Energy Meter Reading System Using Automatic Camera Solar/thermal Energy

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Abstract: Energy meter reading system is the Traditional metering method, but it is not convenient for energy measuring and billing, also more difficult. The most common type of current reading meter is the electromechanical induction watt-hour meter. The energy meter readings are taken by an employee. The worker should come and take the readings that may be improbably to reading error, also has errors while recording what was reading, during data entry. It is hard to access the meters at, indoor meters and meters with obstacle. The problem which arises in the billing system can become inaccurate and inefficient. This theme is an integration of both image processing and embedded system. Here through the Lens (TTL) camera is used to capture the image of the reading. The image is transferred Personal Computer (PC) through the wireless system, where it undergoes processing to extract digits and with reference to previous month data billing base it make a new bill is generated with tariff consideration. In real time applicationthe peoples using smart card the amount will be paid. By using the technology, we can reduce the error appearance by the human interference.

Key words: Automatic Energy Meter Reading (AEMR) · TTL camera · PIC · Energy efficient · Solar/Pelletier · GSM/GPRS

INTRODUCTION

AEMR technique is of automatically collecting the consumption of energy from energy meter devices and transferring that Information to a central database server for billing purpose.

This mandatory have large number of labor operators and traditional working to achieve complete area data reading and billing [1].The traditional meter indication methods that enables remote access of subsisting energy meter by the energy provider and also can monitor the meter interpretation regularly without the person visiting each house [2]. It is adequate data contagion and energy harvesting [3]. The solar panel commutes an inflected light signal into an electrical signal without any additional power postulates [4]. A GSM based module are using to wireless communication combination of electronic energy meter entity to have remote access over the usage of electricity [5]. A microcontroller is manipulated as heart of the system. It observes the Energy Meter IC output pulse and it is proportional to the energy ingested which is counted by using counter and timer of microcontroller [6]. A role of relay to attain connection of load. The automatic metering system is patterned to realize the prevailing electricity billing system easier and efficient [7]. This

system overview of GSM digital power meter set up in every user required unit. A GSM modem is related to the energy meter [8]. Each modem mention in that own sim. The sim card used is carry out in energy meter and it broadcasts a message to the user about the due bill [9]. It researches new possibilities for the next generation of Automatic Meter Reading (AMR) [10] achieved for meter reading measurement automatically and possibly transmits commands to the meters. The design and piece of smart card prepaid electricity meter system, which accepts the authority to buy obtained amount of energy and also distributes the information about their credit balance [11].

Problem Identification: In previous system using manual system to employee calculate the EB reading (value). In need of many employee to work at EB reading to collect the details of power. Minimum of approximate around TN (1,00,000). Additional power to need control whole system. To calculate readings in previous and current section of values. After that powered wise to calculate amount of customer. In some times taken rounded the value of power because unknown details of power to calculate.Sometime the faulted the system values are didn't knowned. In previous system no to notknowed

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values of reading. Previous queuing the line to pay the amount with restrict work.

Objective: On reduced human interference of the system with reduce losses in data.In this system is reduced man power of reading to calculate up to previous data, array of values in reading to taken. And improve efficiency of the system. Manualtaken correction to occurred. So avoid correpction in this automatic system. In EB bill not paid in separated customers to check the details to remove connections automatic cut-IN and cut-OUT process within 0.5second in use of relay, No need additional settingor programed. In this system are uart system to communicate the reading values. In LCD displayed the details in customer usage power [12] with array of data. And also taken one part of GPRS/GSM system to send message usage of customer.. Customer to easy way of pay the bill in RFID reader in rfid tag. Solar/peltier and thermal power energy are used to operate additional small device. In this system are used android apps to communicate. EB server to collect the details of power. Send message to usage of costumer details in power, amount, last date.

Proposed System: In proposed system, camera is used to capture the image from energy meter. The captured reading is given to the the energy meter [13, 14] reading and then the image is converted into the coding by using the visual basic. The camera programmed automatically to work in a particular date of every month. The usage of current is survey and estimate the amount to payment, the due date these all the details will show in the LCD. Coding is also written with
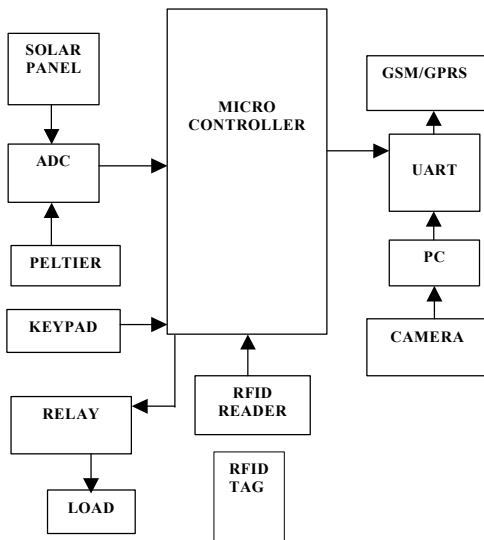
The conditions such as last date and the over range power consume and the penalty for extra usage. The user can pay the money with using smart card by RFID reader. The amount of paid is delivered SMS through the GSM/GPRS [15] by EB server. If the person didn't pay the money on the due date, the load will automatically disconnected by the relay. When the user paid with penalty the load is connected from the main of the board. It can fully reduce the human interface, avoid the losses and dispatch the error in the Electricity Board (EB).

