



Review paper on Internet of things based energy meter with load parameter analysis

Implementing Wi-Fi module with load parameter monitoring & data collection on cloud

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Abstract—This paper is review on “Internet of things (iot) based energy meter with load parameter analysis” In the most of the developing countries, the effort of collecting electricity utility meter reading and detecting illegal usage of electricity is a very difficult and time consuming task which requires a lot of human resources. Energy meter reading and monitoring system using Internet of Things (IoT) present an efficient and cost-effective way to transfer the information of energy consumed by the consumer wirelessly as well as it provides facilities to detect the illegal usage of the electricity. Aim of this study is to measure electricity consumption in the household using IoT and telemetric communication techniques. Also this study aims to detect and control the energy theft. The microcontroller is employed to coordinate the activities with digital energy meter system and to connect the system to a Wi- Fi network and subsequently to the Internet and Server. A passive infrared sensor is engaged with the system to detect when any illegal alteration happen in the metering system. In such case, system will send an alert to the server as well as it has the facility to disconnect and re-connect the electricity supply automatically. The proposed system is capable of continuously monitor and being notified about the number of units consumed to the energy provider and consumer. The energy consumptions are calculated automatically internet by using a network of Internet of Things.

Keywords:- Internet of Things (IoT), Microcontroller, Electricity theft, AMR or ARMS (Automatic Meter Reading System), IOT (Wi-Fi) as communication, Real Time Clock (RTC).

I. INTRODUCTION

The systems consists of a microcontroller Wi-Fi module, LCD display, V/I controller. EEPROM, RTC. In the system Microcontroller continuously reads the energy meter using the Wi-Fi module. It is used to transmit the information to the receiver. Irregularities of bills and reduce man power are overcome by AMR system in high buildings and luxury housing plots. system the e-meter will sense the energy consumed and automatically this method is more useful for the current scenario. The increase in power or energy consumption is automatically increase the cost to avoid these types of problem this paper will be helpful to protect our house more save and save more energy and cost. Cayenne.com is used as a cloud server to communicate between the consumer and Electricity board. Voltage and current values are sensed by the sensor and stored in the server. This system enables the electricity department to read the meter readings monthly without a person visiting each house. This can be achieved by the use of Arduino unit that continuously monitor and records the energy meter reading in its permanent (non-volatile) memory location. This system continuously records the reading and the live meter reading can be displayed on webpage to the consumer on request. This system also can be used to disconnect the power supply of the house when needed.

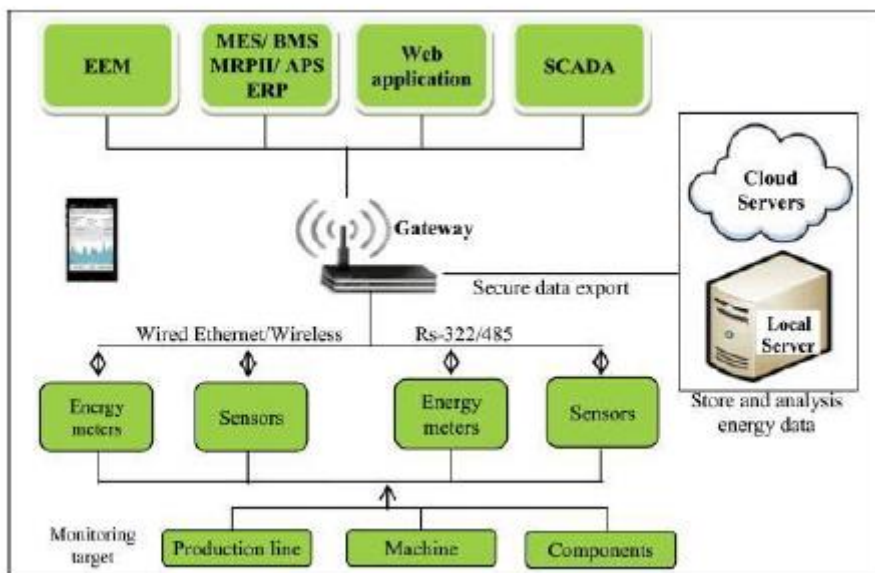


Fig.1. block for Energy Monitoring Using IoT

II. SYSTEM ARCHITECTURE

A. Energy Meter

Electromechanical meter consists of an aluminum disc positioned between two electromagnets, one of whose coil is connected to the load and is the current coil and the coil of another electromagnet is connected to the supply voltage. The interaction of the fluxes between the two coils is responsible for providing a torque to the disc, which starts rotating, with the revolutions proportional to the load current. The counter records the number of revolutions and displays them, which indicates the energy consumed. We are converting voltage or current into signals measured by energy meter which fed to Wi-Fi module.



Fig.2. energy meter

B. Controller

A controller collect data from energy meter via sensing devices . according to collected signal data controller can take decision fed signal to wifi module which connected main cloud server.

C. RTC

A Real Time Clock (RTC) is used to reset the data and it'sstored in online and offline mode.

D. IOT Server

Iot or data server utilize for Voltage and current values which are continuously stored in server. Alerts can be scheduled in a server.

