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Automation of Home Energy Management System and Energy Monitoring Using ZIGBEE and GSM

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Abstract— in this paper present a home energy organization system with power demand time and schedule their power usage in the household loads by themselves for the purpose of reducing electricity expanse and achieved by a power cut. we first introduce a general architecture of an energy administration system (EAS) in a home network (HN) based on the smart grid and then propose a proficient planning method for residence power usage .The goal of the scheme support the customer to use less power during peak hours or move the time of energy used to off peak times such as nighttime and month end Accordingly, all appliances in the home operate robotically in the most cost-efficient way. Therefore, using real-time pricing (RTP) model is adopted there is the prospect that most appliances would operate during the time with the lowest electricity price and power sharing on demand time .Hence optimizes the home energy and reduce the power cost /man power.
Index terms--- Home energy organization, Energy administration system (EAS), Home network (HN), Real time pricing (RTP), and Proficient planning method for power usage.

I. INTRODUCTION

The growing demand of electrical energy has made electric power systems to encounter more regular strain conditions. The common cause of system strain conditions includes transmission line outages, which are likely to occur during significant peak hours. Such actions will cause a supply-limit situation where cascading failures and large-area blackout are probable. Demand reaction (DR) has been visualized to deal with such sudden supply limit events by selectively imposing a control on system loads, whereby regaining balance between electricity supply and demand. DR also plays a unique role in load changing that can help increase consistency and effectiveness in operation. With the application of the proposed systems, Human operator billing are prone to reading error as sometime the houses electric power meter is placed in a position where it is not easily nearby, then inside our system smart meter is used Through the smart meter E-billing is possible. It will automatically it will update the energy consumption of the customer to EB unit. If power will be less in a grid, automatically power will be managed. Our proposed system when low power generation automatically goes to power management. All the devices controlled depends upon the priority based and timing based control the devices when low power generation. This project proposed system has automated metering infrastructure, but Existing System, can't manage the power effectively. Our future work is power sharing during power demand time and reduce the manpower. In general demand response refers to actions taken to change residents' electrical energy demand in reply to variation in the price of electricity over time.

II. LITRATURE REVIEW

To studied this paper for a home authority management scheduler (HAMS) to reduce the cost of energy spending using RTP and with the recent expansion of advanced metering infrastructure, real time pricing (RTP) schemes to be introduced in future retail electricity market [1]. This document suggests an original energy management advance for smart homes that combine a wireless network, based on Bluetooth small Energy (BSE), for the communication among home appliances and this paper approach to reducing peak load demand, electricity utilization charges with an increase console level of consumers [2]. This paper presents the operations of appliance are controlled in response to energy price signals to reduce the consumer's electricity bill whilst minimizing the everyday level of total energy while preserving ease level [3]. In this paper suggest to Wireless Sensor Networks (WSNs) and Power Line Communications (PLCs) are used in this work to realize a smart home control network. The goals are to reduce the impact of wireless intervention in a smart home organize network and needless energy consumption of a smart home [4]. This paper presents a load measurement plan for home energy organization system with energy demand time. The planned system to manage household loads according to their predefined precedence and guarantee the total household power spending below certain

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levels [5]. The goal of this paper the system is to encourage the consumer to use less energy during peak hours or to move the time of energy use to off peak times such as night time and weekend on demand time [6]. In this paper readily available an integrated solution to guess and re-engineer the electricity demand in a region at a given day/time. The system available in this paper expands DR to built-up loads by energetically scheduling and selfish appliances in each dwelling unit [7]. In our study, the Home Energy Management System (HEMS) is expected as one of the promising technologies to satisfy the demand. The HEMS assisted by a sensor network having an efficient power supply in order to be spreading around the people [8]. This paper presents a scheme architecture for load management in smart buildings which enables independent require side load management in the smart grid. Being of a structure composed of three main modules for permission control, load balancing, and demand response, thus allowing the integration of different energy sources, and ease maintenance and upgrading [9]. This paper describes a home energy management system based on power line communication. Elegant metering and power line message can provide full information of energy, using up patterns and intelligent controlling of appliances at home [11].

III. PROPOSED SYSTEM

In this paper proposed to implement automatic metering infrastructure using mesh topology and manage the power based on priority level and then automatically goes to power managed. The concept of this paper reduces the time delay for a lower priority task and Slicing of interrupt timings to improve the performances. Advantages of proposed system Meter reading taken automatically using ZIGBEE and GSM. Then Power cut achieved from EB office through wireless. Normal work happens at any time and external conditions. Occupies Less Manpower and High Accurate meter reading such as Customer service as well.

