ABSTRACT

Health is the most important part of any human's life without health it is useless to any treasure of life. Security of soldiers who are involved in enemies warfare, increasing number of health related issues which involves heart failure, blood pressure. Periodic visits to hospitals has become a tedious job for the patients, challenges to the society which must cope with many more differently abled people .Bio-sensor systems are been used concerning soldiers safety, GSM module which keeps track of of the movements can be used to get updates about patients health on a regular basis, vital parameters such as Pulse rate, ECG can be used and monitored on any mobile device and network developments can be made considering those factors.

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1.0 INTRODUCTION

The project proposes an efficient implementation for IoT (Internet of Things) used for monitoring and controlling the appliances via World Wide Web. Health monitoring is the major problem in today's world. Due to lack of proper health monitoring, patient suffer from serious health issues. There are lots of IoT devices now days to monitor the health of patient over internet. Health experts are also taking advantage of these smart devices to keep an eye on their patients. With tons of new healthcare technology start-ups, IoT is rapidly revolutionizing the healthcare industry.Here in this project, we will make an IoT based Health Monitoring System which records the patient heart beat rate and body temperature and also send an email/SMS alert whenever those readings goes beyond critical values. Pulse rate and body temperature readings are recorded over ThingSpeak and Google sheets so that patient health can be monitored from anywhere in the world over internet. A panic will also be attached so that patient can press it on emergency to send email/sms to their relatives.Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. The sensor clips onto a fingertip or earlobe and plugs right into Arduino. It also includes an opensource monitoring app that graphs your pulse in real time.LM35 is a analog linear temperature sensor. Its output is proportional to the temperature (in degree Celsius). Most people call ESP8266 as a WIFI module, but it is actually a microcontroller. ESP8266 is the name of the microcontroller developed by Espressif Systems which is a company based out of shanghai. This microcontroller has the ability to perform WIFI related activities hence it is widely used as a WIFI module.ThingSpeak provides very good tool for IoT based projects. By using ThingSpeak site, we can monitor our data and control our system over the Internet, using the Channels and webpages provided by ThingSpeak. ThingSpeak 'Collects' the data from the sensors, 'Analyze and Visualize' the data and 'Acts' by triggering a reaction. These embedded systems have also been adopted in the Smartphone technology. And with increased internet penetration in most developing countriesthrough mobile phones, and with use of Internet of things (IoT) will become adopted at a faster rate. The Remote Health Care system utilizes these concepts to come up with a system for better quality of life for people in society.

1.1 PROBLEM STATEMENT

There were no data sending on to the cloud. Elderly people do not have access to smart phones, so SMS alert can work on these problem.

Security issues can be disturbed by man in the middle attack.

Geo location uses web based application which is not convenient to use.

Display section added to display digital map and locate the target by which attacks can be avoided.

1.2 SCOPE OF THE PROJECT

Analog data of pulse, temperature and ECG sensor is first obtained in the digital form. This data is then sent on to the Thingspeak(IOT biggest cloud platform) where it is stored. This data stored is then sent to patient relatives through an SMS alert or by directly calling them.

1.3 AIM AND OBJECTIVE

Our main objective is to analyse and compute the patient health we are using Nodemcu, which is the heart of this project. These smart devices are used to collect temperature, Pulse rate and ECG which are used to evaluate the health condition of the patient. The final results are displayed on the android device, on web server and also the results are sent to the user through SMS.

2.0 LITERATURE SURVEY

In this section ,we will look at several similar systems that are been researched and implemented by other researchers . for further understanding on their methods and techniques , refer to the reverence page at the end of this report to search or text or even websites published.

2.1 Design a implementation of ECG monitoring & heart rate measurement system.

It describes the design of a simple 3-lead Electrocardiogram (ECG) monitoring and heart rate measurement system with LCD output. The system takes the physical pulse input using Ag/Cl sticking electrodes stuck to the arms and right leg of the patient under observation. The model encompasses of instrumentation amplifier and filter circuits etc, which are used for signal conditioning of the pulse input from the patient's body and displayed on CRO as the ECG waveform. Thus conditioned signal is also processed by the microcontroller AT89S52 to count the heart for duration of one minute and displays the information on LCD display.

