Voice Based Energy Meter

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Abstract- In recent times, by the usage of different household appliances the need for electricity has been increased and at the same time consumers has no idea about their consumption as the demand for electricity increasing day by day there should be a proper awareness to the people. Generally, an energy meter is a device which measures the total energy consumed by the different appliances. The drawback of existing system is that it does not providing exact information to the user. The main aim of our project is to design a circuit which gives the information about unit consumption to the buyers as well as it will help to the illiterates and busy people by giving voice alert. Voice alert may be in any language hence it can be used in any place. This project uses ATMEGA328 micro controller system which helps to the deaf and dumb people to know about their consumption by giving voice alert. Now a day's power theft has become a major problem in electricity transmission and distribution. Many people are consuming power without paying a single rupee to the board. We need to avoid it.

Keywords – Energy meter, Current sensor, Comparator, Arduino, LCD, Voice module speaker, GSM module, NODEMCU, Blynk App.

I. INTRODUCTION

The usage of previous energy meter has been decreasing day by day because of its disadvantages [1]. The major drawback of existing energy meter is that it does not providing information about daily consumption and also the feedback giving to the user is not sufficient [2]. In order to overcome the problem static energy meters comes into the picture. Technology is improving day by day in every field they prefer highly protected and automated systems even in electrical distribution system also [3]. This voice based energy meter mainly focus on middle class and low class people to minimize their electricity bill by giving voice alerts[4]. Directly it also benefits to the government as it is minimizing electricity consumption. In this project each consumer will fix some threshold value, in the case of exceeding that limit it will give alert signal by voice message [4]. As the voice message can be in any language. So, our project is user friendly. In developing countries, with the increase of demand for electricity, power theft also increasing day by day [5]. This causes various rigid impacts on revenue as well as on customers. The major problem with the electricity theft is we can't meet the load demand and also it causes generation system to overhead [6].

II. EXISTING SYSTEM

a) **Manual Interfaces:**

Billing of electricity consumption in different places is finished by human operator by visiting one place to another. Because of human interference, error may occur while taking readings; it will lead to error in billing too.

b) **Electricity usage is not monitored:**

In existing system consumers are getting bill for monthly consumption but there is no aware of daily consumption

III. PROPOSED METHODOLOGY

This proposed project "VOICE BASED ENERGY METER" using Aurdino and voice module unit. Aurdino it monitors and records the reading value continuously of energy meter. And it also having the voice module to play the voice alert based our consumption. A.C supply is connected to the meter and from the meter all components have been connected including Aurdino, voice module, GSM module, Relay, loads and led display. The two modules which are connected to the controller voice module and GSM module, the GSM module is used for sending the Messages regarding to the daily consumptions via mobile network ,and the voice module is used to give the voice alert when we exceeds the daily limit. It can be check by android mobile with the help of Blynk APP or AdaFruit App.

1. **Block diagram of proposed system**
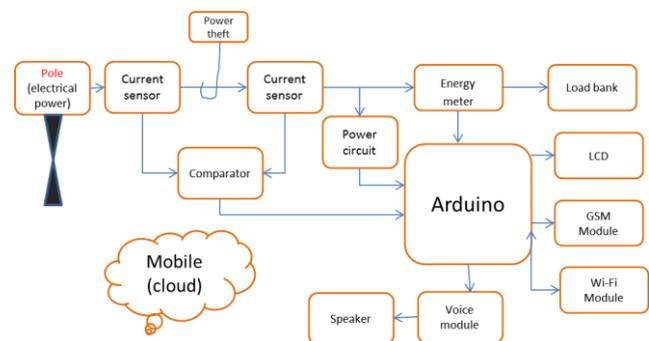
Fig.1. Proposed system

For thefting condition, we have used two current sensors which are connected in series, one current sensor is connected at before to the energy meter and another one is connected at pole side.in the case of thefting if any load is

connected in between, than current sensor will sense that condition and through GSM we will send message. The energy values once taken from the energy meter are digitized and voice processed with the help of microcontroller ATMEGA 328. The billing of the corresponding energy usage is determined and per unit rate of consumption is set at the time of programming.

IV.   ADVANTAGES

c)   Voice based alert system.

d)   Low and efficient in design

e)   User friendly

V.   COMPONENTS

2.   Arduino:-

Uno is a microcontroller board based on the ATmega328P (datasheet).

Fig.2. Arduino

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. Contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

3.   Voice Module

This is ISD1760 Voice Recording Playback Module with On-Board Microphone/Voice Recording IC.
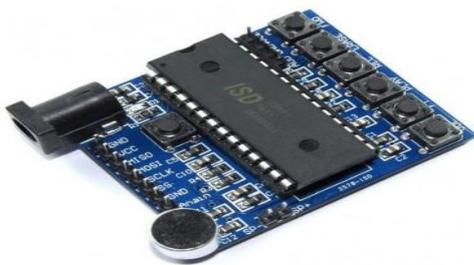
Fig.3. Voice module

The ISD1760 voice module is designed for users who can quickly understand and use the ISD1700 series family chips. It applies to all ISD1700 series chip, with simple,

fully functional characteristics. Recording chip ISD1700 series is a highly integrated, high-performance chips.

4.   Comparator

Comparator is an electrical and electronic device through which it can compare two voltage or current can either output is 1 or 0 to indicate the which is larger. After that we can know the comparator value.

