International Journal of Disaster Recovery and Business Continuity
Vol.11, No. 1 (2020), pp. 69-79

BLYNK AND MQTT BASED SMART HOSPITAL SYSTEM

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Abstract

Hospitals are difficult in geographical point with completely different levels of safety and hazards. A better hospital service should have good security of the patients information, otherwise the working of the hospital will be greatly at fault. This privacy issue has to be solved in a best way possible. Hence the aim should be to secure the patient's info throughout with the help of Message Queuing Telemetry Transport (MQTT). Most of the time, thanks to negligence of hospital workers, excessive variety of patients or inattentiveness of relatives it's going to happen that saline bottle isn't monitored properly and it's going to result in cause coronary failure thanks to "AIR EMBOLISM." By the use of Blynk, a mobile application, the electricity is controlled and therefore, the level of saline bottle is monitored from distant position. Hence the sensors are used along with IoT thus constantly monitoring the surrounding thus providing a major advantage to the hospital environment. The amount of workers are also reduced. IoT tends to be the major key resource that allows devices to be monitored and controlled remotely online, which creates a major opportunity to change the physical world to computer based systems.

Keywords: *Blynk – MQTT (Message Queuing Telemetry Transport) – Privacy security – Data monitoring, Accessing the data.*

I. Introduction:

As of late, numerous inescapable frameworks for social insurance has been proposed, talked about and once in a while figured it out. Unavoidable social services is profoundly multifaceted with numerous applications concentrating on interoperability with the heritage medical clinic resources, the "customary emergency clinic," the security, and security of touchy data, and the convenience of end clients. The thought 24th of Keen medical clinics is presented when Internet of Things (IoT) segments are supporting center elements of a medical clinic. Joint effort among different partners, various interconnected resources and high adaptability prerequisites don't just prompt multifaceted nature and elements. However, likewise to obscure hierarchical limits. Because of the extraordinary number of huge resources in question (understanding life, touchy individual data and money related assets) data

ISSN: 2005-4289 IJDRBC

security is a key issue for shrewd emergency clinics. Dangers to savvy clinics are, be that as it may, not constrained to malevolent activities as far as their underlying driver. Human blunders and framework disappointments as well as outsider disappointments additionally assume a significant job.

The dangers that result from these dangers and comparing vulnerabilities are regularly moderated by a blend of authoritative and specialized security measures taken by savvy emergency clinics which involve great practices. With regard to authoritative measures, consistence with guidelines, staff preparing and mindfulness raising, a sound security association, and the utilization of rules and great practices are especially pertinent. Important specialized measures incorporate arrange division, resource and setup the executives, and system observing and interruption location. Be that as it may, makers of data frameworks and gadgets utilized in keen emergency clinics need to take certain measures as well. Among them are, for example, building security into items from the beginning, embracing secure coding rehearses also, broad testing.

The "Web of things" is an upheaval for the ICT world. Gadgets, framework segments and systems are getting independent, omnipresent furthermore, interconnected. At the point, when this mechanical progression applies to medicinal service parts, one of the most conventional basic sectors1, the outcomes are exceptional. Associated restorative gadgets change the way the social insurance industry works, both inside medical clinics and between various 13 on-screen characters of the social services industry.

Would you be able to envision an electronic gadget gathering data on patients' crucial signs turning out to be, "brilliant"? . On the other hand, one that screens life supporting machines to have the option to respond on any change of status? Associated restorative gadgets can bring expanded persistent well-being what's more, proficiency, especially whenever associated with Clinical data frameworks. At the point, when this applies to the entire social services association biological system, it turns into a "Brilliant Hospital."

ii. Related Work

The constant monitoring and supervising of patients is an important problem in the hospitals in India since the numbers of patients are particularly high. The increase in patients and not enough time or labor to treat them has led to a major effect in the lives of many people around the world. Hence, the importance to focus on health care and the growth of technologies has been significantly increased, To satisfy these requirements, IoT has been viewed as the best solution. Thus the real-time monitoring as well as the alarming systems for patients health during their day to day life achieved using IoT. The problem Air Embolism has to be reduced in the hospital that can be helpful in saving many lives in the health care solutions.