Advantages:

- The output displayed was an ECG waveform on the CRO and Heart rate is counted by microcontroller for one minute and displayed on LCD.
- Accurate graph pattern is formed giving an actual view of the heart pulse in real time.

Disadvantages:

- There was no data sent to the cloud and no notification about ECG value was given to the patient about his/her health.

2.2 IoT based health monitoring system using raspberry pi and Arduino.

It is designed for chronic heart failure(CHF) patients to continuous monitoring of heart to avoid heart attack and heart related disorders. This allow physicians to monitor patient at a distance and take periodic actions in case of necessity. A set of five parameter has been identified i.e electrocardiogram (ECG),Pulse rate, weight sensor, temperature sensor and position detection by using wearable sensors. Once the raspberry pi is connected to internet, it acts as a server and sends data on specific URL. The vital parameters can be visualized and monitored on any mobile device including laptops or smart phones which are connected under same network.

Advantages:

- It can be used for monitoring the patient in timely manner.
- It can be implemented in global network with help of raspberry pi.

Disadvantages:

- It's important to take into account that not everyone owns a smart phone and elderly people often face difficulties in using modern gadgets, such as mobile phones. So they are not able to view the data thought internet.

2.3 Privacy and security issues in IoT healthcare application for disabled user.

Security is defined as the protection of data from unauthorized user. In the IoT era, there is a need for security solutions that protect the confidentiality of data in IoT devices, no matter where the data originates or where it travels. Data should be protected both at the device level and the hospital network level.

Advantages:

- Accessibility

Disadvantages:

- Expensive
- Requires time to adapt
- Over dependency
- Susceptible to network hackers

2.4 GPS and IoT based soldier tracking and health indication system.

It based on IOT including Temperature and heart rate sensor with proper output displayed on LCD. Soldier's organisations plays an important role for careful planning and co-ordination. So tracking the location of soldier from GPS which helps for control room station to know the exact location of soldier. Then it will guide them about High-speed, short-range, soldier-to-soldier wireless communication and give information on situational awareness such as Bio-medical sensors including Temperature and Heart rate sensor. Thus program is developed and implemented on ARM-7 and located to the microcontroller. Bio-sensors can successfully detect the pulses, heartbeat and temperature and displayed the result on LCD display.

Advantages:

- GPS tracks position of soldier anywhere on globe and also health system monitors soldier vital health parameters which provide security and safety for soldiers. Less Complex circuit and power consumption by use of ARM processor.

Disadvantages:

- To monitor the physical status of soldier for future reference we can send the calculated data on cloud. We can also add display section which will help to display digital map and to locate the target and attacks can be avoided.

2.5 An android application for geolocation-based health monitoring, consultancy and alarm system.

In the last decade significant progress have been made in smart phone technology as well as in wireless wide area network technologies. A field that mobile application have great potential is health monitoring. Although the main trend is for individual usage especially in sports heart rate monitoring can also be benefited in emergency alarm system for people who have potential risks while doing sports or elderly people. Periodic visits to hospitals have become a tedious job for the patients. This problem hence is taken into consideration for making it more efficient.

Advantages:

- Real time geolocation tracking is possible.
- Consultancy module is provided within the application for communication.
- Potential to reduce workload of health experts .
- Tedious job of frequent visits is reduced to much extent.

Disadvantages:

- Full authentication cannot be provided in some cases.
- Alarming mechanisms may face problem in specific condition.

3.0 SYSTEM METHODOLOGY

The formal documentation for the phases of the system development life cycle. It defines the precise objectives for each phase and the results required from a phase before the next one can begin. It may include specialized forms for preparing the documentation describing each phase.

3.1 HARDWARE REQUIREMENTS:

- Nodemcu(ESP8266)
- Arduino
- LM35 Sensor
- Pulse Sensor
- ECG Sensor
- GPRS/GSM modem
- Power Supply
- Connector cables - Female to Female and Male to Female.

