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IoT-based Smart Energy Meter System based on Arduino

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Abstract: A worker from the power board stands in front of our house, reading the energy metre and handing over the bills to the house owner every month.This is simply a reading from the metre. According to such reading, we must pay the expenses.The most significant downside of this method is that it requires someone to travel from area to area, reading the metres of each property and handing them the bills.The paraphraser in illBot takes your sentences and alters them, allowing you to swiftly revise and rewrite your text! Many errors occur, such as an excess bill amount or a notification from the power board despite the fact that the payments have been paid. To overcome this problem, we designed a strategy that eliminates all middlemen, including the service provider itself, between the consumer and the service provider. A person from the power board stands in front of our house, reading the energy metre and handing over the bills to the house's owner every month. This is only the meter's reading. According to such reading, we must pay the expenses. The most significant downside of this method is that it requires someone to travel from area to area, reading the metres of each property and handing them the bills. The article proposes a technique for users to use "Thing Speak" to monitor metre readings, control their energy consumption, and keep track of their energy metre payments. The system is built with an Atmega328P microcontroller and an ESP8266 Wi-Fi module.The base for creating and implementing a system is IOT. This system does not require the replacement of the energy metre, but we associate it with the installed energy metre that benefits the consumer (Internet of Things). The meter's real-time data will be downloaded and uploaded to the 005A'ThingSpeak' IOT cloud platform.

Keywords: Smart energy meter, wi-fi module, IOT, ARDUINO etc.

1. INTRODUCTION

Wireless technology is one of the many innovations that have occurred in modern life. This is important in automatic equipment and reduces human labour with the help of a microprocessor. A person from the power board stands in front of our house, reading the energy metre and handing over the bills to the house's owner every month. This is only the meter's reading. According to such reading, we must pay the expenses. The most significant downside of this method is that it requires someone to travel from area to area, reading the metres of each property and handing them the bills. Many times, even when the invoices are correct, problems such as an excess bill amount or a notification from the power board occur. This study uses wireless technology for an Automatic Meter Reading system to tackle the challenges mentioned above. The suggested method communicates between the Electricity Board and the consumer section using the Internet of Things (IOT), conveying overall customer electricity usage, each load's power consumption, and bill information calculated with a microcontroller.

The energy metre shows and transmits information about the number of units used. The energy metre displays the number of units utilised and transmits the information to both the customer and the electricity board, eliminating manpower requirements. With the proliferation of wireless gadgets on the market, the concept is gaining traction. It uses the internet to link the hardware devices together. The Internet of Things (IOT) is a network of physical objects or "things" containing electronics, software, sensors, and network connectivity that collect and share data.IoT allows things to be detected and controlled remotely through existing network infrastructure, allowing for more direct integration between the physical world and computer-based systems, resulting in increased efficiency, accuracy, and cost savings. In the IOT sense, heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring, or field operation devices that assist firefighters in search and rescue operations are all examples of "things." With the help of sensors, these gadgets acquire useful data.

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2. PROPOSED WORK :

