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Multi Functional Board

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ABSTRACT: In most developing countries, collecting electricity utility meter readings and detecting illegal use of electricity is a very difficult and time-consuming task that requires a large amount of human resources. Energy monitoring systems using the Internet of Things (IOT) present an efficient and cost-effective way to wirelessly transfer information on the energy consumed by the consumer. Using IOT and telemetric communication techniques the aim of this study is to measure household electricity consumption and generate its bill automatically. In this paper, the use of GSM module provides notification feature via SMS. Working meters can be easily accessed through a web page designed by us. Current readings with costs can be viewed on the web page. Automatic on and off of the meter is possible. Apart from this, home automation will also be done using IOT technology in this project.

I. INTRODUCTION

Internet of Things (IOT) is a rapidly growing industry, which includes technologies such as "Smart and Safe House", "Smart City", "Virtual Marketing", "Communication and Navigation Equipment", "Virtual Engineering". Such technologies cover almost every segment in industry, business, healthcare, and consumer goods. IoT is one of the major trends in the IT industry. Internet of Things (IOT) is a new field which is developing rapidly now. Internet-related things are designed to make life more efficient and comfortable. Thanks to intelligence and communication, devices appear a new set of functions: monitoring, control, optimization, autonomy.

Connecting devices to the Internet provides new opportunities for both consumers and manufacturers. Consumers can control their costs and manage time, and producers can control the operation of devices, solve its maintenance problems more easily, as well as offer new revenue structures.

A key trend affecting the development of information systems in the energy sector is the smart grid concept. According to the smart grid concept, the priority direction of IT development in the energy sector in the coming years is the widespread introduction of smart (smart) meters. Smart electricity meters are provided with communication tools to transmit accumulated information using network technology to monitor and pay for utilities.

The concept of Internet of Things (IOT) us Enables common everyday devices to connect to each other through the Internet Connected devices can be analyzed remotely through the IOT concept. The IOT concept provides opportunities to create connections between the basic infrastructure and the physical world and computer based systems.

This concept is gaining importance with more and more wireless devices rapidly growing in the market. Hardware devices are interconnected over the Internet. The ESP 8266 Wi-Fi module used in the system provides connectivity to the Internet in the system.

Now-a-days the demand for electricity is increasing at a constant rate in the population and is being utilized for various purposes , agriculture, industries, household purposes, hospitals etc. So, it is becoming more and more complicated to handle the electricity maintenance Now-a-days the demand for electricity is increasing at a constant rate in the population and is being utilized for various purposes , agriculture, industries, household purposes, hospitals etc. So, it is becoming more and more complicated to handle the electricity maintenance

The system is designed on an Arduino micro controller . It can be structurally differentiated into three parts viz., controller, theft detection circuit and a Wifi unit. The controller performs the basic calculations and processes the information. Theft detection circuit provides information about any extra or theft load energy reading and the most important role is played by the Wi-Fi unit to send the information from the controller over the Internet. The Arduino

