DIY Real Time Based Energy Meter

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Abstract- The DIY (Do It yourself) is a new concept of Energy Meter which can calculate the energy consume based on Real time calculation technique. It can be controlled, operated and monitored from anywhere at any time when it is essential. As with the advancement of research and technology a new concept of Prepaid Energy Meter is on demand as the load are variable of different users. DIY meter will be equipped with an indicator which will give alarm and indicate Recharge message in the LCD (Liquid Crystal Display) of the Meter as well as DIY meter app. This meter is equipped with WI-FI, Infrared, Bluetooth, I.o.T and A.I which will send or received message to the users. The amount that has been recharged will be decreases as per the electricity consumed by the users. DIY has three level of amount indicators that is 50%, 10% amount left and when it reaches zero then current will be disconnected automatically. DIY will reduces the energy losses and will be beneficial to both the consumers and the supplier (electricity board) up-to a large extent.

Indexed Terms- DIY, LCD, Prepaid Energy Meter, Indicator, Consumers, Suppliers

I. INTRODUCTION

As we are moving towards the modernization and day by day new technologies and innovation are going on across the globe. In the field of Energy Meter lots of changes are going on to narrow the gap between the consumers and the suppliers. The journey of Energy meter which starts from analog after that digital and then comes smart energy meter. This all things became possible due to the effect of modernization as we all are living in the modern world which is based on Automation. Now a days no one wants to depend on manpower the want do live luxurious life which automation has made possible up-to many extent. We still faces problem in transmission, distribution, electricity bill generation and energy consumption. We all know that electricity plays a vital or crucial role in the development of our country. In our country the Transmission and Distribution of electricity is not balanced i.e. in many area there is zero power cut on the other hand in whole day currents comes for not more than an hour. To manage this situation DIY is used in such a way that all the consumers can able to consume or use electricity according to their requirements and can recharge the energy meter accordingly. The GSM (Global system for mobile communication) enable the system to send or receive the message about the unit consumed i.e. KWh in a day and accordingly the amount is deducted automatically. The main purpose of this DIY is:

- To reduce manipulation
- To narrow the gap between consumers and service providers
- To make energy intake prepaid
- To overcome the difficulties of billing
- To prevent hooking in lines
- To prevent power thefts

II. PROPOSED SYSTEM

The system proposed is the modification of digital energy meter which is equipped with LCD, I.O.T, Microcontroller, Bluetooth, PLC, Wi Fi and Arduino. This all will be interfaced with the energy meter or power meter of each and every house on individual which will have an unique code that will provide a remarkable support to the service provider and consumers up to some extent. In this system the heart

beat from the energy meter is transit to outocoupler and from here to the microcontroller. KWh energy consumed and the rate of 01unit charged i.e. fixed by the supplier has to be automatically which reflect on LCD and app of the consumer.
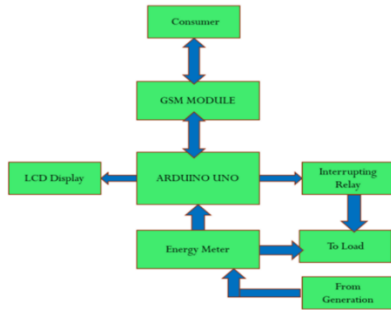
Proposed Diagram of GSM based Energy Meter

The diagram shows the conceptual way of the working methodology of DIY based energy meter. When energy meter is connected with the circuit then it will start measuring the current, voltage, frequency, power factor and energy consumed of the house entire circuit. The IoT based app must be connected with Wi-Fi for it to transmit the data. A part from this Arduino Uno which is additionally connected will display the reading and reflect the amount remaining in the LCD and in the installed app. The users can reset and can update the app when any change will be provided by the service provider. A converter is used in the DIY system which will communicate the data with the microprocessor of the system. As the system starts working with the programme fed by the supplier.

III. COMPONENT LAYOUT

The entire system is automated based system which alerts the user when the amount is low and if the user will not recharged the meter it will automatically get disconnected.

