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WIRELESS AUTOMATIC METER READING USING IoT

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ABSTRACT

The AMR (Automatic Meter Reading) system is a system used for reading energy consumption remotely. This wireless AMR system is based on wireless network and Internet of Things (IoT) technology to solve the problems in existing AMR system. This paper presents the simple low cost wireless GSM energy meter and it has remote access of existing meter. It saves huge human labour. A GSM based wireless module for communication is integrated with electronic energy meter and it has remote access over the usage of electricity**.** The complete monthly usage of electricity and due bill is messaged back to the customer after processing these data using GSM. The due bill is also updated in the sever using Wi-Fi.

Keywords **– Automatic Meter Reading (AMR), Global System for Mobile Communication (GSM) , Internet of Things (IoT), Short Messaging System (SMS)**

1. INTRODUCTION

There is incorporation of mobile technology into MSEB automation system due to the rapidly advancing mobile communication technology and the decrease in costs. We propose a system that collects the energy consumption from residential as well as corporate zones and send it directly to the central server where processing is done on that data for preparation of bills. Automatic meter reading system is mainly consists of Arduino UNO, ESP8266 Wi-Fi module, light to voltage converter, GSM module 900. Load is calculated and power consumed is measured through energy meter. The power consumed is measured and updated to the server using IoT. Internet of Things(IoT) is a system of interrelated computing devices, mechanical and digital machines that are provided with unique identifiers and the ability to transfer data over a network without requiring human to human interaction.

2. EXISTING METHOD:

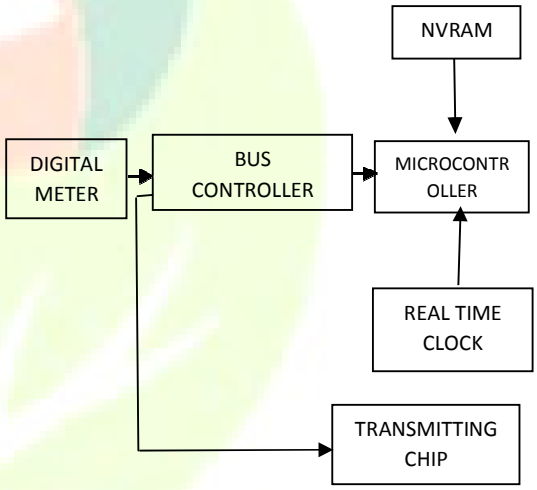

Fig: Transmitter & Central section

The GSM based smart automatic energy meter (GSEMS) presented in this paper absorbed many advanced study results in computer technology and communication technology. The GSM networks plays an important role because it has good coverage facility and to manage fault tolerance The unit-reading task can be finished at the management authority by using this system. The energy resources segment can monitor the utilization of power in order to improve the effectiveness of power. It's the basic to appreciate automatic distribute of energy resources.

The system supports many significant excellences, such as security, accuracy at the higher level and low-expenses. For a long distance transmission GSM telecommunication has shown excellent performance at any conditions.

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3. PROPOSED SYSTEM:

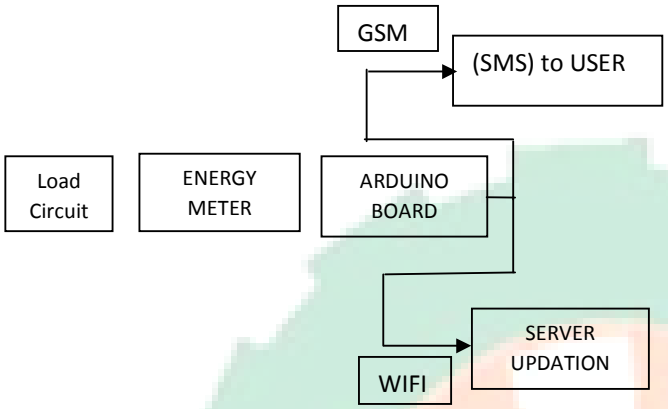

Fig: Proposed system

In proposed system, we replaced the traditional meter by metering module which consist of metering IC and Arduino which scans the energy meter automatically after every month and transmits this collected data to the remote station through the GSM network. After receiving this data is stored in the database and process on it for the creation of bills. As soon as bills are generated, it will send to the consumers via GSM network.

SYSTEM DESIGN

This ARM energy meter is constructed using the Arduino, a TSL 257, GSM modem and . Energy consumed by load is calculated using the pulses in the energy meter. The pulses are counted with TSL 257 light to voltage converter. 1unit = 3200 pulses/kwh ie., 3200 counts is taken as 1 unit. Arduino Uno is used for computation and notification. In energy meter LED blinks depend on the load. Using TSL257 the LED count input is given to Arduino UNO is programmed for tariff calculation. At due date the tariff is calculated and notified to user through SMS from GSM module. GSM module is used for notification to user through SMS. ESP8266Wi-Fi module is used for server updation. Due bill calculated by Arduino is updated to the server. The system design can be discussed as two broad categories, Hardware implementation and software implementation.

