

Article

Raspberry Pi Based Monthly Electricity Energy Meter Billing System

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A B S T R A C T

The aim of the article is to minimize the queue at the electricity bill counters and to restrict the electricity inevitably, if the bill is not paid. In this system, the cloud is used so that the consumer would receive message nearby power consumption (in watts). The execution of this article will help in better energy management. The planned system substitutes outdated meter reading approaches and permits remote admission of prevailing energy meter by the energy worker.

Keywords: Energy Meter, IoT, Raspberry Pi, Gmail for energy bill, Optocoupler

Introduction

Now a days, the skill of e-metering (electronic metering) develops popular. In the outdated system, meter reading is done by human operator, this requires a greater number of labor, operator and long working hours to attain the whole area data reading and billing. The planned system replaces outdated meter reading methods and enables remote access of existing energy meter by the energy provider. Also, they can monitor the meter readings frequently without the person visiting each house.

The key outline of the article is to progress a wireless energy meter. The Raspberry pi takes the reading from the energy meter and that reading send to the cloud. The reading of the energy meter is also sent to the user panel and admin panel. Nowadays electricity cost is high, and consequently, it becomes a need for the consumer to distinguish how much electricity is being castoff by them, in order to control the electricity bill that must come within their budget. In this planned system, a consumer will get energy consumption data on a real-time base on their cell phone.

Literature Survey

Present day as billing in India which uses electromechanical

and anywhere digital energy meter is error prone it devour more time and labor. This paper suggests that a plan of system which can be used for data transmission between personal computer and smart card. Wireless prepaid energy meter billing system has been prepaid which incorporate RF based system. This system designed reduce the efforts of manual data collection of energy meter. The user are not bound to pay excess amount of money, user have to pay to their requirement.¹ The energy meter billing system is an important issue, because increasing number of electricity thefts cases, this technology solve this problem and this system avoid meter reader visit to each house to take reading. Also if user gets incorrect or faulty bill he has go to MSEB office to correct i.e., very much time is wasted this is avoided here by taking photo meter reading with camera located in front of meter sending this reading automatically that means the one GSM reading device is attached to every energy meter.² Traditional meter reading and billing technique is insufficient and have several disadvantage. Each month a person visit to the house and collect the data and produce bill to the consumer. this system is very problematic. Here new method of metering system which utilizes two-way communication with ability control and monitor meter. In this paper the smart system is developed

that uses both GSM and zigbee. Zigbee is used here to communicate with other device and GSM capability for data transfer by using GSM. Electricity theft issue also solve in this system.³This system would then accept authorized scratch card of different denominations for prepaid activation of power supply, continuously monitors the unit being consumed and disconnect the supply remotely when the entitled number of units are expended. This system consists of ARM7 microcontroller and sending the message by using GSM module⁴. In this system GSM based smart energy metering system using IoT which will replace traditional meter reading technique. ATmega328 based power consumption monitoring system that senses parameter and demonstrations on an LCD display. This meter readings are automatically sent on cloud generated using IoT. The main between user and distributor.⁵

Methodology

There are numerous approaches available for calculating the energy meter bill and sending this bill to the user by using IoT. But in this system, we use the raspberry-Pi act as a mini computer for manipulative the energy meter pulse.

Proposed System

Energy Meter Monitoring Using RASPBERRY-PI Board is used to unceasingly monitor the meter reading and give weekly info about the number of units consumed along with its cost to the consumer and electricity department. Main components used in this article are RASPBERRY-PI board, LCD display, energy meter circuit, and load. RASPBERRY-PI is a credit card size minicomputer developed in UK. It acts as a fast processor system. RASPBERRY-PI is a central unit of this article. RASPBERRY-PI board is linked to monitor, cloud LCD, and energy meter through various ports. In this article consumption of energy through variable load stored in an internal memory location of RASPBERRY-PI board. ADE 7757 IC counts the number of units consumed which get displayed on an LCD display along with its cost. The same information is provided to the electricity department through admin panel by using cloud. This system enables the electricity service provider to read meter reading frequently without the person visiting each house so that manual meter reading will get reduced. Customers will get weekly update concerning power consumption through g- mail.