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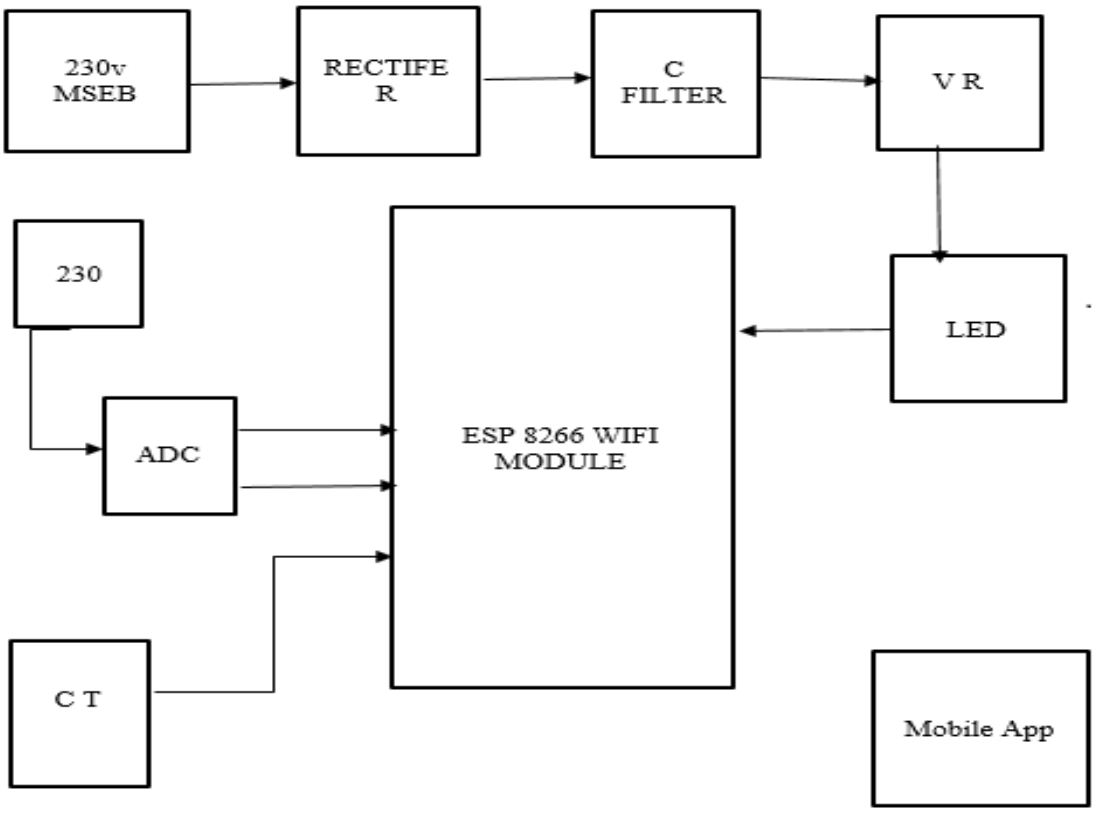
controller is programmed on the Arduino software IDE (Integrated Development Environment) which is a pre requisite to operate on the Arduino board. Its code is derivative of the C language .

II. SYSTEM MODEL AND ASSUMPTIONS

In this project we can monitoring the electrical parameter form single location. this project is help to improve the efficiency of electrical equipment and also help to reduce big losses. This project is used in many application like home ,industrial ,commercial etc.



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The data from the system is displayed on a webpage which can be accessed by both the consumer and service provider. The system is designed on an Arduino micro controller . It can be structurally differentiated into three parts controller, theft detection circuit and a WiFi unit. The controller performs the basic calculations and processes the information. Theft detection circuit provides information about any meter tampering and the most important role is played by the Wi-Fi unit to send the information from the controller over the Internet. The Arduino controller is programmed on the Arduino software IDE which is a prerequisite to operate on the Arduino board. Its code is derivative of the c language.

The block diagram consists of an Arduino UNO board, an ESP 8266 Wi-Fi module . The WiFi module is the main component used in the IOT operation. The centre piece being the Arduino board provides the connection between the different components of the proposed system . It is the core of the system which is necessary for the principle operations that are necessary to be carried out such as the automatic electricity billing and tampering detection inputs from the tampering circuit.

The load represents the devices that require the electricity to operate. The ac supply is connected to the system through the transformers to power the system. The Meter is also connected to the system to automate the power usage of the household. The readings from the energy meter are then processed and are updated over the Wi-Fi through the ESP 8266 Wi-Fi Module.

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3.4 List Of components

Sr. No.	Name of Components	Specification
01	Esp2688	
02	Step down transformer	230V to 12V
03	Rectifier	AC TO DC
04	C filter	PURE DC
05	Voltage regulator	12V TO 5V
06	ADC converter	
07	Load	230 V

- **ESP8266 :**

The ESP8266 is a popular low-cost Wi-Fi microchip, often used in Internet of Things (IOT) projects for its affordability and ease of use. It is widely used to connect devices to the Internet and enable communication between them. Processor: L106 32-bit RISC microprocessor based on Core Tensilica Diamond Standard 106Micro 80 or 160 MHMemory 32 KiB Instruction RAM, 32 KiB instruction cache RAM, 80 KiB user-data RAM, 16 KiB QTRAM, external-PIS system flash: up to 16 MiB supported (512 KiB to 4 MiB typically included)