4. HARDWARE IMPLEMENTATION:

i. Power Supply

Power supply is provided to microcontroller and other device from direct ac lines or from AC to DC adapter.

ii. Arduino UNO :

The Arduino UNO board is based on the ATmega328. It is the central part of project. It takes the role of Communication, Calculation, & Server updation. Program for Tariff calculation and notification to user is done here. Tariff Program is based on Consumption 1A. GSM notification. Is done through AT comments. Power supply ranges from (7-12V). Input & Output pins are categorized into two types Power supply pins (5V, 3.3V and GND). Serial communication pins Rx and TX (0 and 1). It has memory of 32 KB Flash and 2KB of SRAM

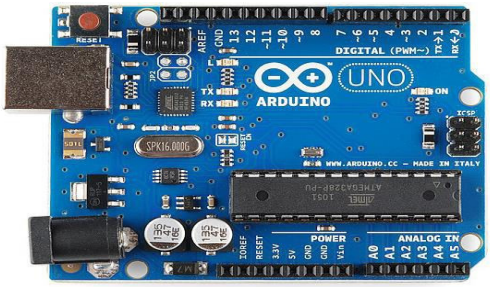

Fig: Arduino UNO

iii. ESP8266 Wi-Fi Module :

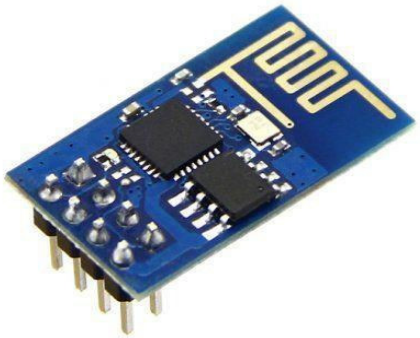

Fig: ESP8266 Wi-Fi Module

The ESP8266 is a chip with full TCP/ IP stack and MCU (micro controller unit). It has memory of 64KB instruction, 96KB data. The supply ranges is 3.3v. It has 16GPIO pins and one 10 bit ADC. The ESP8266 is used as a Wi–Fi module which is used to access the server. The connection with UNO is UART.

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iv. GSM MODULE SIM 900:

Notification to users is done through GSM module .GSM module sim 900 MHz is used in this system.

Fig: GSM MODULE

The Supply voltage range is (12V). Operating temperature -40 to 80 degree Celsius. Default Baud Rate 9600.Control through AT commands. Communication between Arduino and GSM is UART through the Rx and Tx pins

v. Light to Voltage converter

TSL 257 is a precision light to voltage convertor. Combination of photodiode and amplifier. The LED in the energy meter is used to find the amount of energy consumed. LED's pulse depends on the load. TSL 257 converts the pulses to voltage for counting. Supply is given to TSL 257 from Arduino. Output of TSL 257 is connected to Arduino. It has three leads input, output, GND. It has internal amplifier. Output voltage directly proportional to light intensity. Supply voltage range (2.7 – 5.7). Output range max (2.4 v), min (1.6v).

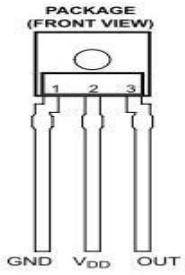
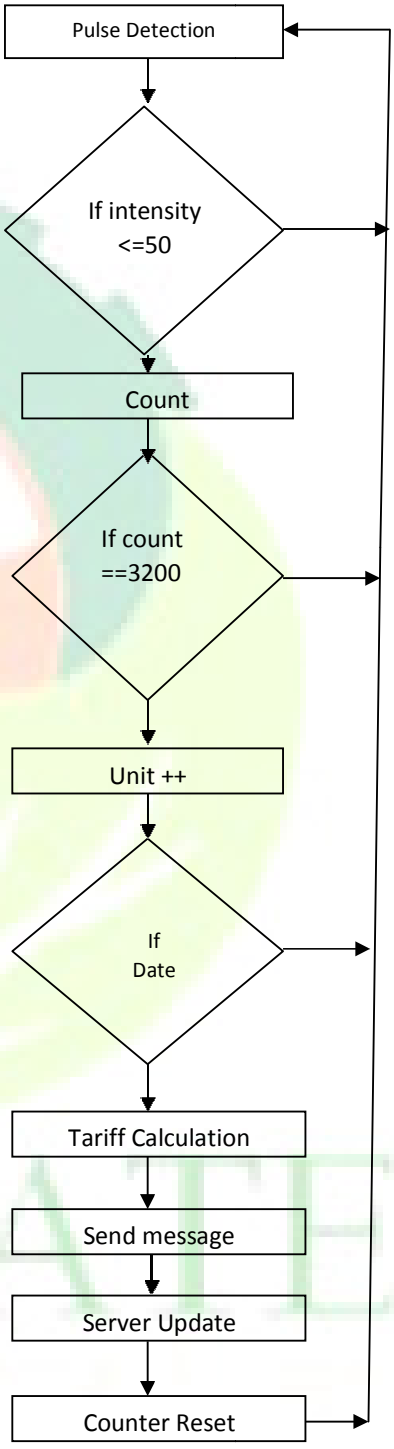


Fig: Light to voltage converter

5.

SOFTWARE IMPLEMENTATION:



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6. CONCLUSION :

Different Electronic meters have been developed at the higher level. The GSM and IoT plays an important role because it has good coverage facility and to manage fault tolerance. In this system, it manages the energy flow. The proposed system is highly effective as it provides security, server updation, accuracy at the higher level. The collected data is transmitted to the centralized sever in very fast manner using IoT therefore this system will be able to calculates the bills instantly and send notification to the user through GSM module and IoT for server updation.

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