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iii. Existing System

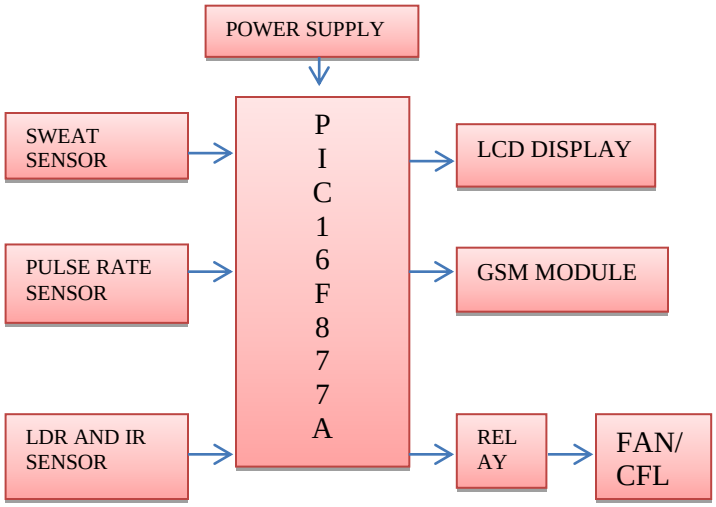

fig.1 Transmitter containing the sensors

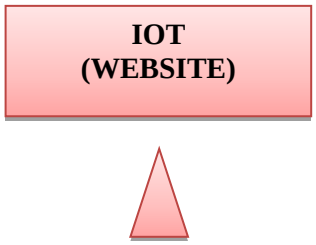

fig.2 Receiver contained the cloud

The existing system consists of a microcontroller with PIC16F877A & GSM Module. The sensors used here are LDR sensor, Sweat sensor, Pulse rate/heart beat sensor, Temperature sensor, IR sensor,. These sensors such as temperature sensor, sweat sensor, pulse rate/heartbeat sensors are placed on human body and IR sensor, LDR sensor are placed in patient's room. The use of these sensors are different and the similarity between them are that they are used to constantly monitor the daily routine of the patients and their health related concerns without disturbing them .These parameters are then communicated to When a person sweat more than other, mainly when there is no form of physical activities, it could be a sign of heart related problem. The heart takes a greater effort in order to pump blood through the clogged arteries to keep the body temperature low. Hence a sweat sensor is used to detect the sweat level in the body. If you experience cold sweats or clammy skin, then its early signs of heart attack. Thus, it becomes necessary to detect sweating of the patient . This temperature sensor is used to sense the body temperature of the patient. Pulse rate/heartbeat sensor is used to heartbeats of the patient. The lower and higher heart rate is necessary to be monitored. Since they play a vital role is dealing with the abnormalities in the

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human body. LDR sensor is used to detect the lighting conditions of the patient room so that it can automatically turn ON and OFF lights. The lighting is provided when the surroundings get dark and the light is turned off if the surrounding is not much dark. It can detect the entry or exit of any entity from that specific patient room.

now a days it has become important to focus on healthcare awareness and also the growth of wireless technologies. To complete our needs, IOT has made possible to view, control things in real time wirelessly through the use of internet. The problems with the wired networks have been overcome by the use of the wireless network in a healthcare. We can even move the healthcare from one place to the other. All these sensors will send data wirelessly over the internet to IoT server. The live data of a patient is also monitored using IoT. The appointed caretakers of the patients will get all the required data from IoT server. The appointed caretaker can also control the electrical appliances over the IOT server. The above details are recorded and then sent to a website where it is stored. Hence, they can be viewed only through a website and can be accessed by anyone who knows the IP address.

We know that the standard of IoT is relatively low hence the privacy of the patients data is constantly in danger of getting exposed or leaked. A lot of research work is done in order to protect these private data of the patients. Only the details about the patients are monitored and recorded, the saline bottle is not taken into consideration. The details are not sent immediately to the nurse who is in charge, which can be really helpful.

iv. Proposed System

Arduino Board

These boards are very low cost compared to the official Arduino boards and the hardware is open supply, The STM32F103C876 is the microcontroller that is used in this proposal. It belongs to a family of medium-density performance microcontrollers. It provides high performance since it has the ARM Cortex-M3 that operates at a frequency of 72 MHz . It has embedded memories of really high speed. The flash memory is up to 128 kb and the Static Random Access Memory is 20kb.