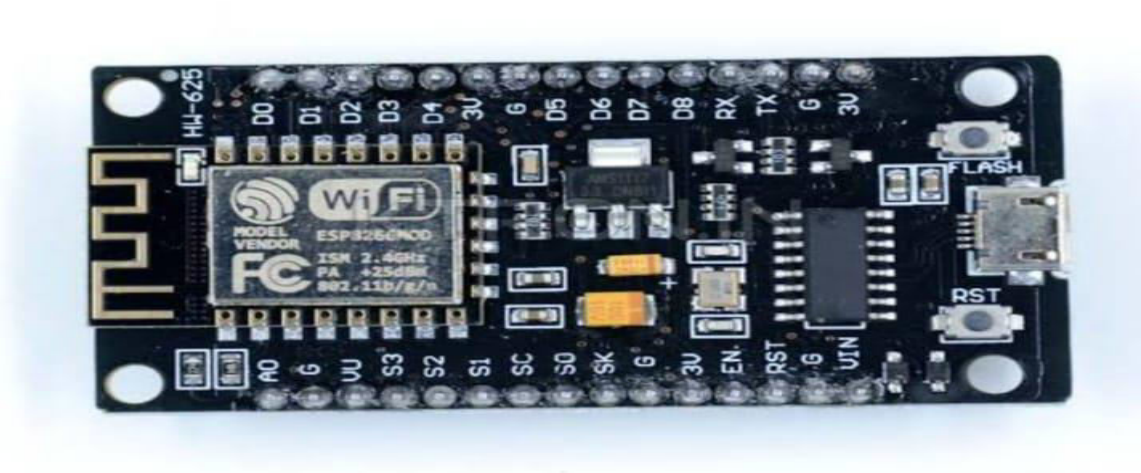

Fig-3.4.1 ESP2866

- **Step down transformer :**

A step-down transformer is a type of transformer that steps down the voltage from its primary winding to its secondary winding. It is commonly used to step down high-voltage electricity to a lower, safer voltage for use in homes, businesses, and various electrical appliances. A step-down transformer is a type of transformer used to step down a.c. voltage or a.c. source. The function of a step-down transformer is to convert the high voltage from the primary coil to a low voltage in the secondary coil. In a step-down transformer the number of turns in the primary coil is greater than the number of turns in the secondary coil. Step-down transformers are used in mains adapters and are used in mobile phones, stereos, CDs, etc. Players etc.

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Fig-3.4.2 STEP DOWN TRANSFORMER

➢ **Rectifier :**

A rectifier is an electrical device that converts alternating current (AC) to direct current (DC). It is commonly used in power supplies for electronics to ensure that current flows in one direction. There are different types of rectifiers including diode rectifiers and semiconductor rectifiers such as silicon-controlled rectifiers (SCRs) and bridge rectifiers. A rectifier is an electrical component that converts alternating current (AC). Converts to direct current (DC). A rectifier is like a one-way valve that allows current to flow in only one direction. The process of converting AC current into DC current is called rectification.

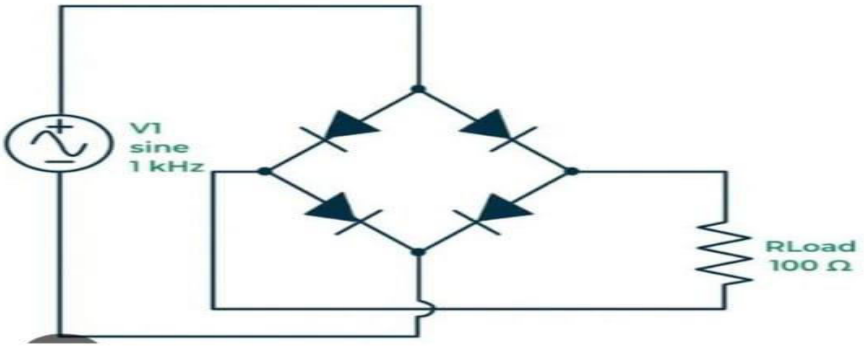

Fig-3.4.3 BRIGDE RECTIFIER

➢ **C filter :**

Capacitor filters, often denoted by the letter "C," are used in electronic circuits to filter out certain frequencies by allowing AC signals to pass through while blocking DC signals. They're commonly used in power supplies to smooth out the output voltage.

