

# Wireless Arm based Automatic Meter Reading & Control System

Perala Vinay Kumar, B. Saritha

**Abstract---** Automatic meter reading (AMR) is the technology of automatically collecting data from energy metering devices (water, gas, and electric). This concept provides a cost efficient and secure manner of electricity billing. At the end of every billing cycle the person from service provider has to visit the place where the meter is placed to get the reading and either note it down or takes an image of energy meter for further data processing (i.e. for generating the bill). By using this system save the time required for conventional billing system and minimized human work load. User and service provider both are get correct reading and bill amount. AMR (Automatic meter reading) System can provide message at hourly, daily and monthly by the request. This technology reduced the man power, reading collection time, theft of electricity also avoids late bill payment. By apply this system data security improved. And improve customer and service provider services the information also provided to the electricity department and to the user using GPRS technology for bill payment purpose.

**Keywords---** Microcontroller, Energy Meter, Opto Coupler, GPRS, RTC, Current Sensors.

## I. INTRODUCTION

Now a day energy meter reader goes to every premise and takes the reading manually then issues the bill. In manually reading human error possible and not provide reliable meter reading. An energy meter is a device which is used to measures the consumption of energy of any residence or other industrial establishment. If any consumer did not pay the bill, the electricity worker needs to go to their houses to disconnect the power supply. The wide proliferation of wireless communication propose and explore new possibilities for the next generation Automatic Meter Reading (AMR) whose goal is to help collect the meter measurement automatically and possibly send commands to the meters. Problem associates with traditional meter reading have been increased day by day, due to various reasons such as rapid growth in population, tedious location, environmental conditions etc. But with new developments of microcontroller, there are many improvements in automating various industrial aspects for reducing manual efforts. In traditional meter reading system in which utility usages are written on paper by workers, there is lot of chances of human errors. This study proposes a wireless ARM- based automatic meter reading & control system (WAMRCS).It uses Current & Power Transformer to read current & Voltage parameters of incoming electrical signal. In the proposed system we are using individual current transformers and resistor circuits for measuring power parameter of individual devices so the microcontroller will

reads the data from transformer and resistor circuit and send to the LCD display to show the parameter and also it will send to the web server by using GPRS so that we can monitor parameters from anywhere.

## II. BLOCK DIAGRAM

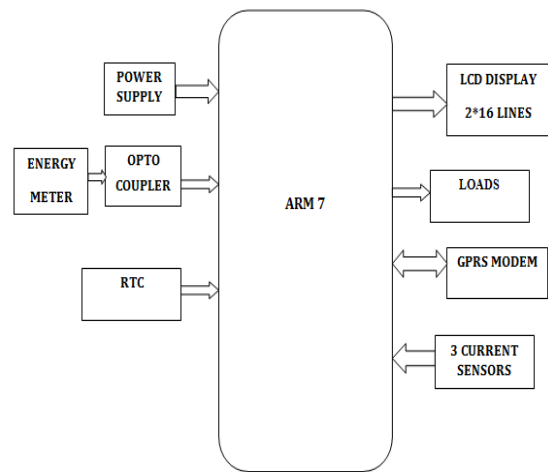


Fig.1: Block Diagram

### System Overview

#### Micro controller:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

#### ARM7

ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

#### Liquid-crystal display (LCD)

It is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

Manuscript received February 01, 2019

Perala Vinay Kumar, M. Tech (E.S.), SR Engineering College, Ananthasagar, Warangal Urban, Telangana, India. (e-mail:peralavinay@gmail.com)

B. Saritha, M. Tech, Asst. Prof., SR Engineering College, Ananthasagar, Warangal Urban, Telangana, India. (e-mail:banalasarita@gmail.com)



*Power Supply Unit*

Supply of 230v, 50Hz ac signal from main supply board is given to a step down transformer. The transformer is selected such that its output ranges from 10v to 12v. Thus the main function of the power supply is to give the voltage supply required for the logic families, which is an output of +5v. 5v regulated supply can be shown as below. Power Supply Unit Diagram The ac voltage typically 230v is connected to the transformer, which steps the ac voltage down to initially filtered by a simple capacitive filter to produce a dc voltage usually has some ripple or ac voltage variation. A regulator circuit can use this dc input to provide regulated that not only has much ripple voltage. This voltage regulation is usually obtained using one of a number of proper voltage regulation IC units.

*Energy meter*

An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establish billing cycles and energy used during a cycle.

*Opt coupler*

Where small size, higher speed and greater reliability are important, a much better alternative is to use an Optocoupler. These use a beam of light to transmit the signals or data across an electrical barrier, and achieve excellent isolation. Opt coupler typically come in a small 6-pin or 8-pin IC package, but are essentially a combination of two distinct devices.

*GPRS*

This section consists of a GPRS modem. The modem will communicate with microcontroller using serial communication. The modem is interfaced to microcontroller using MAX 232, a serial driver. The Global Packet Radio Service is a TDMA based digital wireless network technology that is used for connecting directly to internet. GPRS module will help us to post data in the web page directly.

**III. RESULTS**



**Fig 4.1: Project Hardware kit arrangement**



**Fig 4.2: Welcome to Meter section shown on lcd display**



**Fig 4.3: Current values of loads**



**Fig 4.4: Units consumption**



**Fig 4.5: GPRS connecting**



**Fig 4.6: Online service**



Fig 4.7: Bill Status



Fig 4.8: Data sending and data updated

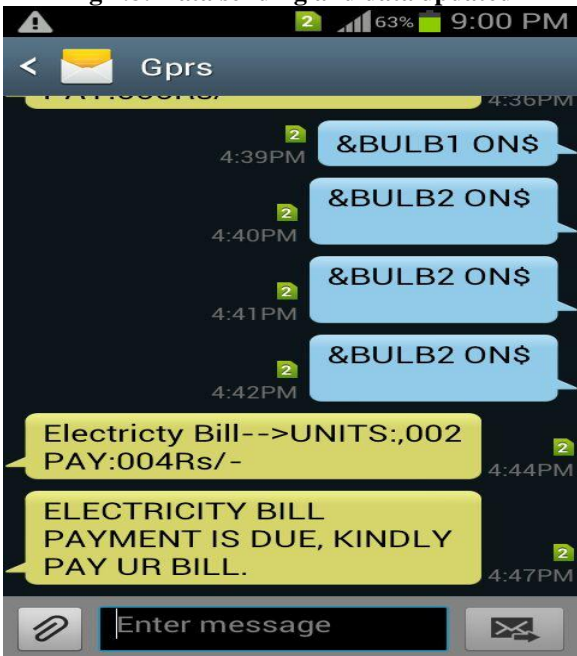


Fig 4.9: SMS sent to the mobile

#### IV. CONCLUSION

By using this embedded system along with GPRS module, provide automation for electrical distribution system. Along with this, it provides better accuracy in meter reading, better control over distribution & management. Same system can be expanded for multipurpose like water & natural gas. Also many users can share same system.

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