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Design Of Talking Energy Meter

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Abstract— *In recent years, the demand for electricity has increased in households with the use of different appliances. This raises a concern to many developed and developing nations with the demand in immediate increase of electricity. People are unaware of energy consumed by various appliances. An electricity meter is a device that measures the amount of electric energy consumed by various electrical appliances. The main drawback of previously used traditional meters is that they do not provide information to the consumers, which is accomplished with the help of Talking Energy Meter. As power consumption is increasing day by day there should be more focus on understanding consumption patterns. Traditional electromechanical energy meters are now replaced by electronic meters in domestic as well as commercial applications. This project is aims to design a circuit which helps the consumer in taking care of the electrical energy consumption. This system helps the users by alerting them about the billing status and unit consumption. The "Design of Talking Energy Meter" using ATMEGA328P arduino is an exclusive system which is used to help the deaf and dumb people to announce their requirements using voice Bluetooth. This aims to provide a user friendly interaction.*

Key words: *ATMEGA328P Arduino, Energy Meter,Unit Consumption, Bluetooth, Global System Mobile, Short Messaging Service.*

1. INTRODUCTION

In the early phase of household technology, delivery of electricity is completely depended on traditional energy meters. These meters play a key role in measuring the consumption of electrical energy in individual households. The usage of these meters has been slowly declining with the improvement in technology as fast changes has been made to encounter the problems occurred by the traditional meters. The major problem arises when habitants are unaware of their daily behavior. Monthly feedback given to the consumers is not sufficient as the consumers will not have knowledge on how much energy does the individual appliances consume. To overcome the problems of traditional electricity meters, electronic meter or static energy meter comes in picture. Now a day's, technology is developing rapidly. High automated and secured systems are preferred in all fields including electricity distribution. Electrical energy is universally accepted as an essential commodity for human beings. Energy is the prime mover of economic growth and is vital to the sustenance of modern economy. Future economic growth crucially depends on the long term availability of energy from its sources.

The Arduino based "Talking Energy Meter" mainly aims at the middle class and the lower class family to bring their electricity bill down with the help of the power consumption alert system. It benefits the government as it is helps to protect the energy meter from tempering. Energy meters being deployed at homes are used for reading the power that is being consumed. This system may install at any place where the energy consumption should be regularly monitored and controlled. This is used to continuously monitor the meter reading and give daily information about the number of units consumed along with its cost to the consumer. It also alerts the user if someone tries to steal the electricity from meter and cut the line and inform the Electricity Board as well as the consumer by mobile application.

Major components used in this system are Arduino ATMEGA 328P, Energy Meter, GSM module, Bluetooth, Relay. Arduino is the central unit of this system and is connected to LCD, GSM module, Bluetooth and Relay.

Arduino drives the Bluetooth to play the voice messages on android based on the energy meter readings. This system also consists of a LCD display that continuously displays the energy meter readings in real time. This can be achieved by the use of arduino ATMEGA328P unit that is used to

monitor and records the energy usage readings in its memory. The arduino that we use here is ATMEGA328P.

2. LITERATURE SURVEY

In order to design this project, literature review has been made from various sources like journal, books, article and others. This chapter includes all important studies which have been done previously by other research work. It is importance to do the literature review before doing the project. The review of the work is given as follows:

In Power Consumption Alert System, they design a circuit which helps the consumer in taking care of the electrical energy consumption, to make the consumer aware and to control the excess power consumption. This system will inform the consumer about their usage rate via SMS. Once the maximum threshold value is reached, power is cut off with a prior notification to the consumer. Due to this, customer feels inconveniency in emergency condition. This system gives the alert to the consumer via SMS only.

GSM based Energy Meter is used to monitor and alert the consumer of their power usage. But the hardware required for this system is very complex.

In our system, we have covered all the drawbacks of existing system. Basically talking energy meter based on arduino is used to give the alert of energy usage and it will also inform the Electricity Board if someone tries to steal the power. The arduino which we have used here is ATMEGA 328P, it has 32K of flash memory, 1K of EEPROM and 2K of internal SRAM (Static Random Access Memory).