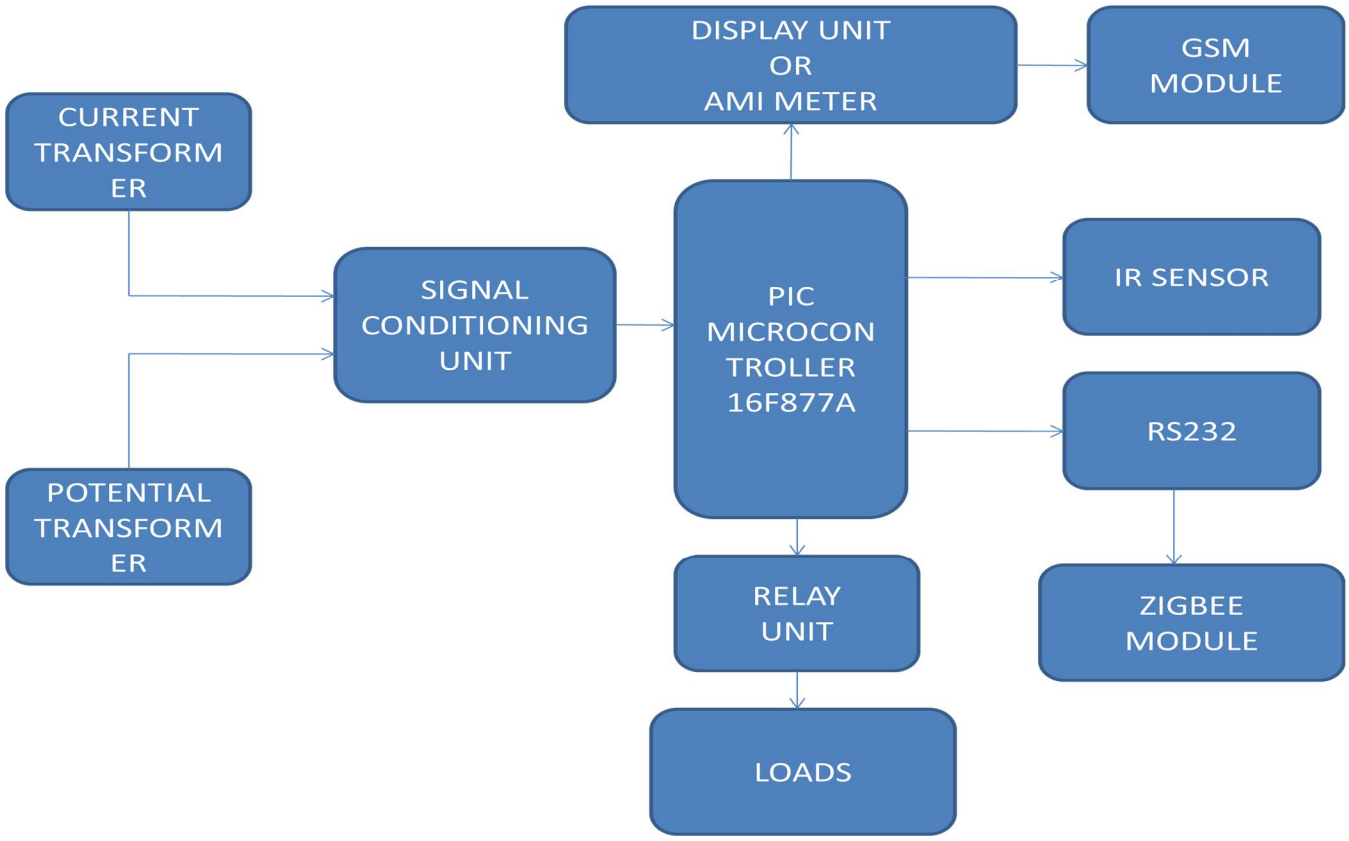

Fig.1 block diagram of proposed system

IV. DESCRIPTION OF BLOCK DIAGRAM

A.Microcontroller (PIC 16F877A)

