

GSM Enabled Smart Grid

Mr.J.Vetrimanikumar, S. Lakshmi ¹, D.S. Mithuna Varshini ², M. Rajalakshmi ³

SSM Institute of Engineering and Technology, Dindigul, Tamil Nadu.
Corresponding Author: S.Lakshmi, D.S.Mithuna Varshini, M.Rajalakshmi

Submitted: 01-07-2021

Revised: 13-07-2021

Accepted: 16-07-2021

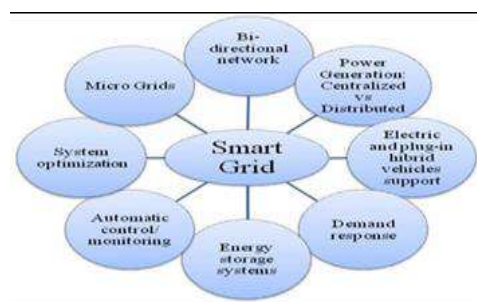
ABSTRACT: The GSM is a technology and take major role in the embedded system .The energy meter reading has not been taken regularly due to the population .In this project the GSM is used for energy meter reading .The proposed system provides the solution for some of the main problems faced by Indian grid system ,such as manual billing, wastage of energy .Objective of this project is to identify the energy consumed per day with the cost and at the end of the month the energy consumed throughout the month and equivalent cost for that will be updated to the consumer through an SMS then if the bill is not paid the electricity board will block the supply .In order to avoid the existing problem in power system ,GSM based energy meter reading system is employed in the proposed system . This method will reduce the manual resource for taking reading.

KEYWORDS: Energy meter, GSM (Global System for Mobile Communication), Embedded System

I. INTRODUCTION

Smart meter is an advanced energy meter that measures the energy consumption of a consumer and provides added information to the utility by using a two-way communication . Consumers are better informed in their consumption of their energy, so they can make better decisions when they are using the energy. Suppliers on the other hand won't need the old fashioned way of manually reading the energy consumed as they would get this information automatic .The system utilize one way communications to collect the data is referred to as automated meter reading (AMR)system. While the system that utilizes two-way communications with the ability to control and monitor the meters is referred to as ADVANCED METERING INFRASTRUCTURE(AMI) system. The combination of automatic reading and two-way communication are the reason why the meter is called smart meter and they are also the difference between the traditional energy meter and the smart

meter. The idea of AMR technology is to do the meter reading automatically and accurate. The benefit of AMR is reducing the meter cost to the supplier and billing the customers with actual meter readings .In addition, AMR will increase the accuracy of the readings and it can allow frequent reading.

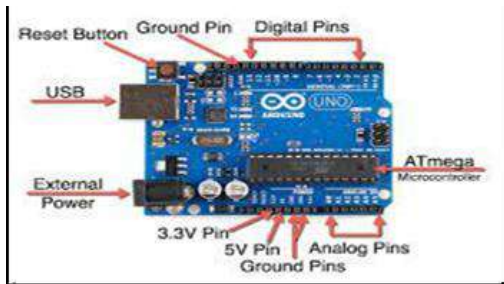


Hardware:

- Microcontroller
- Precision Rectifier
- Relay Driver
- Alarm
- LCD Display
- Power Supply
- GSM Module

Microcontroller:

Microcontroller has timer, inbuilt memory and counters. Microcontrollers are otherwise called as single- chip microcomputer. Harvard Architecture often used the microcomputer for separate memory mapping of data and code. In this project used ATmega328 Arduino Uno Microcontroller board is used. It has 14 input and output pins and 6 pins used for PWM outputs, 6 Analog inputs it can connect easily with the computer through USB cable for power supply. The external supply of 6 to 20 volts and recommended range 7v to 12v. If supply reduced less than 5v the board may be unstable.



Relay Driver:

A Relay Driver is an electro-magnetic switch. It is a type of mechanical switch which is pulled by an electro-magnet, so its resistance is very low and thus it can control large power appliances.



GSM Module:

A **GSM modem** or GSM Module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network. GSM modems typically provide TTL-level serial interfaces to their host. They are usually used as a part of an embedded system.



LCD Display:

A **Liquid-Crystal Display (LCD)** is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with a polarizer. Liquid crystals do not emit light directly,

instead using a backlight or reflector to produce images in color or monochrome.



Energy Meter:

The meter which is used for measuring the energy utilized by the electric load is known as the energy meter. The energy is the total power consumed and utilized by the load at a particular interval of time. It is used in industrial AC circuits for measuring power consumption.



SOFTWARE:

- MPLAB IDE
- Hitech C Compiler
- Language: Embedded C

C Language:

C is a general-purpose procedural, imperative computer programming language and most widely used computer language.

Reason for using C language:

- Easy to understand.
- Various platforms can be used to compile C programs.