3. SYSTEM DESCRIPTION

The different literatures are studied which helped in designing a new system for monitoring and giving the alerts to the consumers.

3.1 Drawbacks of Existing System

a) Manual Interference

Traditional meter reading of electricity consumption is done my human operator by visiting one place to another in every month. This takes more time to collect the data from each and every user and also requires more human operator. Due to human interference, error may occur in reading and results error in billing too.

b) Electricity usage is not monitored

There is no knowledge of electricity usage because in existing system only monthly bill comes so consumers not get aware about their daily usage.

c) No Provision for energy stealing

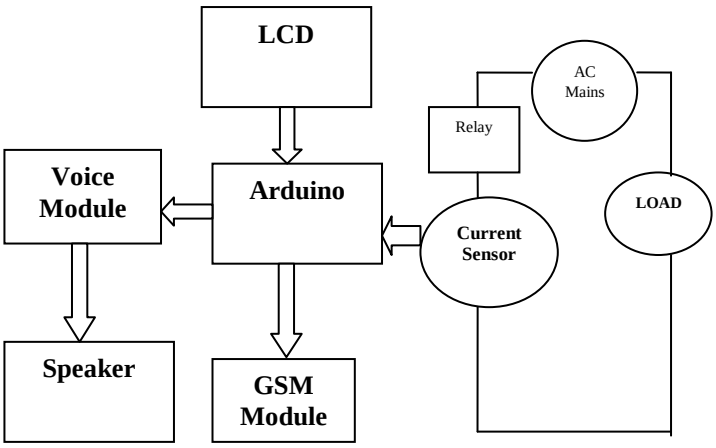
In previous meter, if energy gets theft by the other people, owner not gets information about the stealing of their energy meter. And owner get suffer from this.

3.2 Proposed System

In proposed system, all the drawbacks of existing system are overcome. Talking Energy Meter based on microcontroller is design to give voice alert and monitor the energy usage. Voice can be in any language so that it easy to understand for common people. It is more convenient to physically disabled people.

4. BLOCK DIAGRAM

Fig. Block diagram of Design Of Talking Energy Meter



I.

5. COMPONENTS

A.HARDWARE

1. Arduino:-

Arduino is a device which is used to build Electronic projects. It consists of a pre-programmed microcontroller or integrated development environment that runs on computer, used to write and upload computer code to the physical board.

2. LCD Display:-

LCD displays the daily consumption unit, time and date.

3. Relay:-

The SPDT Relay(10A) is a high quality Single Pole Double Throw Relay(SPDT).The Relay consists of a coil, 1 common terminal, 1 normally closed terminal, and one normally open terminal.

4. GSM Module:-

Easy to interface with Arduino. GSM is Global system for mobile communications. It supports global quad-band network. It has a TTL serial port and there is no need of MAX232. It has better signal reception capability.

5. Bluetooth:-

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth

module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping) feature.

6. Current Sensor:- Current sensor is a device that detects electric current in a wire, and generates a signal proportional to that current. The generated signal could be analog voltage or current or even a digital output. The generated signal can be then used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control.

B.SOFTWARE

- Arduino-1.8.3 – Programming Software and Compiler

The compilation process:-

The arduino code is actually just plain old c without all the header part (the includes and all). when you press the 'compile' button, the IDE saves the current file as arduino.c in the 'lib/build' directory then it calls a makefile contained in the 'lib' directory.

