identified with a patient's wellbeing. In this undertaking our commitment will be twofold. Firstly, we critically assess the existing literature, which examines the successful approaches on send IoT in the field for medicinal Furthermore keen health awareness. Secondly, we recommend another semantic model for patients' e-Health.^[6] Those suggested model named concerning illustration 'k-Healthcare' makes utilization of 4 layers the sensor layer, the system

layer, the web layer and the benefits layer. Know layers coordinate for one another(adequately and proficiently should gatherings give An stage to gaining entrance to patients' wellbeing information utilizing advanced mobile phones.

Block Diagram

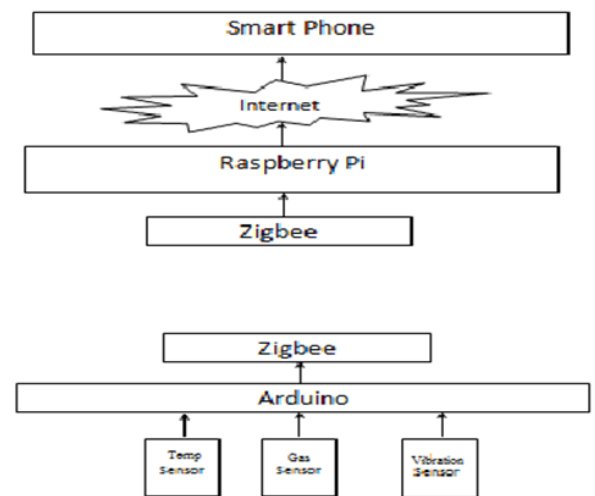


Fig 1: Proposed block diagram of health care system

3. METHODOLOGY:

Hardware description:

Raspberry Pi board

The raspberry pi will be a credit-card-sized single-board workstation created in the uk by the raspberry pi framework for those purposeful of pushing those educating support of fundamental PC science over schools. The raspberry pi need a Broadcom BCM2835 framework around a chip (SoC), which incorporates a ARM1176JZF-S 700 MHz processor, feature center iv GPU, What's more might have been initially dispatched with 256 megabytes for RAM, later upgraded on 512 mb.

Arduino:

Those Arduino Uno will be An microcontroller table In light of the ATmega328 (datasheet). It need 14 advanced input/output pins (of which 6 might be utilized Likewise PWM outputs), 6 simple inputs, a 16

mhz ceramic resonator, a USB connection, An energy jack, a ICSP header, Also a reset catch. It holds All that necessary on help the microcontroller; essentially associate it on a workstation for a USB link alternately force it for a AC-to-DC connector or battery should get began.

Ethernet (Tcp/Ip Protocol)

- Bus topology, Wired LAN in IEEE 802.3 physical layer standard
- 10 Mbps, 100 Mbps (Unshielded and Shielded wires) and 4 Gbps (in twisted pair wiring mode)
- Broadcast medium— Passive, Wired connections based.
- Frame format like the IEEE 802.2
- SNMP (Simple system management Protocol) open framework (therefore permits gear of separate specifications).
- Everyone associated with a basic correspondence channel in the organize listens What's more assuming that those channel will be unmoving pulley afterward transmits. Whether not idle, sits tight What's more tries once more.
- Multi right may be similar to on an bundle switched organize.

Mercury Sensor:

This specification applies to mercury switch(mercury type) for 220V current circuits, used in electronic equipment. Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

- (1). Ambient temperature : 15 to 35
- (2). Relative humidity : 25% to 85%
- (3). Air pressure : 86 KPa to 106 KPa

LM35 Temperature Sensor:

LM35 is a precision ic temperature sensor with its yield proportional of the temperature (in oC). Those sensor meandering may be fixed What's more accordingly it may be not subjected will oxidation and other procedures.

For LM35, temperature might a chance to be measured more faultlessly over with An thermistor. It likewise have low self-warming What's more doesn't result in more than 0. 1 oC temperature Ascent for at present air. Those operating temperature reach is from -55°C with 150°C. The yield voltage varies Eventually Tom's perusing 10mV because of the opposition will each oC rise/fall over encompassing temperature, i. E. , its scale variable will be 0. 01V/ oC.

Gas Detector:

Gas detectors are commonly housed in an disk-shaped plastic nook something like 150 millimeters (6 in) to breadth Furthermore 25 millimeters (1 in) thick, yet the shape might fluctuate Eventually Tom's perusing producer or result offering. A large portion smoke detectors worth of effort possibly by optical identification (photoelectric) or toward physical procedure (ionization), same time others use both identification techniques with expansion affectability on smoke. Smoke detectors done expansive commercial, industrial, and private edifices need aid generally powered toward a vital flame alert system, which may be powered Eventually Tom's perusing the building force for a battery reinforcement. However, in Numerous single crew separated Furthermore littler numerous gang housings, a smoke alert will be often powered best Eventually Tom's perusing a single disposable battery.

Zigbee:

Zigbee is An low energy turn off about WiFi. It is a determination for small, low control radios In light of IEEE 802. 15. 4 – 2003 remote individual range Networks standard. Those determination might have been acknowledged and approved Toward those Zigbee collusion to december 2004. Zigbee collusion will be an assembly of more than 300 organizations including industry majors in Philips, Mitsubishi Electric, Epson, Atmel, texas Instruments and so forth.