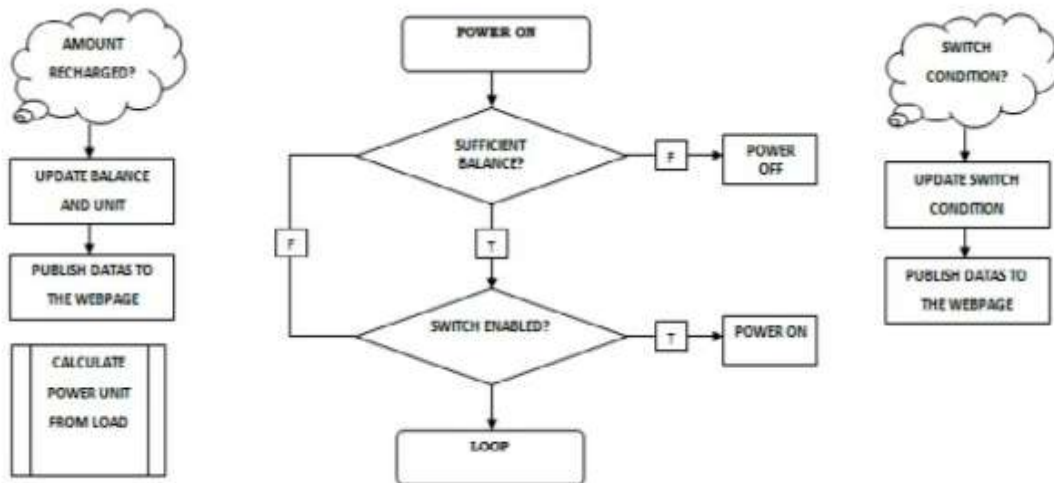
PROPOSED SYSTEM:

Daily consumption reports are generated which can be monitored through an Android application and/or web portal. Also, Android users can pay their electric bills from their Android application. Non-Android users can monitor and pay their bills online. The system is more reliable and accurate reading values are collected from energy meters. Live readings of the energy meter can be viewed through an Android application. Also, the readings can be viewed online. The human-intensive work is avoided and all the values are maintained in

the central server. The communication medium is secure and tampering of energy meters can be identified easily. If an error occurs in the system, the value in the central server will not be updated. Once the value updated crosses the threshold time, the server can determine that something is wrong in the

system and can report the engineers in EB. Thus, identification of error becomes easier. Since the values are stored in the central database, the reports are made accessible from anywhere in the world. Also, the server is online 24x 7.

FLOW DIAGRAM:



ADVANTAGE:

- It reduces electricity losses.
- It reduce manpower resource to take reading.
- Smart grid is capable of meeting increased consumer demand without ading infrastructure.

DIS- ADVANTAGE:

- Continuous communication network should be available.
- It is expensive to install smart meter compare to traditional old electricity meter.

II. CONCLUSION:

There is no doubt that the future belongs to the smart grid, and that power generation will change significantly by the time it becomes reality. Large power plants will continue to ensure the basic supply, but there will be also renewable energy sources, causing fluctuations in the grid .In the not too distant future, flexible intermediate storage of temporary excess power in the power grid will be possible using electric vehicle and stationary storage units .Sensor and smart meters will switch these units on or off, ensuring efficient load management.

REFERENCE :

- [1]. Andrzejozadowicz, jakubgrela, "Control application for an internet of things energy meter-a key part of an integrated building energy management system",2015 IEEE.
- [2]. P. Loganthurai, M. Veeralakshmi, A. Vanmathi, Professor, Department of EEE, K.L.N College of Engineering, "Smart Energy Meter Billing using GSM with Warning System",IEEE 2017
- [3]. OsmiJaiswal, Dilip Chaubisa, B.E, Student Department of ECEL.D College of Engineering,"Arduino Mega and IOT based Intelligent Energy Meter (IEM) to Increase Efficiency and Accuracy in Current Billing Methodology" ICE-CDS-2017
- [4]. Md. Masudur Rahman,OhidullIslam, Md. SerazusSalak in," Arduino and GSM Based Smart Energy Meter for Advanced Metering and Billing System," Pabna University of Science and Technology, Pabna, Bangladesh 2015 IEEE.
- [5]. Himshekar Das, L. C. Samika, GSM Enabled Smart Meter and Automation of Home Appliances, National Institute of Technology, Silchar, India 2015 IEEE

- [6]. “Arduino Board uno”,
<https://www.arduino.cc/en/Main/ArduinoBoardUno>
- [7]. Nikhil V. Patil, Dnyaneshwar R. Bondar, Rohan S. Kanase Department of Electrical Engineering, Rajarambapu Institute of Technology, Islampur, India “Intelligent Energy Meter with Advanced Billing System and Electricity Theft Detection” ICDMAI,2017
- [8]. “Electricity sector in India”,
https://en.wikipedia.org/wiki/Electricity_sector_in_India
- [9]. “Energy efficiency in the agriculture sector”,
[HTTP://WWW.THEHINDUBUSINESSLINE.COM/TODAYSPAPER/TPOPINION/ENERGY-EFFICIENCY-INAGRICULTURESECTOR/ARTICLE2546816ECE](http://WWW.THEHINDUBUSINESSLINE.COM/TODAYSPAPER/TPOPINION/ENERGY-EFFICIENCY-INAGRICULTURESECTOR/ARTICLE2546816ECE).
- [10]. “The loss of power by Namrata Koli”,
<http://economictimes.indiatimes.com/newsections/energy/theloss-of-power/lifenologyshow/44083310.cms>