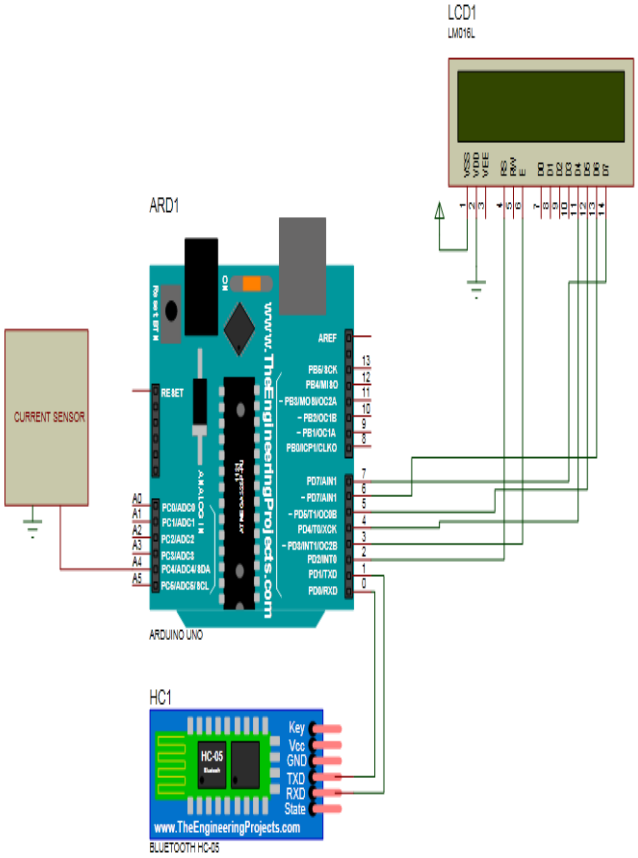
This make file copies arduino. c as prog.c into 'lib/tmp' adding 'wiringlite.inc' as the beginning of it. this operation makes the arduino/wiring code into a proper c file (called prog.c).

After this, it copies all the files in the 'core' directory into 'lib/tmp'. these files are the implementation of the various arduino/wiring commands adding to these files adds commands to the language. The core files are supported by pascal stang's procyon avr-lib that is contained in the 'lib/avrlib' directory. At this point the code contained in lib/tmp is ready to be compiled with the c compiler contained in 'tools'. If the make operation is successful then you'll have prog.hex ready to be downloaded into the processor.

6. WORKING

The purpose behind this system is to design a circuit which aware the consumer about their energy usage by giving the voice alerts. It also helps to monitor the electrical energy usage and protect the meter if someone tries to theft the electricity by cutting the line of meter with prior SMS to the electricity board. The block diagram of Design of Talking Energy Meter based is shown in fig.

The current sensor is use to detect the power consumption and same will display on the LCD. Arduino is the main controller which use programming to get hte power data and to send the message to mobile phone via bluetooth.The Bluetooth is connected to android mobile phone with the App called voice app which is use to connect with google for text to speech converter. The messages in the program we set the current unit are and the load till now is with the real time data.



A. Advantages:-

• Voice based alerts.
• Efficient and low cost design.
• User friendly
• Energy readings are stored in non volatile Memory.

B. Disadvantages:-

• Interfacing energy meter to Micro Controller is Sensitive.

C. Applications:-

This system can be practically implemented in real time Where there is a limitation on energy utilization

7. RESULT

The project “Design Of Talking Energy Meter” is design such that whenever the usage of energy exceeds the threshold value which is set by user, it announces an alert message which was already predefined in the voice circuit. The SMS of monthly billing status is also sends on user’s mobile number which is mentioned in program.

8. CONCLUSION

This project is mostly emphazing the minimization of generation misfortunes with ceaseless task, maintaining a

strategic distance from influence request and expanding the compelling yield items by decreasing the greatest influence. Effective request administration venture is utilized to abridge power charges, positive points of confinement inside contracted request in order to stay away from the punishment and influence charges which influence the creation procedure. It is valuable in stack shedding that uses the base embed age and ideal usage of both EB influence and embed age prompting low pay back period and high reserve funds of influence and cash . The reasonableness and viability of the proposed ideas are confirmed by the reenactment and test comes about. The Talking Energy Meter proven to provides effective, reliable and efficient wireless automatic power meter reading, billing and notification through the use of GSM networks, thus reduce human Operator meter reading, operation cost and meter tempering will not be possible.