Flowchart:

Fig. 1: Automatic energy meter reading system
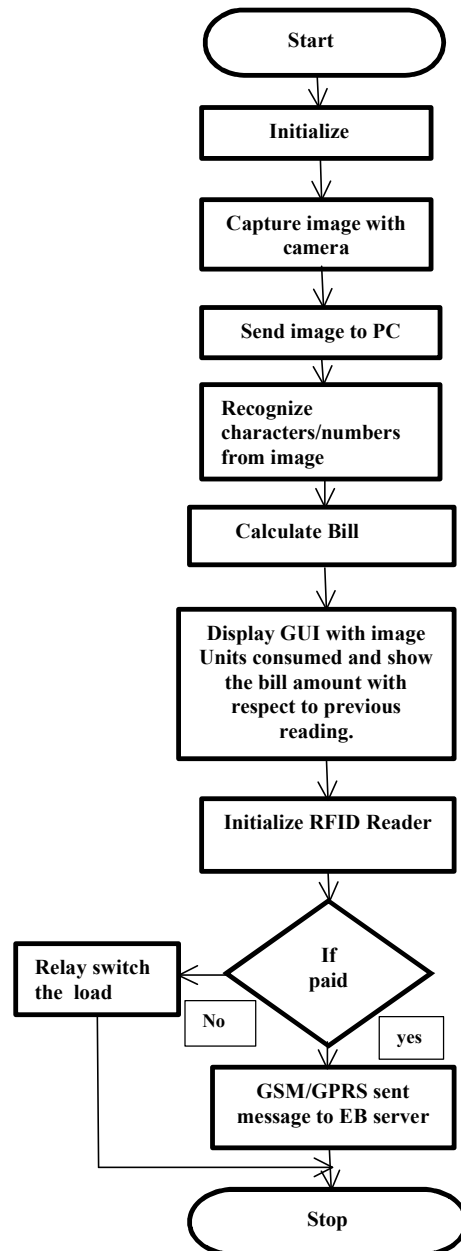
RFID (Radio Frequency Identification) is a method of indicating unique items using radio waves. Typical RFID systems are made up of three components reader, antennas and tags (transponders) that carry the data on a microchip. RFID Reader is made up of integrated circuits containing a tiny antenna. Low frequencies of 125 to 134 kHz and 140 to 148.5 kHz in high frequencies of 850 to 950 MHz and 2.4 to 2.5 GHz are used. Wavelengths in the 2.4 GHz range are limited because they can be absorbed by water.

Fig. 2: RFID Reader

GSM (Global System for Mobile communications based on a *Group of Special Mobile*) is the most popular standard for mobile phones in the world. Its booster the GSM Association, estimates that 80% of the global mobile market uses the standard Its all present of makes international roaming very common between mobile phone operators, enabling subscribers can use their phones for communication purpose parts of the world. GSM different from its ancestor in that both signaling and speech channels are digital may and thus is considered a second generation (2G) mobile phone system. This has also meant that data communication is easiest way to build into the system. GSM EDGE is a 3G version of the protocol.

GPRS (General Packet Radio Service) is a based up on packet communication service for mobile devices that allows data to sent and received across a mobile telephone network. GPRS is a step towards 3G and is often referred to as 2.5G.

Fig. 3: GSM/GPRS communication

For the circuit need the input supply if the user didn't paid the money the load will disconnected so the circuit will off to overcome the problem we are using the solar and pettier devices.

Solar panel is used to convert the light energy to electrical energy we can receive the energy up to 230v
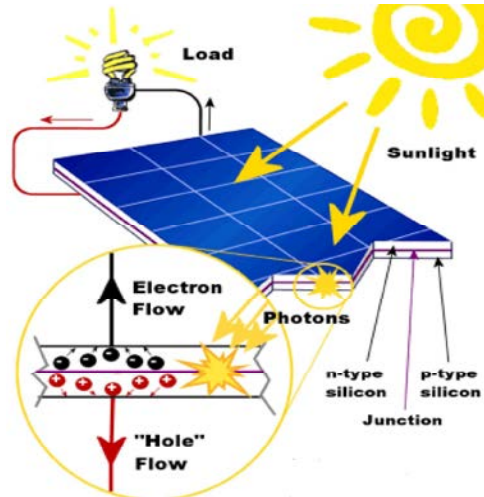

Fig. 4: Solar panel

Pettier is the device used to convert thermal energy to electrical energy. Which is the solid state device and it is small size and light weight. It can perform precise temperature control.