E. Wi-Fi Module

Wi-Fi module which appropriate for adding Wi-Fi usefulness to a current microcontroller venture by means of a Universal Asynchronous Transmitter Receiver (UART) serial association. The module can even be reinvented to go about as an independent Wi-Fi associated gadget.

F. Voltage Sensor

To get DC motion from an AC framework for contribution to a microcontroller, we are utilizing this voltage detecting circuit. The circuit gives a precise technique to making this DC flag. The voltage is detected by utilizing a potential transformer and the got flag is amended at the primary operation amp stage and enhancer at the second operation amp arrange.

G. Current Sensor

The current is detected from by utilizing current transformer and it is corrected at the main operation amp stage and enhancer at the second operation amp arrange

H. LCD

A Liquid Crystal Display (LCD) is additionally has 64 bytes of character-generator (CG) RAM. This memory is utilized for characters characterized by the client.

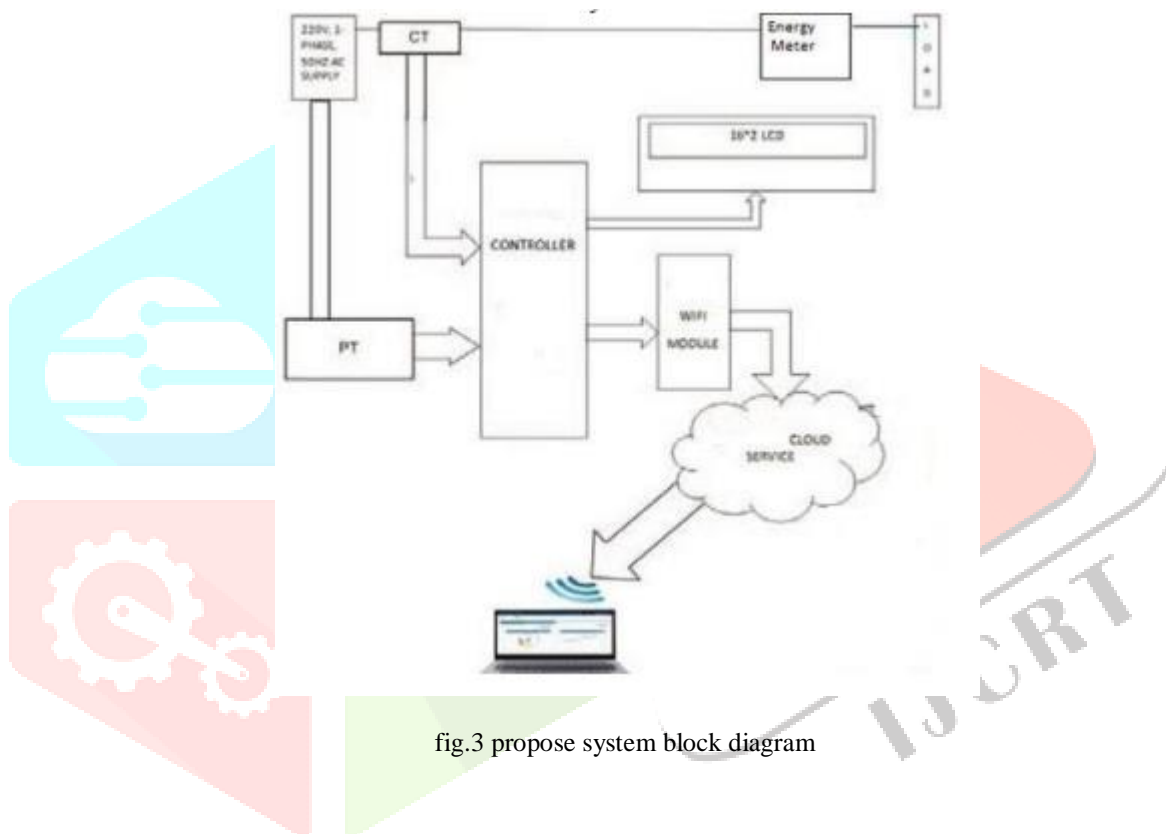


fig.3 propose system block diagram

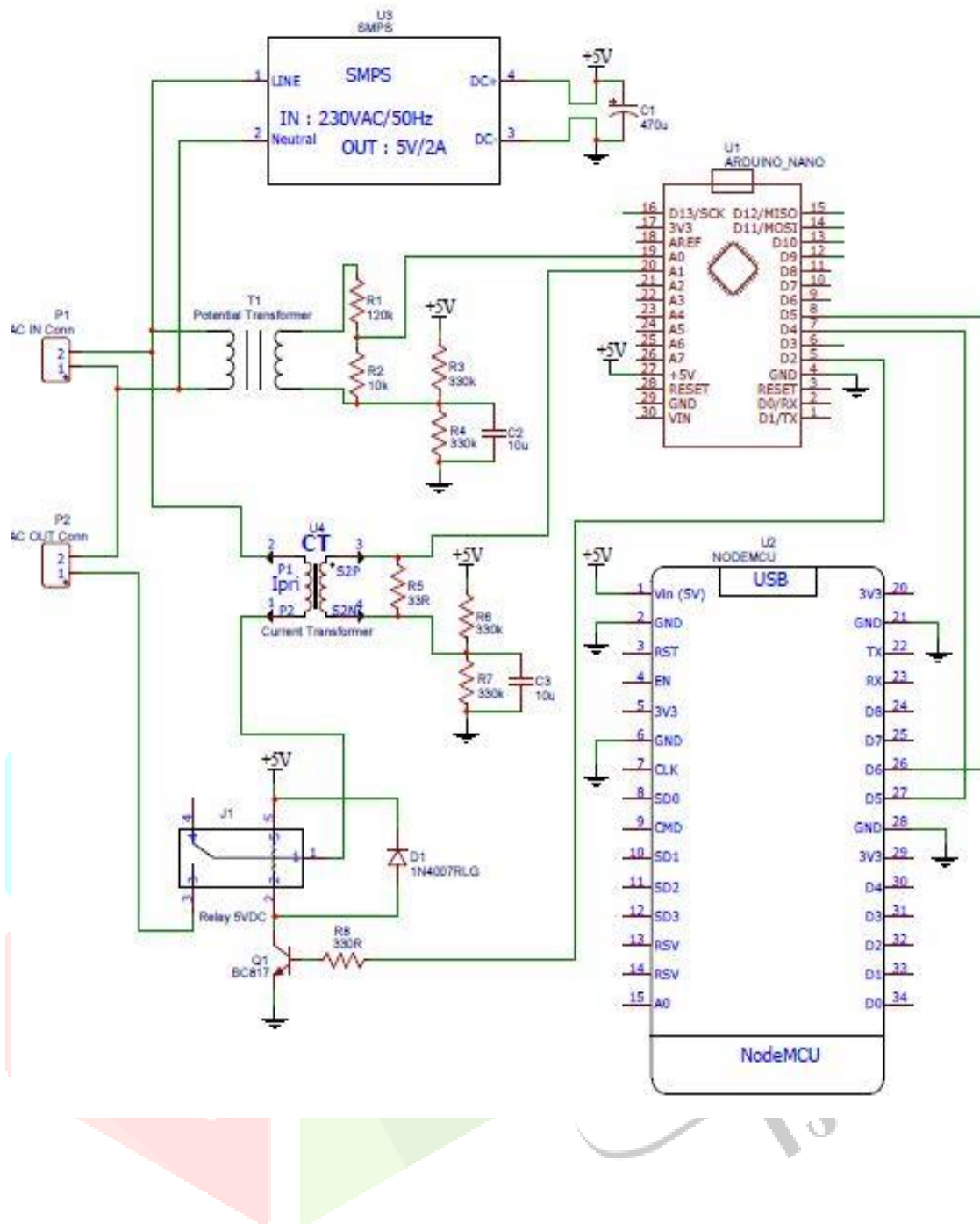


Fig.4. Schematic circuit diagram of constructed hardware

III. WORKING AND RESULTS OF PROJECT

The Arduino board is designed in such a way that it is very easy for beginners to get started with the microcontroller. This board is particularly suited to breadboards, the connections are very easy to handle. Let's start with powering the board.

Powering you ArduinoNano There are three ways you can power your Nano.

USB Jack: Connect the mini USB jack to a phone charger or computer via a cable and it will draw the power needed for the board to function

Vin pin: The Vin pin can be supplied with an unregulated 6-12V to power the board. The on-board voltage regulator controls this on the +5V,+5V pins: If you have a regulated +5V supply you can supply it directly to the +5V pin of the Arduino.

