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Automatic Energy Meter Reading Through Serial Communication Using Modbus Software

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A B S T R A C T

Now a day the energy meter monitoring and taking the readings needs lot of manual power. It is also an urgent problem that the household wants to solve it because, the accuracy and real time of meter data copy affects the power system information level, management decisions and economic benefits. We overload electrical circuits it could cause a fire and load demand. The home appliances, which consume more power, cause an increase in the payment of excessive bills. Automatic Meter Reading (AMR) technologies in Electrical Utilities have been exploiting their own infrastructure to bill their customers in an efficient and economical way.

Keywords:RS – 485 converters, RS485 Cable, Modbus / Modscan Software, Smart Energy Meter Having Serial Communication Port, Web Server.

1. INTRODUCTION

Electricity is the building block for the development of any nation. It directly affects the economic growth of the country. Now a day the person from electricity board goes to every premise and takes the reading manually and then issues the bill. In manual reading there are chances of error while making the electricity bill. An energy meter is a device which is used to measures the consumption of energy of any residence or any industrial establishment. In earlier days, to measure electricity consumption the electricity board hire's a person who visit each and every house and record the data from the energy meter manually. This is too laborious. In this metering system people try to manipulate meter reading by adopting various corrupt practices such as current reversal or partial earth fault condition, bypass meter, magnetic interference etc. In case consumer haven't pay the bill, the electricity board worker needs to go to their houses to disconnect the power supply. The wide escalation of wireless communication proposes and explore new possibilities for the next generation which is Automatic Meter Reading (AMR) whose purpose is to collect the meter data automatically and send it to the electricity board as well as consumer. Automation ranges from connecting to a meter through an RS-485 interface for transmitting the meter reading all the way from the meter to the utility company via web server through software.

1.1. Important Terminology

SMART ENERGY METER:A smart energy meter is a device which is used to measures the consumption of energy of any residence or other industrial establishment. It has a serial communication port inbuilt in the energy meter.

RS-485 TO USB CONVERTER: It is used to enable personal computers to connect with RS-485 compliant devices on industrial automation networks.

MODBUS SOFTWARE: It is a serial communication protocol. It has become a communication protocol and is now commonly available for means of connecting industrial electronics devices. It is developed for industrial application. It is relatively easy to

deploy and maintain compared to other standards. It can enable communication among many devices connected to the same network.

1.2. Proposed System

In our project, we are going to implement a software based, reliable and efficient power metering system for electricity board and consumer. Automatic Meter Reading helps the customer and energy provider to access the accurate and updated energy meter data from the energy meters. It will gather the data from energy metering devices and transmits to the electricity board in order to process billing on monthly basis. The concept of serial communication is used for the transfer of data from energy meter to the software via RS485 communication cable. This system will monitor the consumed power in particular home and transmitted the data via serial communication. It can fetch consumption at hourly, monthly, bimonthly, yearly basis on request or even in Real Time.

2.METHOLOGY

2.1 Hardware

This project consists of an energy meter which is an important part of the system. It is used to read the data of energy consumption and that energy meter is interface through a serial communication cable RS-485. The energy meter has the port inbuilt inside it which is used for the serial communication. The port is used for to transmitting the energy meter reading through the RS-485 cable to the software. By applying the 1 phase 230V AC supply the energy meter will start counting the unites. The meter reading then transmitted through the RS-48 cable to the Modbus software.

Fig. 2.1.1Energy Meter

Fig. 2.1.2 RS-485 to Converter

2.2 Software

Modbus software is a serial communication protocol. It has become a communication protocol which we are using in this project. The energy meter data is converted by the RS-485 to USB converter. The data then is displayed in the software. The computer work as a master and the energy meter work as a slave. By entering the slave id of the energy meter in the Modbus software the energy meter is then connected to computer. By entering the address and length we will get the different data for example device id, voltage, current, active power, phase current, neutral current, power factor, frequency, total tamper count, maximum demand, real time etc. These data are then transmitted to the website through a drive which is link in the website. Website has the energy meter data which are been upload in the drive. Different consumer will have their different login id and password where their energy meter data is upload. The consumer can access the data by login in the website. They can see their energy consumption weekly, monthly, bimonthly or yearly if they want to see. They can also see the weekly, monthly, bimonthly or yearly database. This is for the residential area. It can be done for the industrial purpose.