1) Name Specification

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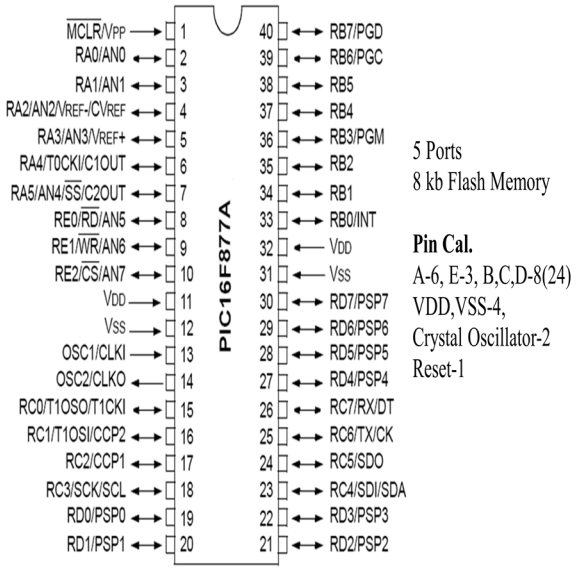
PIC---- Peripheral Interface controller
16---- Controller Family Identification

F---- Family

877----- Controller Series

A----- Advanced

PIN DIAGRAM of PIC



The PIC microcontrollers used for wide range application and then operating frequency range is 20MHz. It is a family of CMOS 8-bit flash controller. This type of processors has reduced instruction set and instructions are executed virtually in each cycle.

B.Current Transformer

A current transformer (CT) is used to measure alternating electric current. Current transformers, together with voltage (or potential) transformers (VT or PT), are known as device transformers. Current transformers are commonly used in metering and shielding relay in the electrical control industry. Current transformers are used extensively for measuring current and monitor the process of the power grid. Along with voltage leads, revenue-grade CTs drive the electrical utility's watt-hour meter on practically every building with three-phase service and single-phase services greater than 200 amperes.

C. Potential Transformer

Probable transformer or voltage transformer gets used in electric power scheme to step down the system voltage to a secure value which can be fed to low ratings meters and relays. Commercially accessible relays and meters used for protection and metering, are designed for low voltage.

D. Signal Conditioning

Signal condition can include amplification, filtering, converting, range matching, isolation and any other processes required to make sensor output proper for processing after conditioning.

E. Relay Unit

The relay is an electrically operated switch for use Electro Magnetic type Relay. Many relays use an electromagnet to function a switching device mechanically, but other operating principles are also used. Relays are used where it is essential to manage a circuit

by a low-power signal.

F. RS232

In telecommunications, RS-232 is typical for serial binary data interconnection between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating equipment). It is commonly used in computer serial ports.

G. ZIGBEE

The TARANG-F4 module is using this paper. It is a high performance 2.4GHz Zigbee. Zigbee is used to transmit data from node terminal to EB station. Using XTU we can modulate the properties of Zigbee.

1) Features Of ZIGBEE: 100mW output power
Long range: 4000 m

Low power operation.

V. DESCRIPTION OF SOFTWARE TOOLS

MPLAB IDE (compiler)

Proteus 8 Professional

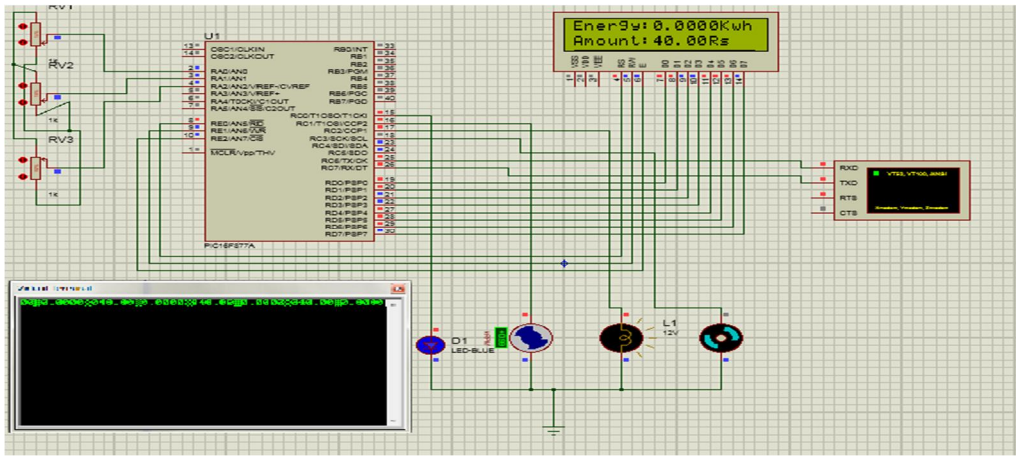
A. MPLAB IDE (Compiler)

The Embedded C program for the necessary control operation of the PIC microcontroller is written using the MPLAB Software and Program is complied to detect the error in the coding.