The Architecture of this ARM cortex-M3 is a “HARWARD ARCHITECTURE”. The harward architecture provides 2 different buses. One for the data transfer and other for the instruction. They communicate using ROM and RAM memories. The 3 stage pipelining is used here. That is fetch, decode and execute the instructions. Since it provides less processor area and better debugging as well as handling the interrupt, it becomes a cost effective device. In order to provide better interrupt handling capability, a Nested Vector Interrupt Controller(NVIC) is incorporated.

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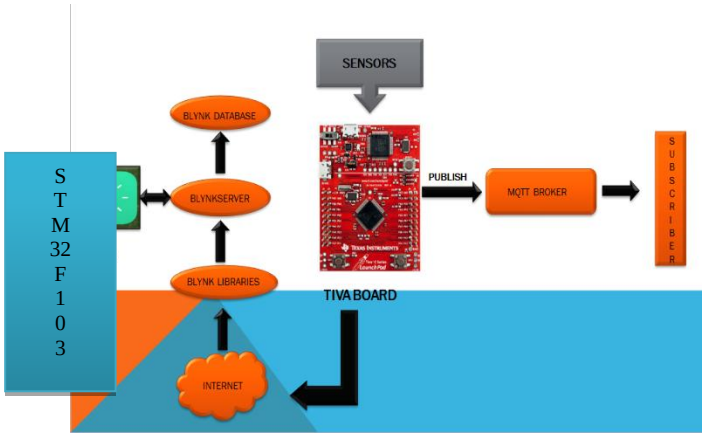

fig. 3. Block diagram of blynk controlled mqtt system

Blynk:
Blynk is an app that can be installed in an IOS as well as on an Android phone. Then it acts as an intermediate between the mobile and the boards such as Arduino, tiva, stm, Raspberry Pi etc. and then control them over mobile phones.

There are widgets provided in this app so that the controlling of the boards becomes much easier like working in a real time simulator.

There are blynk database, blynk server and the blynk libraries. The Wi-Fi and Local Area Network can be used to connect between the blynk cloud and the blynk server to control the arduino board.

The blynk libraries have the files that are incorporated to control certain types of boards. Hence having the particular library file for a particular board is necessary at all times.

Once the app is installed in your mobile phone, you can use the widgets provided in the app after creating an account with the app. This account is created using your mail ID.

The authentication number for the particular account will sent to your mail ID. And this number is necessary for the rest of the process, like, controlling the board through the app.

Temperature and Humidity Sensor:
Most humidness sensors use electrical phenomenon measuring to see the quantity of wet within the air.
The specifications of the DHT11 include the following.
The accuracy of the Temperature measured will be about plus or minus two percent in degree Celsius. Then the temperature range is about fifty percentage and the humidity range and accuracy will be about ninety percent and plus or minus five percent. The DHT11 calculates ratio by measure the impedance between 2 electrodes.

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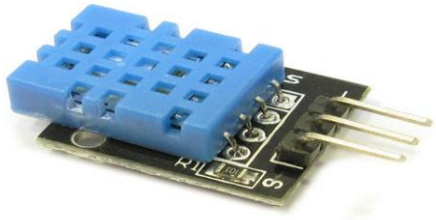

fig.4. DHT11 Sensor

Flame Sensor:

A flame-sensor is one reasonable detector that is especially designed for sleuthing additionally as responding to the incidence of a fireplace or flame. The flame detection response will rely upon its fitting. It includes Associate in Nursing device, a fossil fuel line, gas & a fireplace suppression system. This sensing element is employed in industrial boilers. the most perform of this is often to relinquish authentication whether or not the boiler is correctly operating or not. The response of those sensors is quicker additionally as additional correct compare with a heat/smoke detector thanks to its mechanism whereas sleuthing the flame.

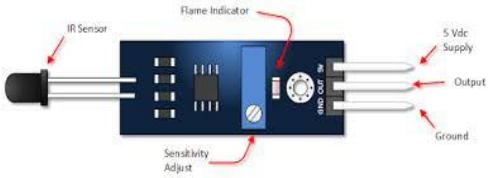

fig 5. Flame Sensor

Light Sensor:

Light sensors are devices that are used in the conversion of light energy into an electrical signal. The output signal generated by this sensor indicates the intensity of the light in the surrounding. Here this sensor is used to manage the power usage of a hospital in an efficient manner.