9. FUTURE SCOPE

Our project "Design a Talking Energy Meter based on Microcontroller" is mainly intended to get a voice alert about daily consumption. This system used a Bluetooth module. And also it sends the SMS to user as well as electricity board when someone tries to steal the energy from meter.
The size of this project can be compact by using advanced processor. It can be modified to detect the faulty condition like over voltage, over current, etc.

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REFERENCES

[1] *A. C. D. Bonganay, J. C. Magno, A. G. Marcellana, J. M. E. Morante and N. G. Perez, "Automated Electric Meter Reading and Monitoring System using ZigBee Integrated Raspberry Pi Single board Computer via Modbus,"Electrical, Electronics and Computer Science (SCEECS), 2014 IEEE Students' Conference, Bhopal, 2014,pp.1-6.*

[2] *Aswini, N. Nisari, Nivetha, B. Vaishnavi, "Power Consumption Alert System,"International Research Journal of Engineering and Technology, vol.04, no. 03,Mar-2017.*

[3] *K. Ashna and S. N. George, "GSM based Automatic Energy Meter Reading System with Instant Billing," in Automation, Computing, Communication, Control and Compressed Sensing (iMac4s), 2013 International Multi Conference IEEE, 2013, pp.65-72.*

[4] *M. Moghavvemi, S. Tan, and S. Wong, "A Reliable and Economically Feasible Automatic Meter Reading System using Power Line Distribution Network," International Journal Of Engineering-Materials And Energy Research Center, vol.18, no.3, pp.301-318, 2005.*

[5] *Mandeep Singh, Ritula Thakur, Dr. S. Chatterji, "Design of GSM Based Talking Energy Meter," International Journal of Innovations in Engineering and Technology (IJIET), vol.3, Issue 4 April 2014.*

[6] *Md. Wasi-ur-Rahman, Mohammad Tanvir Rahman, Tareq Hasan Khan and S.M. LutfulKabir, "Design of an Intelligent SMS based Remote Metering System," International Conference on Information and Automation (IEEE), vol.978-1, pp.4244-3608, 2009.*

[7] *S. Shahidi, M. A. Gaffar and K. M. Salim, "Design and Implementation of Digital Energy Meter with Data Sending Capability using GSM Network," Advances in Electrical Engineering (ICAEE) 2013 International Conference, Dhaka, 2013, pp.203-206.*

[8] *Vijeta Pal, Pankaj Bisht, "Microcontroller Based Talking Energy Meter, "International Journal on Emerging Technologies (Special Issue NCETST-2017) vol.8, no.1, pp.609-611, 2017.*

[9] *V. V. Das, "Wireless Communication System for Energy Meter Reading," in Advances in Recent Technologies in Communication and Computing, 2009 ARTCom'09 International Conference IEEE, 2009, pp.896–898.*

[10] *V. Vinu, "Wireless Communication System for Energy Meter Reading, "In International Conference on Advances in*

[11] *Terry Chandler, "The Technology Development of Automatic Metering and Monitoring System", The 7th International Power Engineering Conference, pp.147-150, Nov. 2005.*

[12] *Energy Control, http:// www.enrgycontrols.org,2007*

[13] *Albert Treyl, Thilo Sauter and Gerd Bumiller, "Real-Time Energy Management over Power-Lines and Inetrnet", The Proceeding of the 8th International Symposium on Power Line Communications and its Application, pp. 306-311, 2004*

[14] *Malaysia. Malaysian Energy Commission, Electricity Supply Industri in Malaysia, Performance and Statistical Information 2008,Suruhanjaya Tenaga, 2008*

[15] *Embedtronics, http://www.embedtronics.com2005*

[16] *Moe Rahnema, "Overview of the GSM System and the Protocol Architecture", IEEE Communication Magazines, pp. 92-100, Apr1993*

[17] *L. Cao, W. Jiang, Z. Zhang, "Networked Wireless Meter Reading System Based on Zigbee Technology", IEEE Chinese Control and Decision Conference , pp.3455-3460, 2008.*