3.2SOFTWARE REQUIREMENTS:

- Arduino IDE
- Coding Language: Embedded C

3.3 SYSTEM ARCHITECTURE

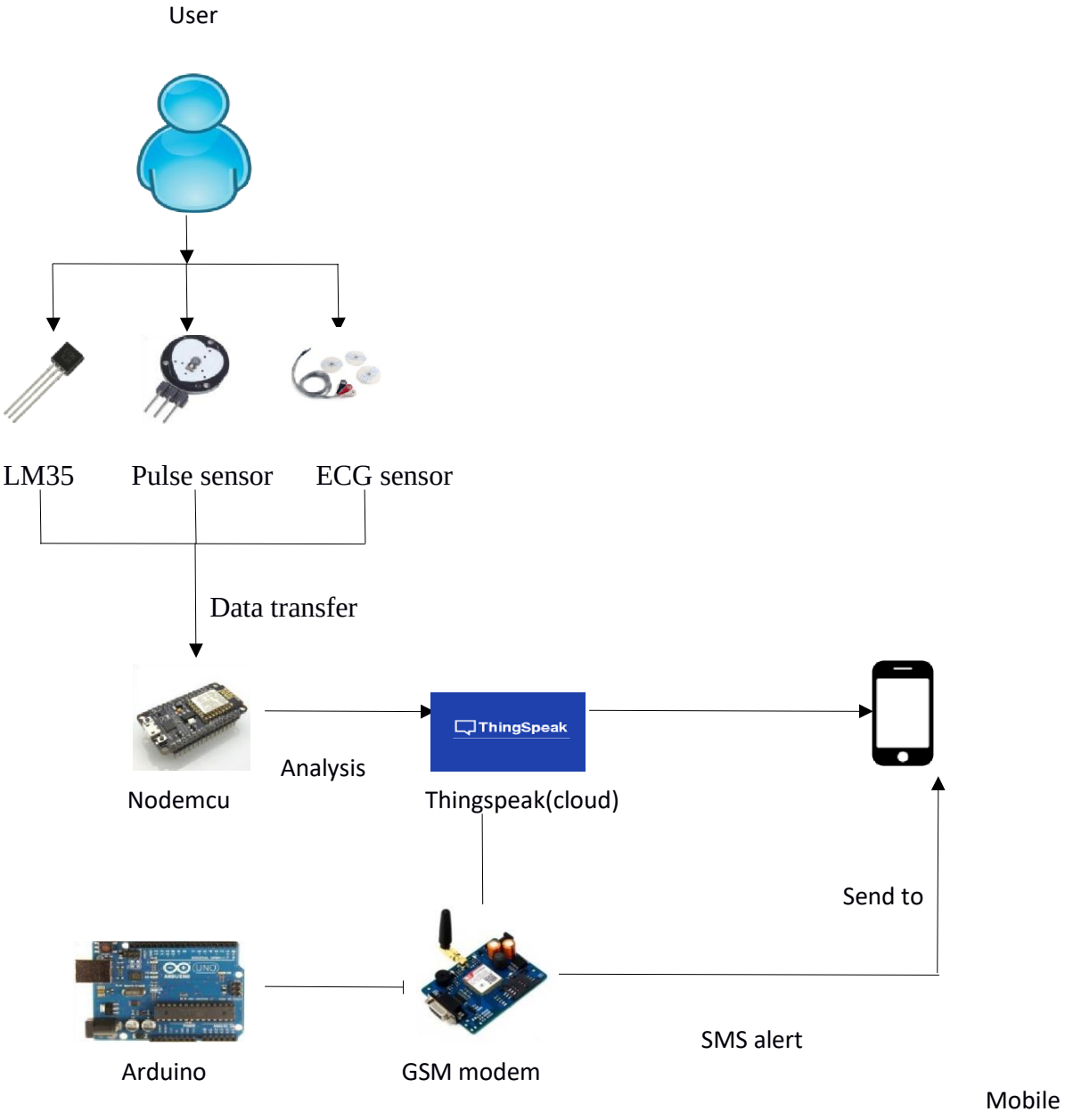

Fig: System Architecture

1. Every user will have LM35 sensor, Pulse sensor and ECG sensor
2. Data from sensor is transferred to Nodemcu(ESP8266).
3. Nodemcu(ESP8266) will analysis the data and upload on ThingSpeak(cloud)
4. Arduino is connected to GSM modem.
5. The data from cloud will send to GSM modem.
6. GSM modem will give SMS alert on the mobile.