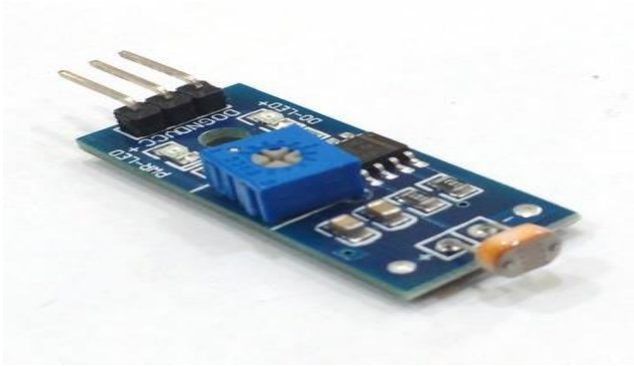

fig . 6 Light Sensor

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The sensor senses the light intensity required during a broad day light as well as for a gloomy night light. With the help of this sensor the usage of electricity can be minimized and the power management is good.

Saline holder:

In many hospitals the problem with "Air Embolism" has become a major threat to the patients. This problem is addressed in this proposal. Here an ultrasonic sensor is used. This sensor is used to detect the level of the glucose present in the saline bottle.

The level of glucose in the saline bottle is constantly monitored and detected by the arduino board and then sent to the blynk via cloud.

When the glucose level is reduced below the limit, then a notification is sent to the nurse who is in duty.

This helps in avoiding many accidents that happens due to air embolism.

Advantages:

The Flame and IR sensor are detected by the arduino board transfer the data to the cloud and the value are shown in
the BLYNK.
The saline bottle level is detected by the Ultrasonic sensor and the notification sends to the nurse using a BLYNK app.

In the proposed system, the information about patients is safeguarded by using MQTT.

Here MQTT is used as a Broker. The Doctor who is responsible for the patient data will be having a particular ID. This ID acts as a key to get the data. When the relatives of the patient require the data of the patient, with the help of the doctor they can subscribe to this ID in order to view the data.

v. Conclusion:

Recently IoT has been integrated in our day to day life, as it tends to be the best technology in improving the lives of people and also helps in taking care of the necessities that requires intelligence of the human brain.
The spectrum of IoT is very large that it covers all the aspects that are important for the day to day life interaction between human and the technology.
It even helps in health care, monitoring data, saving data, and accessing the stored data.
It has taken another step in increasing the privacy of the data that are stored in it. Since, the data stored in internet can be accessed by anyone, the further steps includes the security of the private data.
IoT has to be beneficial, at the same time, it has to be convenient, that it should not exploit any of the natural resources that are present.
The electricity wastage has become an major problem to all types of hospitals whether private or even government. This happens because of not switching off the electrical or electronic appliances.
Over 30% of the total power consumption is due to the lighting sources.

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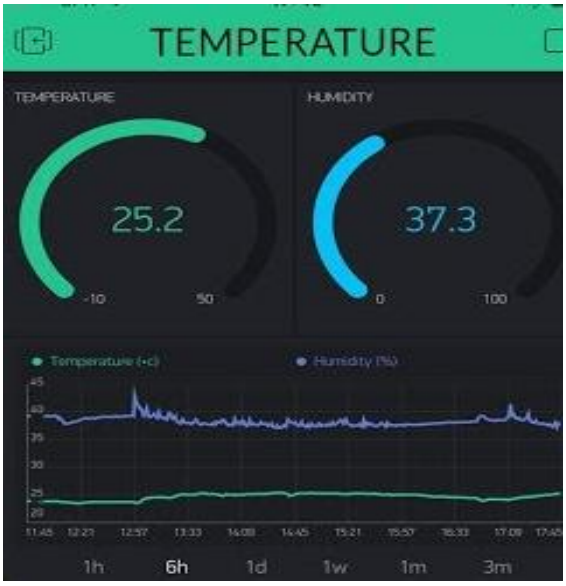
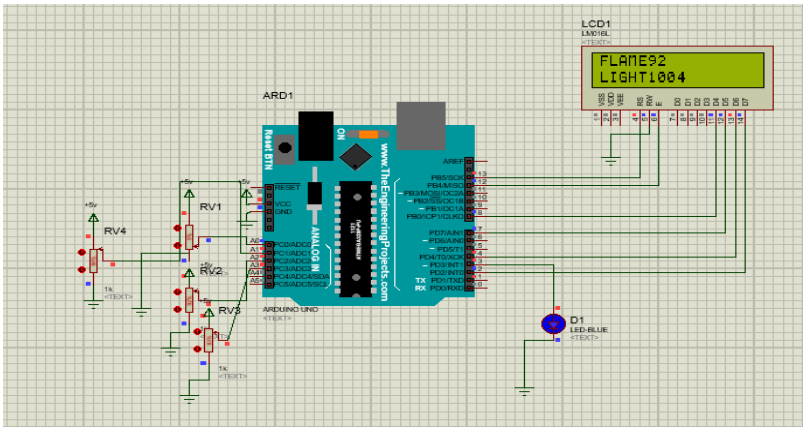
Thus IoT helps in sorting these problems and also in avoiding “Air Embolism”.