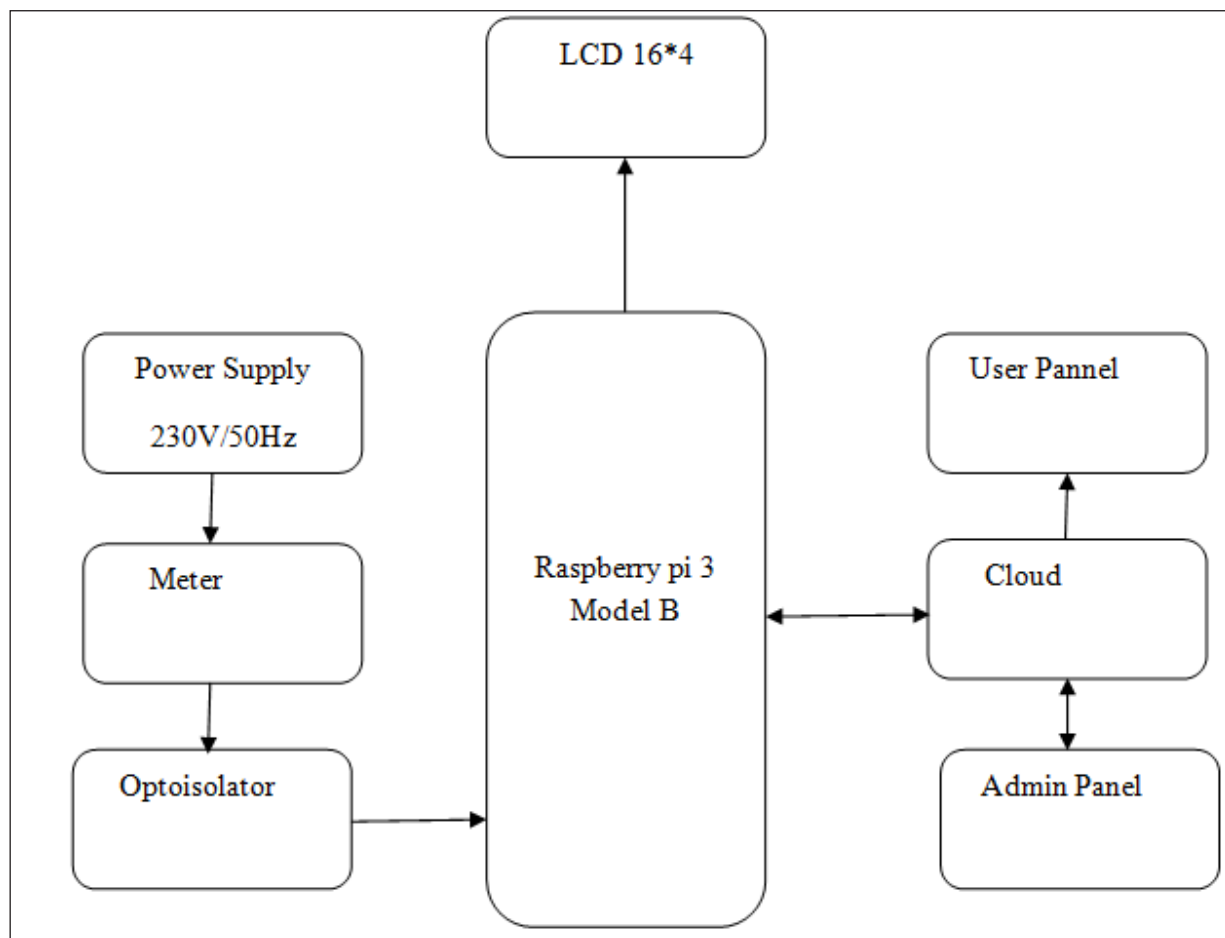


Figure 1. Block Diagram

Hardware

Raspberry-Pi



Figure 2. Raspberry Pi 3 Model B

Raspberry pi is a credit card size computer developed in UK in February 2012. There are models of raspberry pi which are 1. Raspberry pi A 2. Raspberry pi A+ 3. Raspberry pi B 4. Raspberry pi B+. There are 3 versions of Raspberry pi 1. Raspberry pi version 1 i.e. BCM 2835 2. Raspberry pi version 2 i.e. BCM 2836 3. Raspberry pi version 3 i.e. BCM 2837. We are using Raspberry Pi 3 Model B which is the latest development platform from the Raspberry Pi Foundation. It is at equally at home as the brains behind embedded electronics prototypes or at the center of a Plex driven media center. Essentially a tiny PC, the Pi 3 is compatible with several different operating systems and is plug-and-play with a variety of peripherals. Several generations of Raspberry Pis have been released. The first generation (retrospectively known as the Raspberry Pi 1) was released in February 2012 in basic Model A and a higher specification Model B. Improved A+ and B+ models were released a year later. The Raspberry Pi 2 was released in February 2015 and Raspberry Pi 3 in February 2016.

ADE 7757

ADE7757 is a 16 pin, low-cost, single-chip solution for electrical energy measurement. The ADE7757 is a high correctness electrical energy dimension IC. It is a pin reduction version of the ADE7755 with an development of a precise oscillator circuit that serves as a clock source to the chip. The ADE7757 eliminates the cost of an external crystal or resonator, thus reducing the overall cost of a meter built with this IC. The chip straight borders with the shunt resistor and operates only with ac input its salient features are: Can read up to 999999 units (kWh) with a resolution of 0.01 units Designed for normal 230V AC and maximum line current of 30 amps. The meter count is 100 pulses/kWh, i.e., 100 pulses will be obligatory to register one unit.

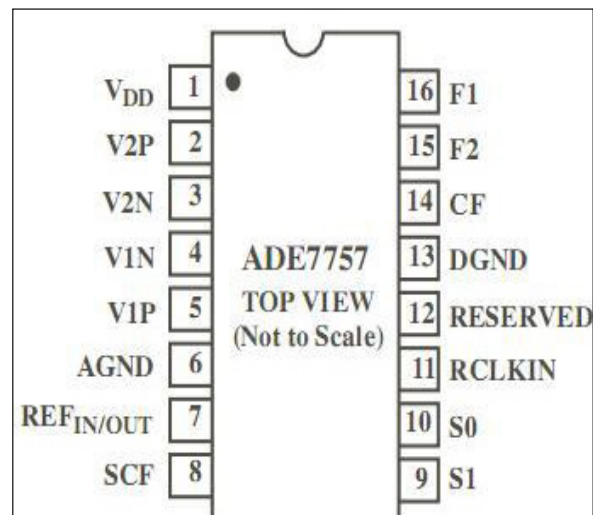


Figure 3. Pin Diagram

Conclusion

The article implementation will help to the MSCB for controlling the meter from the remote location. For reducing the man power and human error, our system generates bill itself.

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