3.4 IMPLEMENTATION

The connection of all components of this project is been given below figure. There is Nodemcu, Arduino, pulse-rate sensor, temperature sensor ,ECG sensor, jumper wire, bread board and power supply.

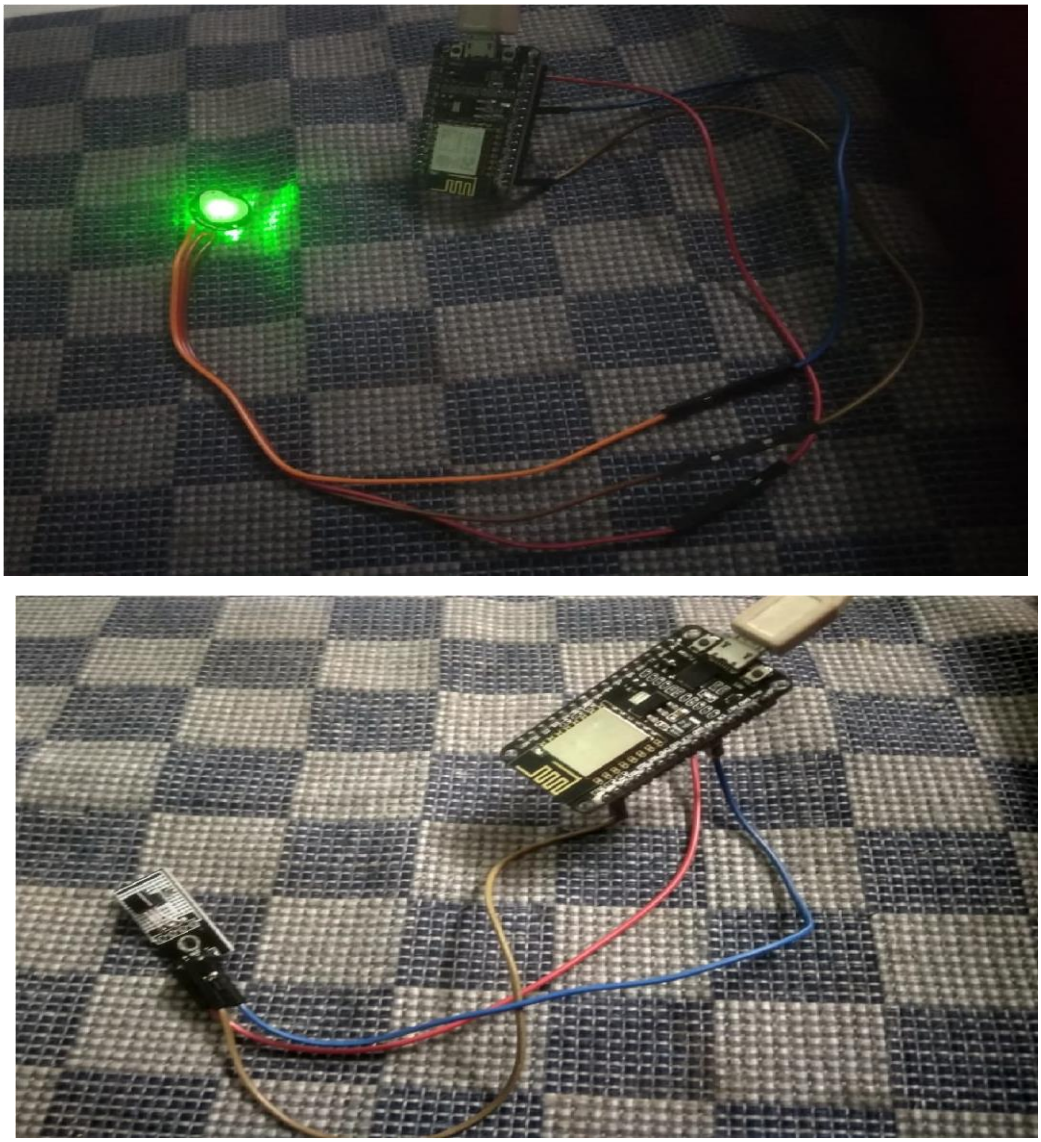

Figure 3.4: Hardware Connection

3.5 SYSTEM OVERVIEW

This system has function of the various components such as Nodemcu(ESP8266), Arduino,GSM modem. Nodemcu analyzes the data and uploads on Cloud.

