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SMART ENERGY METER WITH MULTI-INTIMATION

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Abstract - *The main aim of our project is to design and implement a smart energy meter for electricity billing to avoid haven errors. Now-a-days person standing in front of our house from electricity board, whose duty is to read the energy meter and handover the bills to the owner of that house every month. According to the meter reading user have to pay the bills. The main drawback of this system is that person has to go area by area to read the meter of every house and handover the bills. Many times errors like extra bill amount, or notification from electric board, even though the bills are paid are common errors. To overcome this drawback our proposed idea will eliminate the third party between the consumer and service provider, and the errors will be minimized. In this proposed work we energy consumption by a house for a week and month along with rated amount will be sent as message by using GSM. An alert message also sent to them as an intimation for paying the electricity bill prior to the due date.The proposed system is implemented and demonstrated in hardware.*

***Key Words*: Arduino, GSM, LCD.**

1. INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today's industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation. The proposed system to designed and developed to accomplish the various tasks in an adverse environment of an industry. The intelligent this project is an own to the technical advancement. This prototype system can be applied effectively and efficiently in an expanded dimension to fit for the requirement of industrial, research and commercial applications. Microcontroller is the heart of the device which handles all the sub devices connected across it. We have used as microcontroller. It has flash type reprogrammable memory. It has some peripheral devices to play this project perform. It also provides sufficient power to inbuilt peripheral devices. We need not give individually to all devices. The peripheral devices also activates as low power operation mode. These are the advantages are appear here.

II. PROBLEM DEFINITION

The Present in premises of consumers and information is collected by using man power in each month. So, that meter has some disadvantages. Meter reader person must be required to read that meter of each consumer for reading power consumption by using of electromechanical meters meter reading changes and errors are more. Calculated bill is used at time when extreme weather conditions occur and meter to be read are not easily accessible to the reading.

III. METHODOLOGY

- In this system to explore the new possibilities for the next generation automatic meter reading whose goal is to collect the meter reading automatically.
- Every week & month after microcontroller sends the consumed unit and price to mobile phone.
- Mobile phone sends SMS of this information to EB office as well as owners mobile these numbers already stored in the microcontroller.
- The units of energy consumed by a house for a week and monthly along with rated amount will be sent as message by using GSM.
- An alert message also sent to them as an intimation for paying the electricity bill prior to the due date.

GSM – Global System for Mobile Communication

In this paper GSM is used as a media which is used to control and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. Thereby, here GSM is used to monitor and control the DC motor, Stepper motor, Temperature sensor and Solid State Relay by sending a message through GSM modem. Hence no need to waste time by manual operation and transportation. Hence it is considered as highly efficient communication through the mobile which will be useful in industrial controls, automobiles, and appliances which would be controlled from anywhere else. It is also highly economic and less expensive; hence GSM is preferred most for this mode of controlling. Hence this automatic system is more efficient and less expensive and more convenient to use from were ever possible. Hence can be preferred mode of communication for controlling purpose.

Energy meter:

Electric meter or energy meter is a device that measures the amount of electrical energy consumed by a residence, business, or an electrically powered device. Electric meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establishes billing cycles and energy used during a cycle. In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas, the electric rates are higher during certain times of day, to encourage reduction in use. Also, in some areas meters have relays to turn off nonessential equipment.

IV. LITERATURE SURVEY

Automatic energy meter reading using smart energy meter:

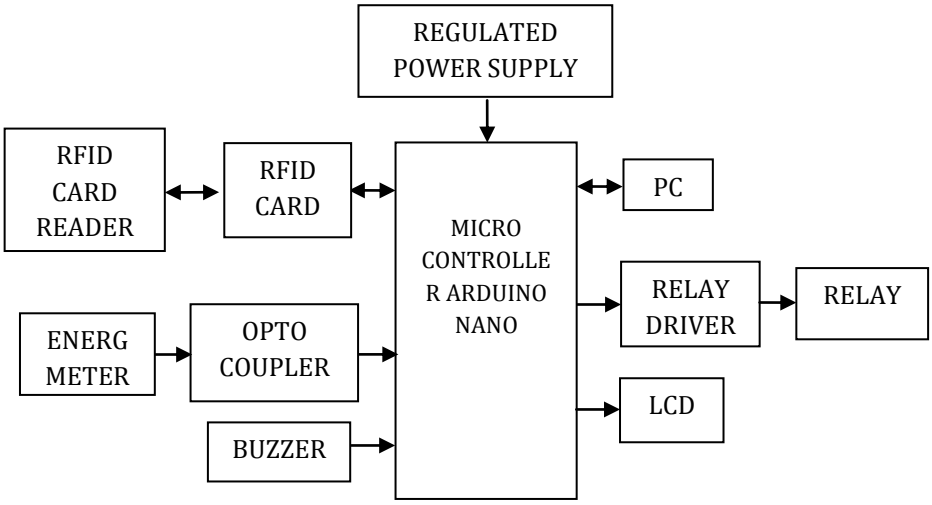
An automatic remote meter-reading system based on GSM is present. This useful to obtain meter reading when desiredso meter readers don't need to visit each customer for the consumed energy data collection and to distribute the bill slip. Microcontroller can be used to monitor and record the meter readings. In case of a customer defaulter, no need to send a person of utility to cut-off the customer connection. Utility can cut off and reconnect the customer connection by short message service (SMS).Furthermore; the customer can check the status of electricity (load) from anywhere. In this system energy meter reading are being transferred by making use of GSM.