B. Proteus 8 Professional

It is used to verify the proper operation of our proposed system through simulation. Initially, all the devices are connected according to the circuit diagram and then the Embedded C coding is dumped in the microcontroller for necessary operation of the controller.

VI. SIMULATION RESULT



The top of figure gives the replicated output using PROTEUS. Here to show two motors are used. Then the highest priority load which is the light system is given by the radiant lamp connected. Now when the controller receives a low peak to average signal, then it will turn ON the motors. The demand time increases the home energy system will be given in the signal of high max out to average ratio. Thus, it will turn OFF the lowest priority loads then turn ON the highest priority loads.

VII. CONCLUSION

This paper presents an automation of home energy management system and energy monitoring on Zigbee and GSM Module. The

simulation results show that the proposed automation of energy management system based on the smart grid can successfully and proactively control and manage the operation of various appliances to keep the total family consumption below a specified demand limit. Simulation results specify that at a low demand limit level, the system is able to keep the total family demand below the limit, but customers may need to sacrifice their comfort level to some extent. However, it is expected that the results of work will benefit of electric distribution and exact response aggregators in providing an exact and deep accepting into the limits and achieve the power cut on demand response time.

REFFERENCES

[1] Cynthujah Vivekananthan, Student Member, IEEE, Yateendra Mishra, Member, IEEE, and Fangxing Li, Senior Member, IEEE," Real-Time Price Based Home Energy Management Scheduler," IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 30, NO. 4, JULY 2015.

[2] Mario Collotta, Member, IEEE, and Giovanni Pau," A Novel Energy Management Approach for Smart Homes using Bluetooth Low Energy," IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, VOL. 0, NO. 0, SEPTEMBER 2015.

[3] Serene Althaher, Student Member, IEEE, Pierluigi Mancarella, Senior Member, IEEE, And Joseph Mutale, Senior Member, IEEE," Automated Demand Response from Home Energy Management System under Dynamic Pricing and Power and Comfort Constraints," IEEE TRANSACTIONS ON SMART GRID, VOL. 6, NO. 4, JULY 2015.

[4] Mingfu Li and Hung-Ju Lin," Design and Implementation of Smart Home Control Systems Based on Wireless Sensor Networks and Power Line Communications," IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, VOL. 62, NO. 7, JULY 2015.

[5] Dhinakar P1, John Clement Sunder A2, Ramesh S M3, Vignesh Kirubaharan D4," Load Measurement in Home Energy Management System with Demand Response," International Advanced Research Journal of Science, Engineering and Technology Vol. 1, Issue 3, November 2014.

[6] P. Dhinakar A. John Clement Sunder, S. M. Ramesh D. Vignesh Kirubaharan," Demand Response Based Home Energy Management System," International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 3, Issue 11, November 2014.

[7] Yusuf Ozturk, Senior Member, IEEE, Datchanamoorthy Senthilkumar, Member, IEEE, Sunil Kumar,Senior Member, IEEE, and Gordon Lee, Senior Member, IEEE," An Intelligent Home Energy Management System to Improve Demand Response," IEEE TRANSACTIONS ON SMART GRID, VOL. 4, NO. 2, JUNE 2013.