vi. Result

Stimulation:





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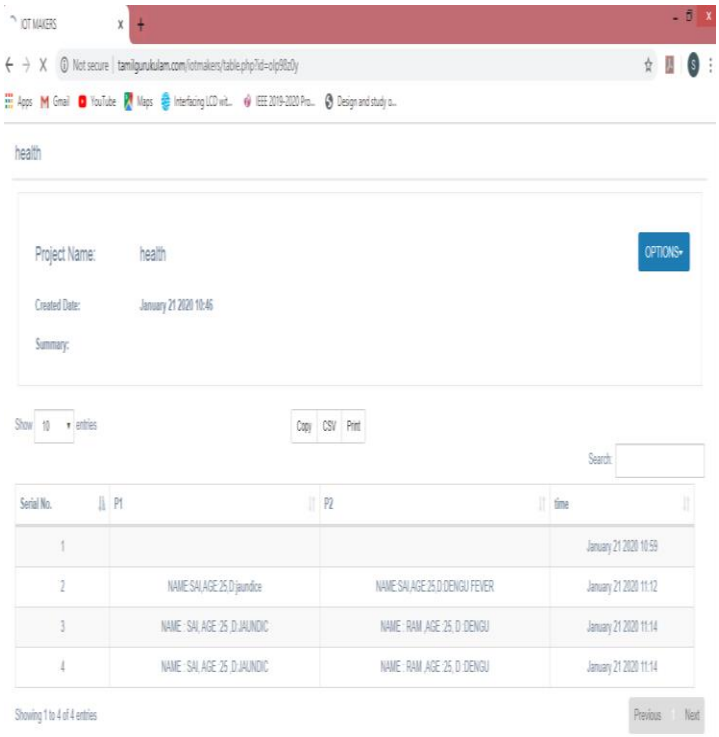

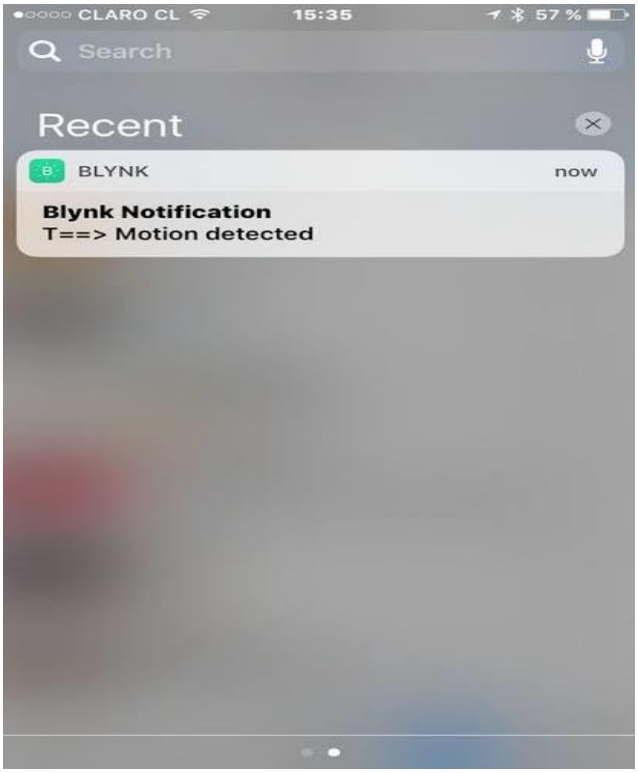

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