The Universe asynchronous Receiver/Transmitter (UART) controller is the key component based on the serial communications of subsystem of a computer. The UART takes bytes of data and transmits the individual bits in a subsequent of information can be present
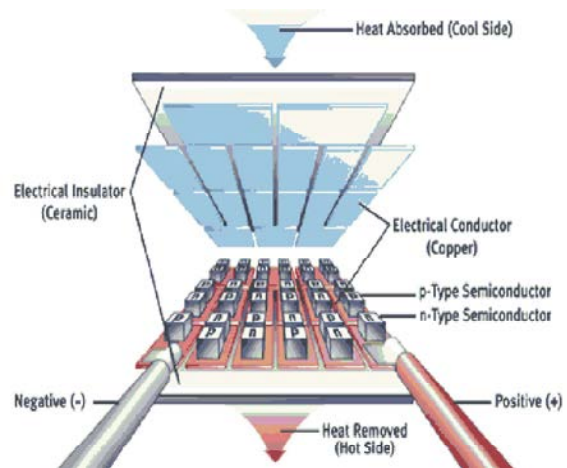

Fig. 5: Pelitier

The destination, a second UART challenge the bits into complete bytes. Of operation of Serial transmission of digital information through a single wire is much more cost powerful than parallel transmission through multiple wires. A UART is mostly used for convert the transmitted information between sequential and parallel form at each end of the link. Each UART contains a shift register which is the significant method of conversion between serial and parallel forms

Embedded C is a High-level language programming for system development. The key motivation for this practice is performance, despite the disadvantages of assembly programming when correlate to high-level language programming. Used to Run Hole Program of The Circuit

Keil Software is the leading dealer for 8/16-bit development tools. It is described in C51 Compiler is the de facto industry standard and supports more in the system it makes C compilers, macro assemblers, real-time kernels, simulators,bum,debuggers,simulators, integrated environments and decision boards.it Used To Compile Embedded C Program

MATLAB is the Matrix Laboratory is a programming for scientific calculations and Input / Output operation. It has many built-in functions (more computations and many toolboxes), including optimize the values and analysis of data requirement. Used For Image To Array Conversion. Visual Basic Is Used For Access the Data Base.

Table 1: comparison between manual and automatic reading

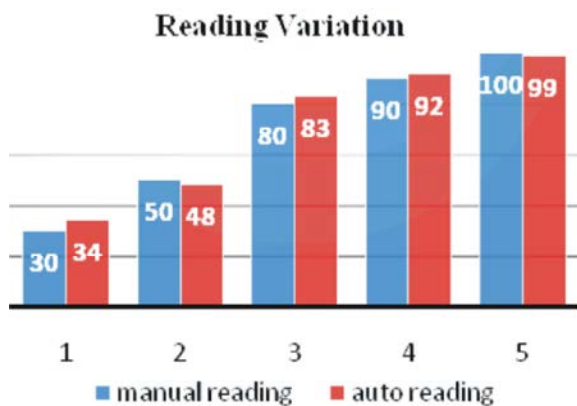| S No	Manual Reading	Auto Reading	Manual Reading Cost	Auto Reading Cost
1	30	34	60	68
2	50	48	100	96
3	80	83	160	166
4	90	92	180	184
5	100	99	200	198

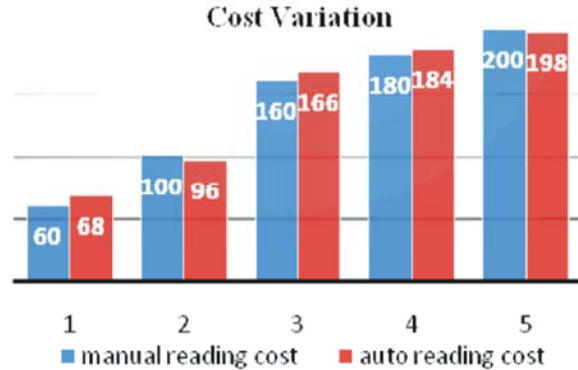Fig. 6: Reading Variation between Manual &Automatic Reading System

Fig. 7: Cost Variation between Manual & Automatic Reading Systems

CONCLUSION

This proposed system it is possible to avoid meter reader visit and revisit (if there are any problems in billing) to each house to take reading and corruption. Also if consumer gets faulty bill he has to go to energy provider office to correct it and be in long queue. This is avoided hereby taking photo of meter reading with camera located in front of meter and sending these readings to server by using GSM/GPRS. The system also reduce he human interference and it fully help to EB department it has future developed by android apps like internet banking. The circuit always possible to work any conditions during the power cut times by the external sources. The relay will auto connect & disconnect the load according to EB payment. The system fully helps to overcome the problems by the employee.

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