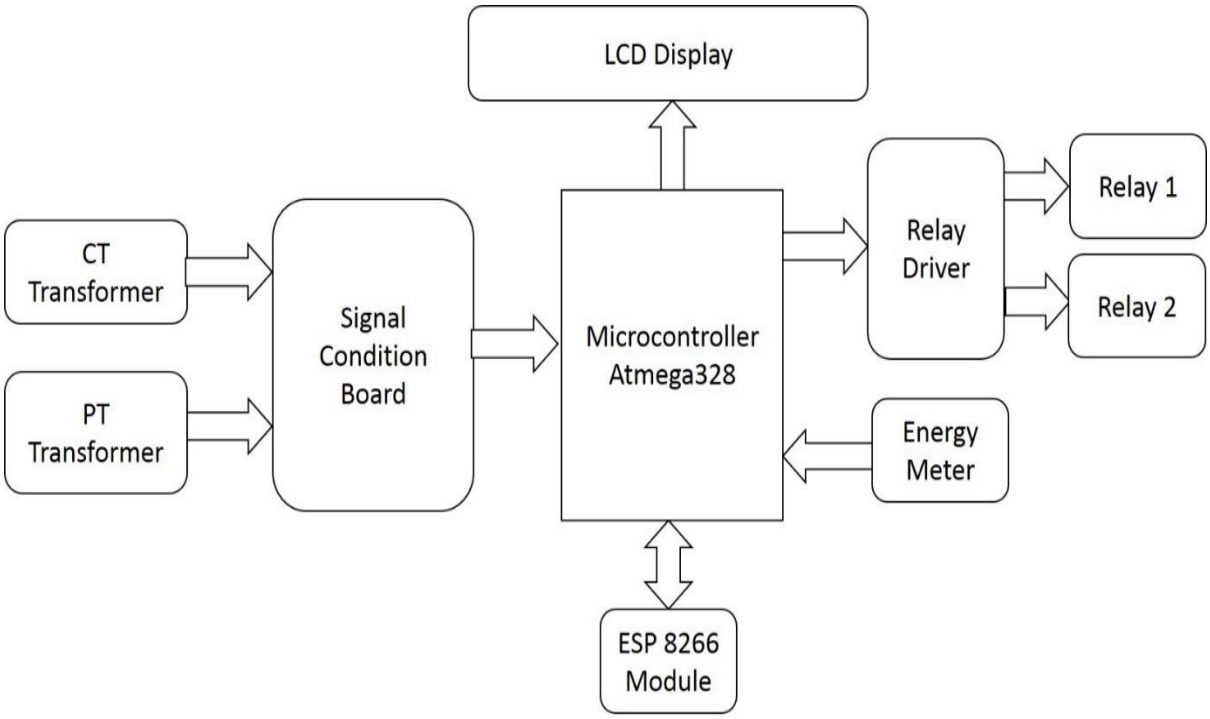

Fig.1: Block Diagram of Proposed System

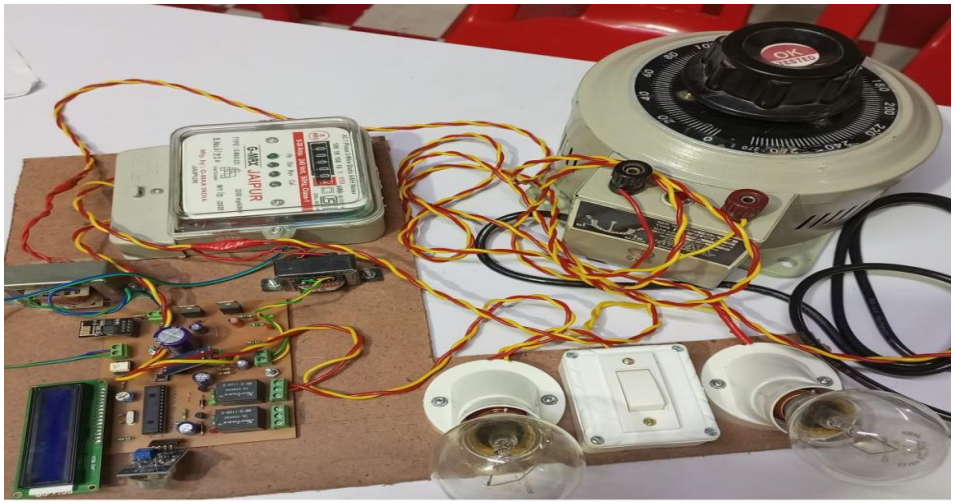

Fig.2:Hardware System

The project's major goal is to create an IoT-based energy metre reading that can be shown in a chart and gauge format over the internet for units consumed and cost. We used a digital energy metre with a current and power transformer that is connected to a microcontroller via a signal conditioning board for this creative project. Each time the metre LED flashes, the signal conditioning sends a reading to the programmed microcontroller. This reading is taken by the microcontroller and sent to the cloud through ESP 8266. The ESP8266 is a Wi-Fi module that connects the microcontroller to the internet. The data is serially delivered from the ESP8266 to the ideas speak web page, resulting in a global display.

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3.RESULT:

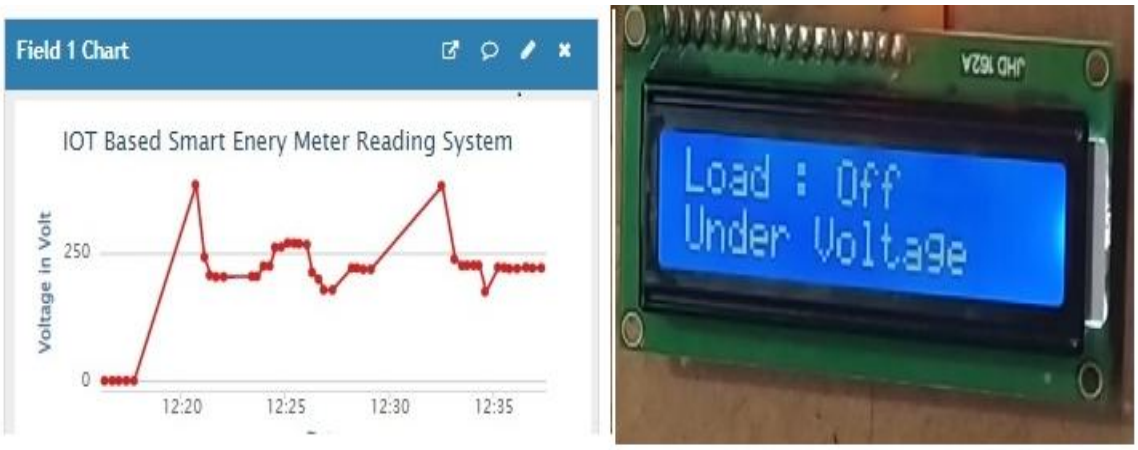

Fig3:Voltage in Volt VS Date With LCD

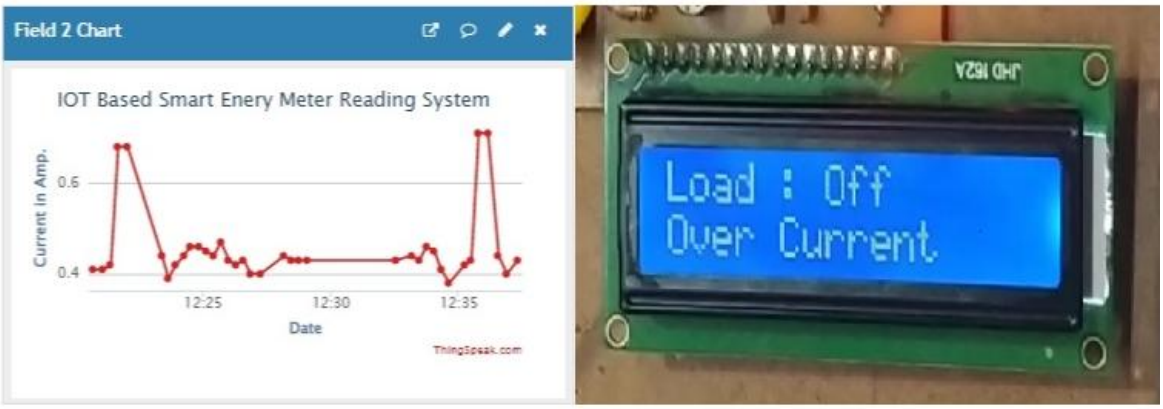

Fig4:Current in Amp. VS Date With LCD

Fig5:Fire Detection VS Date With LCD

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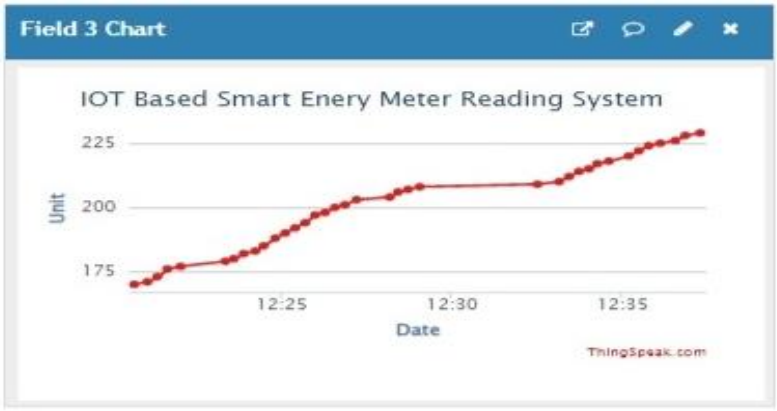

Fig6:Unit VS Date

Fig7 : Load VS Date(Load 1-ON &0-OFF)

4. DISCUSSION:

The graph of pulse count versus date is shown in this diagram. We're using the Thingspeak.com website to receive the password and ID, as well as access to the channel.

A graph of voltage in volts versus date is shown in Figure 3. Because the voltage is low, the load is turned off and the LCD is displayed if the voltage is less than 200. The graph depicts the field level of voltage count VS date, as well as the Tuesday, April 19th, 2022, voltage of 219.32v and time of 12:37:19.

And keep track of how many pulse count the meter reads.

The graph of Current in Amp VS Date is shown in Figure 4. If the current is greater than 0.7Amp, the load is turned off and the LCD is displayed because the current is too high. The graph depicts the field level of current count versus date, as well as the Tuesday, April 19th, 2022, current in 0.43 and time 12:37:19 at a certain time.

And keep track of how many pulse count the metre reads

On an LCD display, Figure 5 depicts a graph of Fire Detection vs. Time. The load is turned off and the LCD is displayed because there is a continuous leak of LPG gas. The graph shows that load 1 is fired and load 0 is not fired as a function of time, as well as the date of Tuesday, April 19th, 2022, and the hour of 12:37:19.

In Figure 6, we have a graph of Unit vs. Date. The graph depicts the Unit:229, as well as the time 12:37:19 on Tuesday, April 19th, 2022. The graph of Load 1-ON and 0-OFF VS Date is shown in Figure 7. The graph shows that load 1 is ON and load 0 is OFF, as well as the time 12:37:19 on Tuesday, April 19th, 2022.

The meter reading tells you how much pulse count you have.

5. CONCLUSION:

The designed smart energy metering system has demonstrated its ability to accurately measure energy metres. The project's entire design, which included under voltage, overcurrent, and fire detection, took a reasonably scientific approach. It has been accomplished to display IOT-based energy meter readings for unit utilized and cost thereon via the internet in graphical gauge formats on the item talk website. As a result, this project can educate management about squandered time and unnecessary trips, as well as bookkeeping and billing, because it provides an exact accounting of units driven due to the prevention of fraud.

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