4. WORKING PRINCIPLE:

In this paper we have temperature, gas, patient's body movements reading are monitoring using Raspberry Pi. These sensors signals send to the Raspberry Pi via amplifier circuit and signal conditioning unit (scu), because the signals levels are low (gain), so amplifier circuit is used to gain up the signal and transmit the signals to the Raspberry Pi. Raspberry pi is a linux based operating system works as a small pc processor system. Here patients body temperature, body movements, respiration and heart rate is measured using respective sensors and it can be monitored in the monitor screen of computer using Raspberry Pi as well as monitoring through anywhere in the world using internet source. In this project, we are giving the complete portrayal on the recommended framework construction modeling. Here we need aid utilizing raspberry phytotoxin board as our stage.^[7]

It need a ARM-11 SOC for incorporated peripherals similar to USB, ethernet What's more serial and so forth throughout this way, observing and stock arrangement of all instrumentation may be enha. Ahead this table we are introducing linux pauling working framework for fundamental drivers for every last bit fringe units What's more client level product stack which incorporates a light weight GUI In light of XServer, V4L2 API to cooperating for feature units in cameras, tdt stack should convey for organize units Also A percentage standard framework libraries for framework level general io operations. Those raspberry phytotoxin board provided with the over programming stack may be associated with those outside organize What's more a Polaroid may be associated with those raspberry phytotoxin through USB transport. The architecture of the web server has the following layers.

- In the bring down level those web server need those physical facilitating interfaces utilized for storing and looking after those information identified with those server.

- Over those physical facilitating interface those server need http server product What's more different web server segments to sidestep the immediate cooperation with the physical communication for the more level levels.

- Those last layer need the devices and benefits for cooperating with the feature streams which incorporates the picture codec What's more storing interfaces, association supervisors and session control interfaces and so on.

After interfacing every last one of units control up those gadget. At those gadget begins booting starting with flash, it To begin with load the linux pauling of the gadget Also instate every last one of drivers and the center portion. Then afterward introduction of the part it principal check climate every last one of gadgets would working appropriately or not. After that it loads the record framework Furthermore begin the startup scripts to running vital procedures and daemons. At last it begins those primary provisions. When our requisition begins running it to start with check every last one of units Furthermore assets which it necessities would accessible or not. Then afterward that it check the association with those units furthermore provides for control of the client.

5. RESULTS:

The proposed method of patient monitoring system is monitor patient's body temperature, gas sensor senses gas and vibration sensor for sudden movement using Raspberry Pi. After connecting internet to the Raspberry Pi it act as a server. Then the server is automatically sends data to the website. Using IP address anybody can monitor the patient's health status anywhere in the world using laptops, tablets and smart phones. If these parameters are goes to abnormal it will automatically sends alert mail to the doctors and relatives. After full hardware completion process, then putty software is used for completion of full project. Sakis 3g is used for install a USB device.

Then apache server is used for transfer these parameters from Raspberry Pi to website. After installing Putty Software install Sakis3g software. USB modems are not possible for install directly to the Raspberry Pi. So after installing Sakis3g install USB modem device to the raspberry Pi. After installation then type lsusb in the linux terminal for whether the USB modem is detected or not. After detection modem connect to the internet.

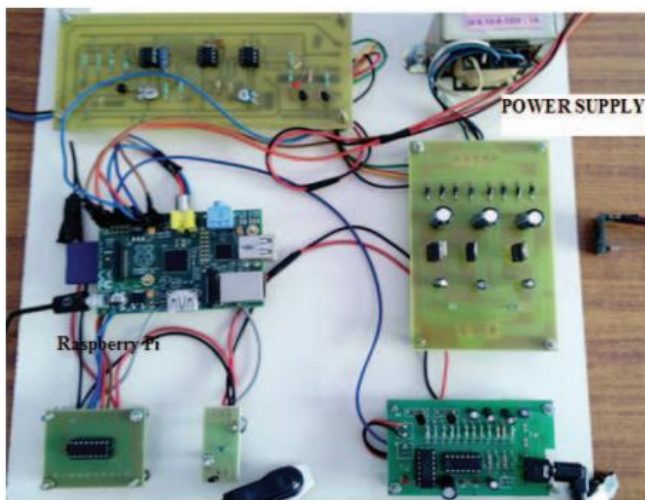


Fig 2: Hardware design and implementation

Install Apache server to the Raspberry Pi for internet monitoring. Apache server is used for transferring the values from Raspberry Pi board to web server. PHP server is used for run the webpage coding. After creating web page coding saved it on Raspberry Pi desktop. After installing PHP server webpage is run. The parameters values is also display in the webpage. To allow your Apache server to process PHP files, you will need to install PHP5 for Apache. Type the following command to install PHP server. Sudo apt-get install php5 libapache2-mod-php5 -y. Then again open one linux terminal. Then type username and password. After registering Airtel network, type ifconfig in the linux terminal. There are three types of IP addresses are displayed. In that process choose ppo IP address. If we disconnect the USB modem, then again register with network means the address is changed. Now the ppo IP address is 223.236.0.92.

Then type python main.py in the linux terminal for run these parameters Patient's (heart rate, Respiration rate, body movements and body temperature) codings. Then type this address 223.236.0.92 in browser. After that anybody can monitor the patient's health status anywhere in the world.



Fig 3: Patient health status are monitoring using IP address

These parameters values are goes to abnormal it will automatically sends alert mail to the doctors and relatives. Human beings normal body temperature is 35° C. The temperature value is goes to 40° C the mail is sent.

6. CONCLUSION & FUTURE SCOPE:

The project "Effective ways to use IOT in the field of medical and smart health care" 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 11 Processor board and with the help of growing technology the project has been successfully implemented.

- 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.

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