Arduino Code:
cpp

```cpp
const int buttonPin = 2;    // pin number for the push button
const int ledPin = 13;      // pin number for the LED

int buttonState = 0;        // variable for reading the push button status
void setup() {
 // initialize the LED pin as an output:
 pinMode(ledPin, OUTPUT);
 // initialize the push button pin as an input:
 pinMode(buttonPin, INPUT);
}
void loop() {
 // read the state of the push button value:
 buttonState = digitalRead(buttonPin);

 // check if the push button is pressed. If it is, the buttonState is HIGH:
 if (buttonState == HIGH) {
  // turn LED on:
  digitalWrite(ledPin, HIGH);
 } else {
  // turn LED off:
  digitalWrite(ledPin, LOW);
 }
        }
```
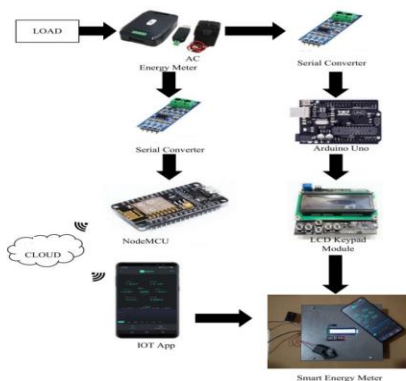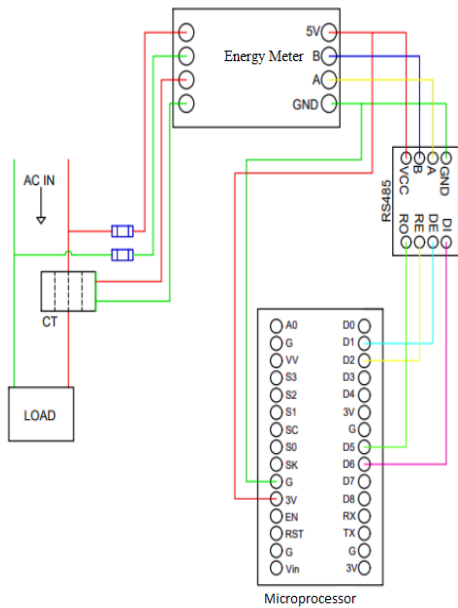
Steps:
1. Set up your components on the breadboard according to the circuit setup.
2. Connect your Arduino Uno to your computer using a USB cable.
3. Open the Arduino IDE and create a new sketch.
4. Copy and paste the above code into the Arduino IDE.
5. Select the appropriate board (Arduino Uno) and port from the Tools menu.
6. Upload the code to your Arduino Uno by clicking the upload button (right arrow).

IV.   WIRING DIAGRAM LAYOUT

Microprocessor

Energy Meter to Arduino Uno Wiring Diagram

V.   RESULTS AND DISCUSSION

48 hours Test Data of Household using IoT App

DATE	TIME	Voltage (V)	Current (A)	Power (W)	Energy (kWh)	Frequency (Hz)	Power Factor
7/18/24	11:00 PM	220.900	0.796	162.10	0.007	60.000	0.940
	5:00 AM	228.300	0.574	125.30	0.885	60.100	0.980
7/19/24	11:00 AM	217.700	0.313	64.40	1.619	60.000	0.950
	5:00 PM			OFFLINE			
	11:00 PM	221.800	0.896	186.10	4.355	60.200	0.940
	5:00 AM	225.800	1.361	275.30	5.560	59.900	0.900
7/20/24	11:00 AM	216.400	0.486	98.70	6.863	60.000	0.940
	5:00 PM	224.000	0.334	62.10	7.875	60.200	0.840
	11:00 PM	222.610	0.854	171.72	8.995	59.949	0.904

System Ready   LCD Display of total units and balance

CONCLUSION

1. This paper is enable the researchers to implement energy meter with Arduino Based AI and IoT with real time monitoring system.

2. Here we can able to develop a program and successful executed to display the measured data through IoT based Application in an smart phone with LCD Display.

The Application based and LCD can show are the same unit to the kilo-watt hour meter for the household individual system.

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