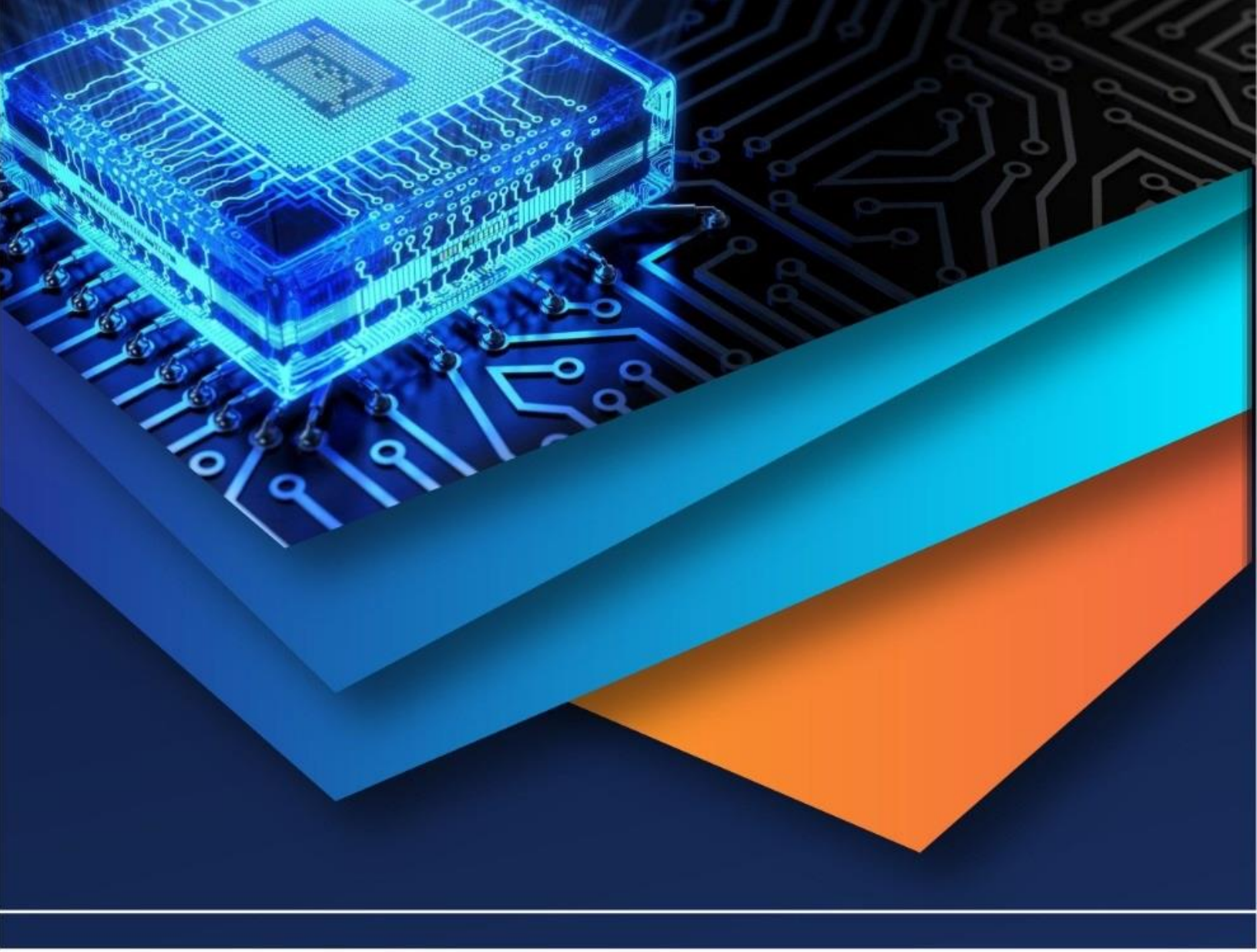
[8] Takashi Yoshikawa and Shota Saraya," HEMS Assisted by a Sensor Network Having an Efficient Wireless Power Supply," IEEE TRANSACTIONS ON MAGNETICS, VOL. 49, NO. 3, MARCH 2013.

[9] Giuseppe Tommaso Costanzo, Student Member, IEEE, Guchuan Zhu, Member, IEEE, Miguel F. Anjos, Member, IEEE, and Gilles Savard," A System Architecture for Autonomous Demand Side Load Management in Smart Buildings," IEEE TRANSACTIONS ON SMART GRID, VOL. 3, NO. 4, DECEMBER 2012.

[10] Francisco Jose Bellido-Outeirino, Member, IEEE, Jose Maria Flores-Arias, Member, IEEE, Francisco Domingo-Perez, Aurora Gil-de-Castro and Antonio Moreno-Munoz, Senior Member, IEEE," Building Lighting Automation through the Integration of DALIwith Wireless Sensor Networks," F. J. Bellido-Outeirino et al.: Building Lighting Automation through the Integration of DALI with Wireless Sensor Networks.

[11] Young-Sung Son, Topi Pulkkinen, Kyeong-Deok Moon and Chaekyu Kim," Home Energy Management System based on Power Line Communication," IEEE Transactions on Consumer Electronics, Vol. 56, No. 3, August 2010.

[12] Due-Man Han and Jae-Hyun Lim Member, IEEE," Design and Implementation of Smart Home Energy Management System based on ZigBee," IEEE Transactions on Consumer Electronics, Vol. 56, No. 3, August 2010.



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