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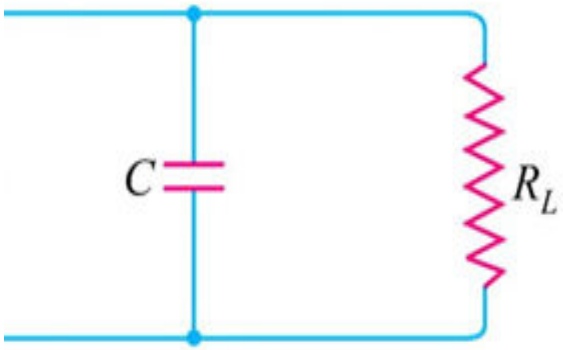

Fig-3.4.4 C FILTER

➢ **Voltage regulator :**

A voltage regulator is a device that maintains a constant output voltage despite changes in input voltage or load conditions. It ensures that the voltage supplied to a circuit or device remains within a specified range, which is crucial for the proper functioning of electronic systems. Voltage regulators are commonly used in power supplies, automotive systems, and electronic devices to ensure stable operation and protect sensitive components from damage due to voltage fluctuations.

Fig-3.4.5 VOLTAGE REGULATOR

➢ **ADC converter :**

An ADC (Analog-to-Digital Converter) is a device that converts continuous analog signals into discrete digital numbers. This conversion process is necessary in digital systems where signals need to be digitally processed or stored. ADCs are commonly used in a variety of applications such as digital audio recording, temperature sensing, and sensor data acquisition in industrial automation.

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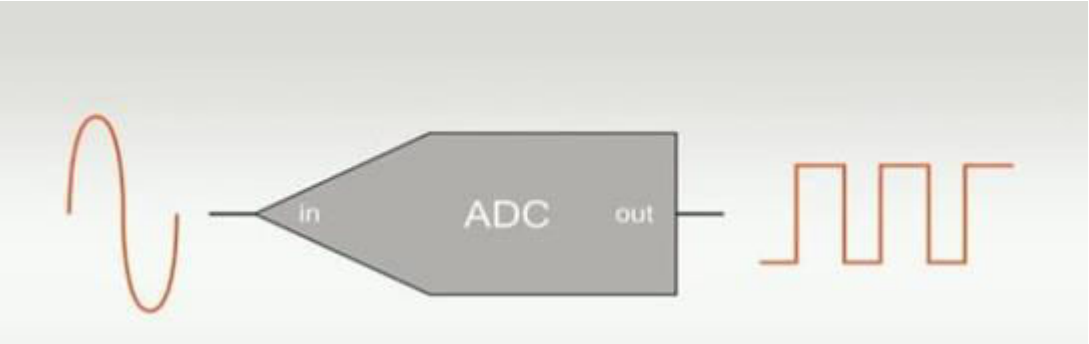


Fig-3.4.6 ADC CONVERTE

III. NECESSITY

Remote monitoring: IoT devices can remotely monitor electrical parameters such as voltage, current, power factor and frequency, enabling real-time monitoring from anywhere. Energy Management: By collecting data on electrical parameters, IOT systems can analyze energy consumption patterns and optimize energy use, thereby saving costs and improving efficiency. Predictive Maintenance: Continuous monitoring of electrical parameters can help predict equipment failure or maintenance needs, allowing for proactive maintenance scheduling and minimizing downtime.

Safety and Security: IOT devices can detect abnormal electrical parameters that may indicate hazards such as overloading or short circuits, enhancing safety.

Smart Grids: In smart grid systems, IOT devices to optimize power distribution, reduce losses can monitor and control electrical parameters to make and integrate renewable energy sources. Home Automation: IOT devices can be used in smart homes to monitor electrical parameters and optimize energy consumption for appliances, lighting and HVAC systems. Overall, an IOT-based system They provide a scalable and efficient way to monitor and manage electrical parameters, offering benefits in terms of energy efficiency, safety and operational efficiency.