3.5.1 SENSOR TO NODEMCU(ESP8266)

Sensors	Pin Configuration of Sensors	Pin Configuration of Nodemcu
Pulse-rate	**GND** **VCC** **Signal**	**GND** **VCC** **A0**
Temperature(LM35)	**GND** **VCC** **Output**	**GND** **VCC** **D7**
ECG(AD8232)	**GND** **3.3V** **Output** **L0+** **L0-**	**GND** **VCC** **D5** **D6** **D8**

3.5.2 NODEMCU(ESP8266) TO THINGSPEAK

First capturing the data uploading the readings to ThingSpeak. ThingSpeak uses HTTP calls (i.e. simply like reading a web page), which include the data readings as fields at the end of HTTP call. ThingSpeak automatically charts the data points and get some rapid gratification seeing that data collection is working. It can even embed their charts in the website pages.

3.5.3 ARDUINO TO GSM MODEM

GSM Modem GND(Ground) is connected to Arduino Pin Ground.

GSM Modem TxD is connected to Arduino Pin Rx

GSM Modem RxD is connected to Arduino Pin Tx

3.5.4 GSM MODEM TO SMS ALERT

Patients Phone number and reports are saved in GSM modem.By using GSM simcard connected on GSM modem it will send the patients report on the patients registered number.

3.5.3 VISUALIZATION

Visualization is any technique for creating images, diagrams, or animations to communicate a message. Visualization through visual imagery has been an effective way to communicate both abstract and concrete ideas since the dawn of humanity. The data from database and cloud will be visualized and displayed on a Dashboard .