5.   GSM Module

GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at 850 MHz, 900 MHz, 1800 MHz and 1900 MHz frequency band. GSM system was developed as a digital system using time division in multiple access technique for communication purpose shown in figure 4.

Fig.4. GSM module

6.   NODEMCU

Wi-Fi is a subject for wireless localized region scheme with electronic system. This system is used of connect and transferring and receiving data from one system to another system. Wi-Fi matched devices can communicate with web. This device has capacity to connect electronic device within 100 feet.

Fig.5. NODEMCU

Wi-Fi subject may be utilized to render the Internet reach to devices that are within the capability of a wireless meshwork that is connected to the Internet. Shown in figure 5.

7.   Energy meter

Energy meter is an electrical device through which we can measure the consumed electrical energy. The amount of consumed energy can be display in LCD. Generally the unit of energy consumption showing in kWh, but in this

proposed system it will show and speak total power consumption along with Rupees. Shown in figure 6.

Fig.6. Energy meter

8. Current sensor

Current sensor is device through which detecting the electric current in a in wire. Whenever the current passing through current sensor the value of current can be measured and can be display in LCD. Basically current sensor is used to measure the current range from Pico amps to 1000 amps. The current sensor is totally depending on the magnitude, accuracy, bandwidth, robustness, cost, etc. shown in figure 7.

Fig.7. Current sensor

9. Speaker

A speaker is a term used to describe the user who is giving vocal commands to a software program. 2. A computer speaker is an output hardware device that connects to a computer to generate sound. The signal used to produce the sound that comes from a computer speaker is created by the computer's sound card.

Fig.8. Speaker

10. LCD

It is called liquid crystal display. There is a use of character LCD. This will be connected to microcontroller. The function of LCD will be display all the system generated massage coming from the controller. It provides interactive user interface.

Fig.9.LCD

VI.   SIMULATION/EXPERIMENTAL RESULT

This proposed project voice use as a basis energy meter is develop to alert whenever the utilization be more than the threshold limit. In case of thefting, sensor will observe and through the GSM message will be sent. In present energy meter we r getting monthly billing status, but in our project we will get ensure of our daily consumption levels.

Fig10 . Proposed system

VII.   CONCLUSION

The VOICE BASED ENERGY METER is used to alert the user whenever the usage of energy exceeds the threshold value which can be set by user, it announces a voice message which is already predefined in the voice module and at the same time we can get a massage on our mobile. The status of energy meter can be check by android mobile with the help of Blynk APP or AdaFruit App from all over the world. This helps in saving electricity and also keeping the electricity bills under limits. It not only benefits the consumer, but also benefits the government as it is capable of reducing the power consumption and subsequently can reduce the unusual power usage. By using this meter, customer can manage their energy consumption. A small module consisting of the Microcontroller ATMEGA 328p, Voice Module, GSM Module Current sensor, Wi-Fi module, LCD, and Speaker can be installed with energy meter to make the electricity consumption smarter. In this system, the use of GSM and

voice module provides numerous advantages over the methods that have been previously used.

VIII.   FUTURE SCOPE

"VOICE BASED ENERGY METER" is mainly intended to get an alert through voice if the usage goes beyond threshold value. This system used a voice circuit into which a predefined alert message is stored. The energy meter, voice circuit and load is interfaced to the Arduino. The Arduino controller is programmed in such a way that it always checks the energy meter readings. If the usage of energy exceeds the set level written in the program, it plays the alert message predefined in the voice circuit. This project can be extended by introducing a GSM module which intimates the over energy usage to the owner. The energy values stored in memory can be retrieved and can help in plotting a power utilization graph in the PC.

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AUTHOR'S PROFILE

DEVRAJ KUMAR, As I completed my intermediate in 2016 on state board of Bihar and right now I am pursuing my B-Tech in stream of Electrical and Electronics Engineering from Kuppam Engineering College, Kuppam batch 2016-2020.. We thought to do a project which will be useful to electricity board. We are facing lot of problems with present energy meter and with present electricity system, so that we got an idea. On "VOICE BASED ENERGY METER".

D. RAJITHA. As I completed my diploma in EEE in 2017 in Palamaner and then I joined in engineering in Kuppam engineering college. Now I am in my final year of engineering we thought to do a project which will be useful to electricity board . We are facing lot of problems with present energy meter and with present electricity system, so that we got an idea i.e. "voice based energy meter". It is economical and also it is beneficial to the board.

L. HARATHI , As I completed my intermediate in 2015 on state board of Andhra Pradesh and also pursuing B.Tech in Kuppam engineering college as electrical and electronics engineering 2020.this is first paper publication on voice based energy also worked on same project for past one year because we are seeing village area there is no investigation of energy so that we got an idea to do smart voice based energy meter it has many features and it is economical ,compact in size and it can place every suitable place.

V.   SRIMAHESHWARAN, Assistant Professor

As I received the BE degree from Bannari Amman Institute of Technology Sathyamangalam in 2009 in field of EEE and also ME degree from Bannari Amman Institute of Technology Sathyamangalam in 2011 in the field of Power Electronics and Drive. Now I am working as

assistant professor in the Kuppam engineering college in department of Electrical and Electronics' Engineering. I am interested in research and development in new Technology.

R. BALARAM SAI, Assistant Professor

As I completed M.Tech from SVPCET, Puttur, Andhra Pradesh in Dec-2017 as PE&D specialization and present I am working as Assistant Professor in Kuppam engineering college, department of EEE. This proposed model has conducted under the guidance of me. I am interested in research and development in renewable energy and new technology.