IV. RESULT

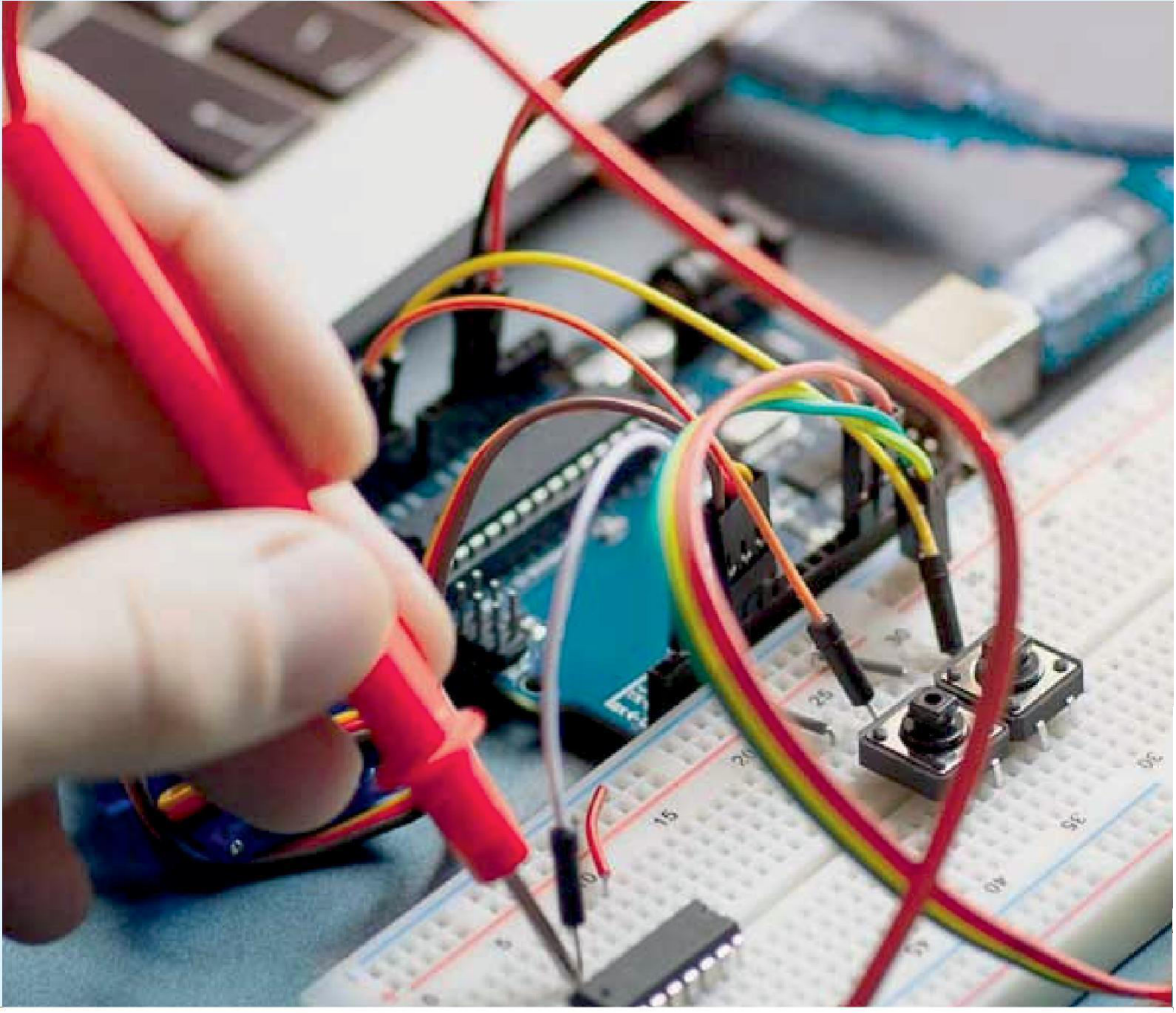
This multifunction board shows live parameter's live voltage, current, power, Power factor of connected load through IOT on mobile application from remote distance. It shows parameter on live project, Magnitude of voltage 230 volt, Current 0.60 Amp, Power is 131 watt & power factor is 0.95 lagging.

REFERENCES

[1] Landi, C.; Dipt. di Ing. dell"Inf., Seconda Univ. di Napoli, Aversa, Italy ; Merola, P. ; Ianniello, G, "ARM-based energy management system using smart meter and Web server", IEEE Instrumentation and Measurement Technology Conference Binjiang, pp. 1 – 5, May 2011

[2] Garrab, A.; Bouallegue, A.; Ben Abdallah, "A new AMR approach for energy saving in Smart Grids using Smart Meter and partial Power Line Communication", IEEE First International Conference on Renewable Energies and Vehicular Technology (REVET), pp. 263 – 269, march 2012

[3]Darshan Iyer N, Dr. KA Radhakrishnan Rao, "IoT Based Energy Meter Reading, Theft Detection & disconnection using PLC modem and Power optimization ",IRJET, (2015)



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