4.0 RESULTS

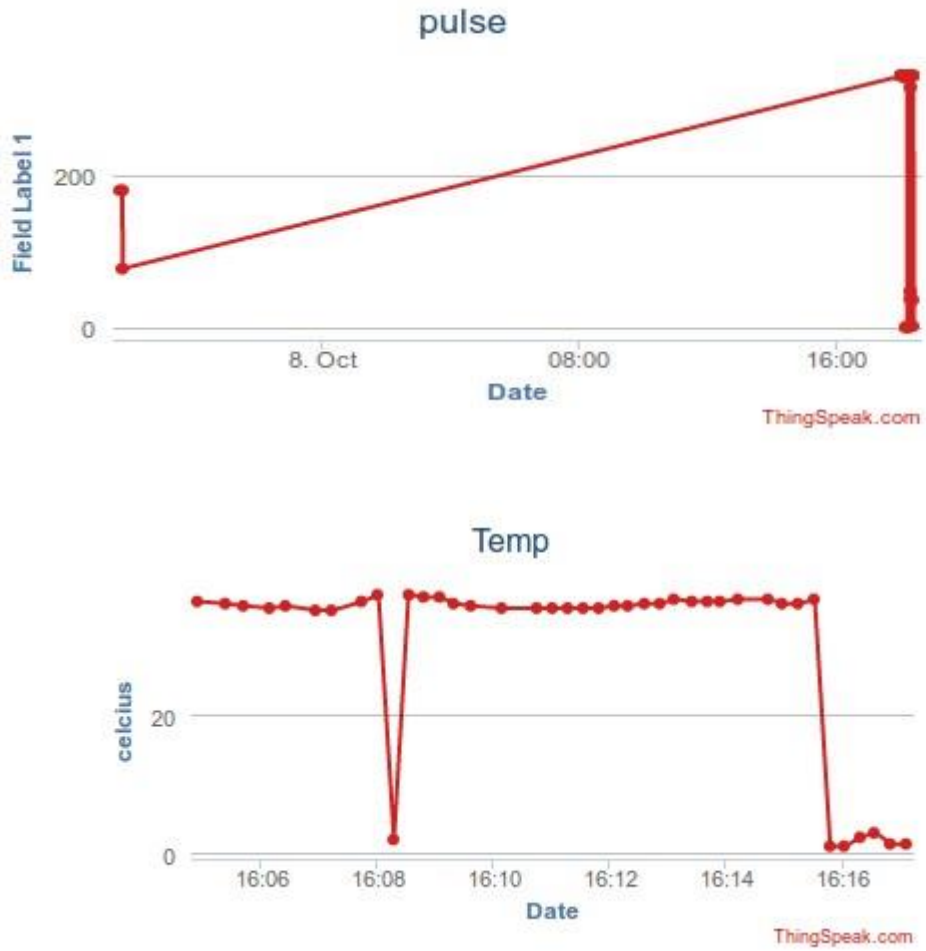

Figure 4.1: Data Visualization

The data visualization is displayed in the following format which displays Number of patients beats per minute. The graph consists of Fields-Pulse ,Temperature(celcius),ECG and Date.

2019-10-05 10:34:55 UTC	38	36.45
2019-10-05 10:35:23 UTC	39	36.13
2019-10-05 10:35:42 UTC	40	35.81
2019-10-05 10:36:10 UTC	41	35.48
2019-10-05 10:36:26 UTC	42	35.81
2019-10-05 10:36:57 UTC	43	35.16
2019-10-05 10:37:14 UTC	44	35.16
2019-10-05 10:37:45 UTC	45	36.45
2019-10-05 10:38:01 UTC	46	37.42
2019-10-05 10:38:17 UTC	47	1.94
2019-10-05 10:38:32 UTC	48	37.42
2019-10-05 10:38:48 UTC	49	37.10
2019-10-05 10:39:04 UTC	50	37.10
2019-10-05 10:39:20 UTC	51	36.13
2019-10-05 10:39:36 UTC	52	35.81
		35.48

(a)Temperature

	A	B	C	D
1	created_at	entry_id	field1	
2	2019-10-07 11:44:50 UTC	70	48.06	
3	2019-10-07 11:45:06 UTC	71	48.39	
4	2019-10-07 11:49:06 UTC	72	184.19	
5	2019-10-07 11:49:21 UTC	73	183.23	
6	2019-10-07 11:50:09 UTC	74	180.97	
7	2019-10-07 11:50:25 UTC	75	180.65	
8	2019-10-07 11:50:40 UTC	76	180.65	
9	2019-10-07 11:52:15 UTC	77	61.29	
10	2019-10-07 11:52:46 UTC	78	191.94	
11	2019-10-07 11:54:03 UTC	79	180.97	
12	2019-10-07 11:54:19 UTC	80	180.65	
13	2019-10-07 11:54:51 UTC	81	180.32	
14	2019-10-07 11:55:22 UTC	82	180.65	
15	2019-10-07 11:55:54 UTC	83	180.65	
16	2019-10-07 11:56:10 UTC	84	180.97	
17	2019-10-07 11:56:41 UTC	85	180.32	

(b)Pulse-rate

Figure:4.2 Output

This data from database is displayed in the following format and it consists of Date,Time and Field.

5.0 CONCLUSION AND FUTURE SCOPE

In future studies the proposed system can be extended to include other physiological signals.Data analysis can be carried out based on patient profile characteristics such as age,gender and country.Confidentiality will be assured and investigation of privacy and security issues will be done in IOT healthcare applications for differently abled .A wireless healthcare monitoring system by means of using mobile devices and sensors can be implemented in global network . Implementation of expert system features like speed variations with moving screen,exact heart rate with analysis,also enabling the transmission of ECG signals through mobiles,signal transmitters or internet. Thus ,it encourages enabling technologies and application domains that are likely to drive IoT research in the near future.In addition,embedded medical devices are spreading to provide accessible information anywhere in the world.Healthcare organizations use the continuous engineering potential to design powerful future.

5.1 REFERENCES

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