V. DESCRIPTION

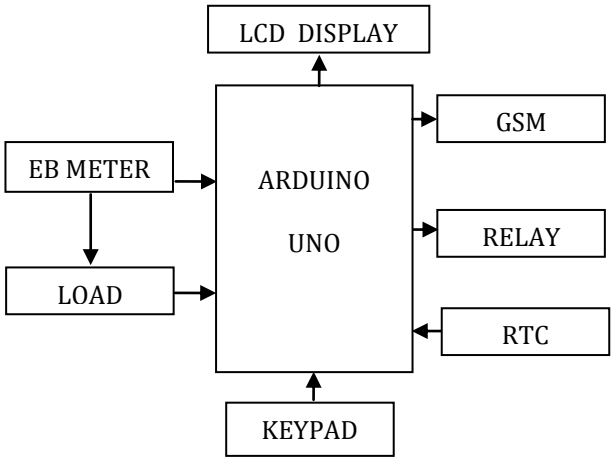
Electricity consumption in a house is done manually and we receive electricity bill. Many researches are done to improve this system of billing. In this project we concentrate in this part where the units of energy consumed by a house for a week and monthly along with rated amount will be sent as message by using GSM. An alert message also sent to them as an intimation for paying the electricity bill prior to the due date. Automatic power off will be carried out if fail to pay the electricity bill. This system also enables a consumer to get information about the energy consumed by individual rooms in their entire house. From this a consumer can have the information about their accurate usage of power. Errors made by the electricity board like extra bill amount, fault occur by energy meter also can be prevented.

VI. BLOCK DIAGRAM

EXISTING SYSTEM BLOCK DIAGRAM



PROPOSED SYSTEM BLOCK DIAGRAM



VII. HARDWARE DESCRIPTION

1. Arduino Uno:

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.You can find here your board warranty information's.

2. Power Supply:

The Arduino/Genuino Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector. The board can operate on an external supply from 6 to 20

volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

3. Memory

The ATmega328 has 32 KB (with 0.5 KB occupied by the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

4. Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the interface toolbar. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the boot loader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

5. LCD Display

A **liquid crystal display** (**LCD**) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. They are used in a wide range of applications including: computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube(CRT) displays in most applications.

6. Energy Meter

Electric meter or energy meter is a device that measures the amount of electrical energy consumed by a residence, business, or an electrically powered device. Electric meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establishes billing cycles and energy used during a cycle. In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas, the electric rates are higher during certain times of day, to encourage reduction in use. Also, in some areas meters have relays to turn off nonessential equipment.

7. GSM Modem

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. For the purpose of this document, the term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA.

8. RELAY

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

9. Real Time Clock

A real-time clock (RTC) is a computer clock (most often in the form of an integrated circuit) that keeps track of the current time. Although the term often refers to the devices in personal computers, servers and embedded systems, RTCs are present in almost any electronic device which needs to keep accurse.

10. Timing

Most RTCs use a crystal oscillator, but some use the power line frequency. In many cases the oscillator's frequency is 32.768 kHz. This is the same frequency used in quartz clocks and watches, and for the same reasons, namely that the frequency is exactly 2^{15} cycles per second, which is a convenient rate to use with simple binary counter circuits.

11. Keypad

A numeric keypad, or numpad for short, is the small, palm-sized, seventeen key section of a computer keyboard, usually on the very far right. The numeric keypad features digits 0 to 9, addition (+), subtraction (-), multiplication (*) and division (/) symbols, a decimal point (.) and Num Lock and Enter keys. Laptop keyboards often do not have a numpad, but may provide numpad input by holding a modifier key (typically lapelled "Fn") and operating keys on the standard keyboard.

VIII. ADVANTAGES

- Low Cost.
- Higher Efficiency.
- Reliable.

IX. APPLICATIONS

- Used in industrial applications.
- Relay time based EB bill generated every month.

X. IMPLEMENTATION OF HARDWARE

Fig 1. Hardware Implementation.

XI. RESULT

The system detects accident from vehicle and send message through GSM module. The message is received by another GSM module. Google Map Module It displays google map show u exact location of accident and it details. It gets detail SMS from accident location. Hence there is small variation in the coordinates, initial value of latitude and longitude are same but fractional value changes with small difference.

XII. SCOPE AND FUTURE WORK

In the present time of 21st century we have no space for errors or faults either in any technical system or in general application. Using this project we can reduce the manual efforts to take the energy from energy meter. It is a user friendly project in which the electrical department can send the bill via SMS. Power consumption of the meter is an important design constraint. Though its overall cost is a bit high but if produced in a large scale we can reduce the cost. we plan to cut off the power automatically.

XIII. CONCLUSION

The objective of this project is to pay the Electricity Bill through SMS and Amount payment Android Mobile. The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. The proposed system based on Atmel microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology The feature makes this system is the base for future systems.The principle of the development of science is that "nothing is impossible". So we shall look forward to a bright & sophisticated world.

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