There are totally 14 digital pins and 8 analog pins on your nano board. The digital pin can be used to interface the sensor by using it as an input pin or an output pin as a drive load. A simple function like pin mode() and digital write() can be used for his digital pen. Analog pins can measure analog voltages from 0V to 5V using any of the 8 analog pins using a simple function like analogRead().

Infected 0 (Rx) and 1 (Tx): Rx and Tx Pak are used to receive and transmit TTL. they are dangerous

Compatible ATmega328P USB to TTL serial chip. External interrupt pins 2 and 3 can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. PWM pins 3, 5, 6, 9 and 11 provide 8-bit PWM output using the analog write() function. SPI pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK) are used for SPI communication. In-Built LED Pin 13 is connected to a built-in LED, when Pin 13 is HIGH - the LED is on and when Pin 13 is LOW, it is OFF. I2C A4

I. (SDA) and A5 (SCA) are used for IIC communication using the Wire library. AREF used to provide reference voltages for analog inputs with the analogReference() function. AC input signals are continuously fed to the Arduino Nano controller via CT and PT. Real time energy metering data of current and voltage is sent by the WiFi ESP8266 controller to the Raspberry Pi (server) which stores the data in the cloud.

I. CONCLUSION

The strong reason for the design of IoT based e-meters is to reduce the power consumption in the home. It avoids human intervention, reduces cost, saves manpower. It works both automatically and manually. This computerization makes the structure more effective and accurate while reducing the work cost. It continuously monitors system or load parameters such as current, voltage, power to detect abnormalities in power consumption

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