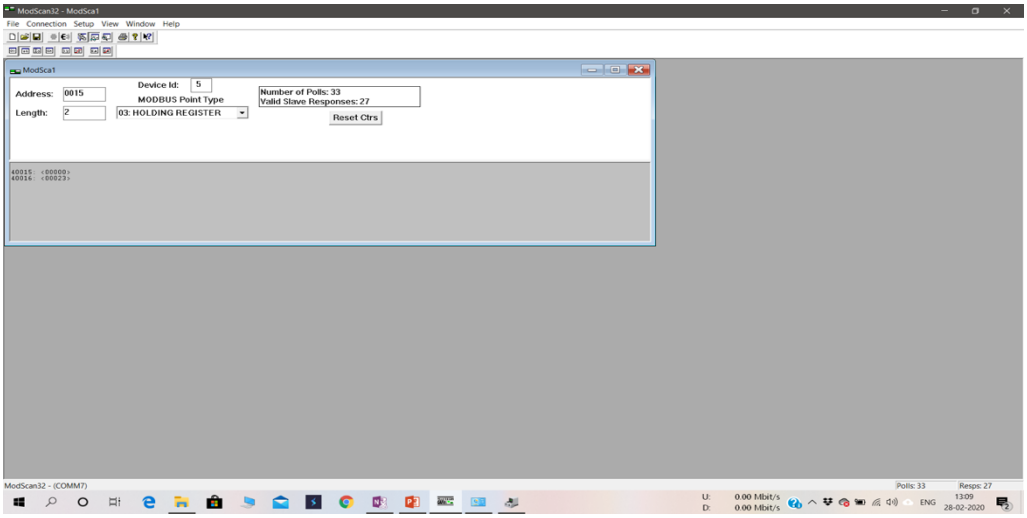


Fig 2.2.1 Modscan32 Software

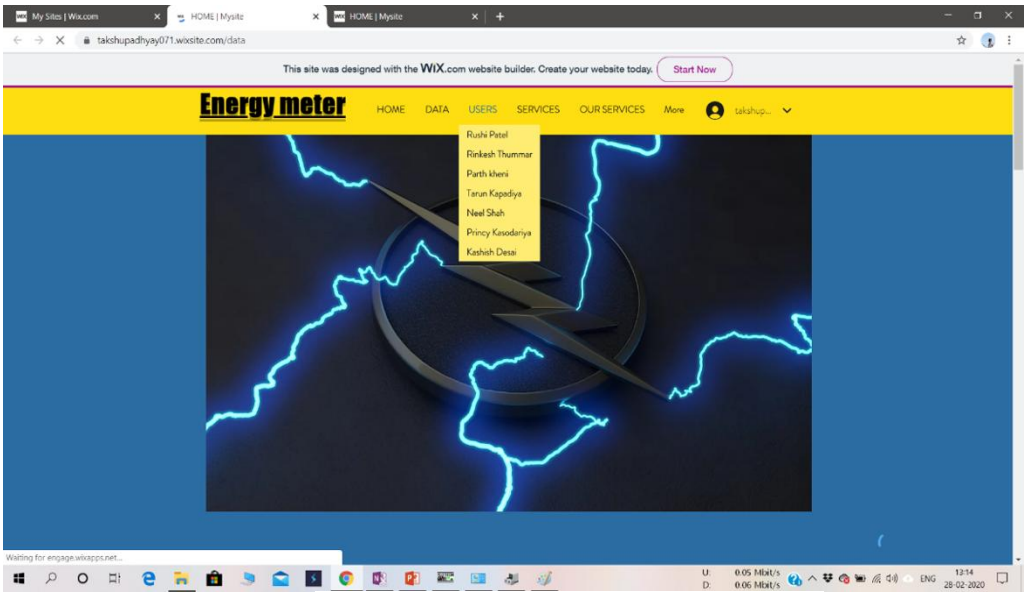


Fig 2.2.2 Website for The Consumer

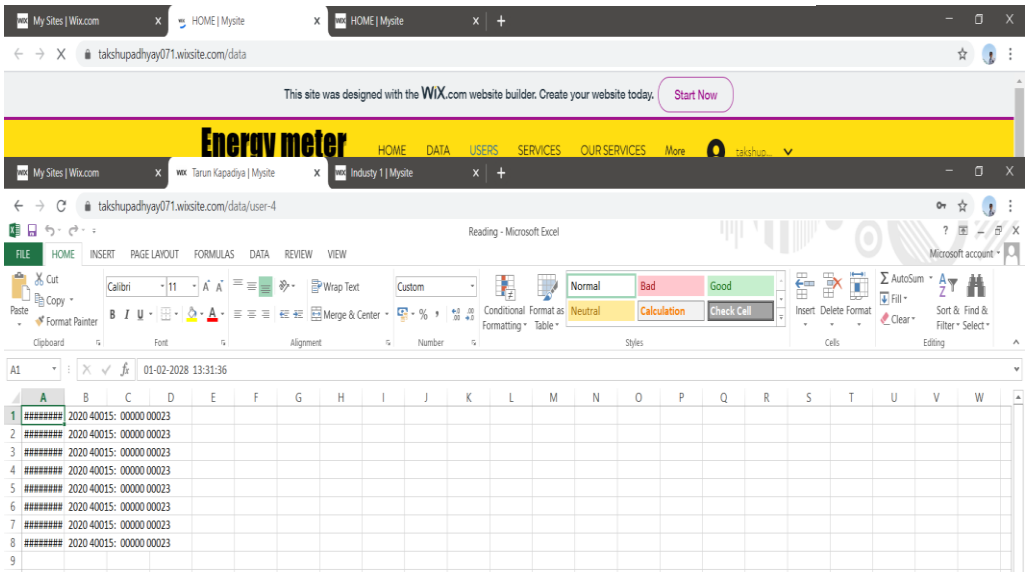
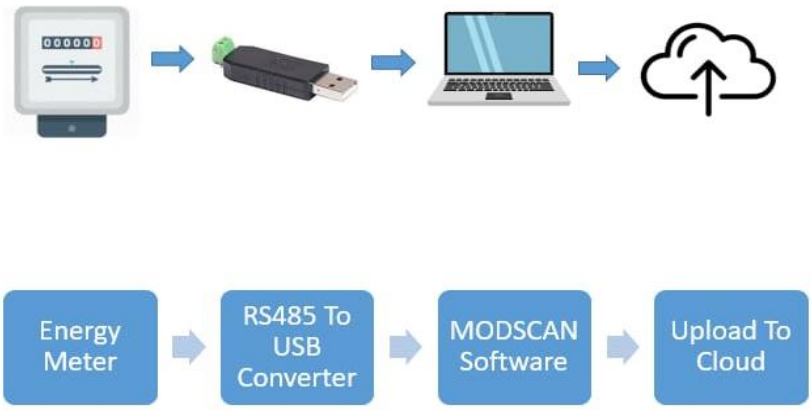


Fig 2.2.3 Energy Meter Data of The Consumer

2.3 Block Diagram



3.MERITS

- The system helps to maintain the data properly.
- This system is very accurate, simple and low power consumption which is used for the real time applications.
- Electricity Board side is easy to manipulate for bill generation and other such task.
- Accurate meter reading, no more estimates.
- Improved billing.
- Accurate profile classes and measurement classes, true costs applied.
- Improved security and tamper detection for equipment.
- Energy management through profile data graphs.
- Less financial burden correcting mistakes.
- Less accrued expenditure.
- Transparency of "cost to read" metering.
- Improved procurement power though more accurate data.

4.DEMERITS

Risk of loss of privacy.

Increased security risks from network or remote access.

5.CONCLUSION

In the present work wireless meter reading system is designed to continuously monitor the meter reading and it avoids the human intervention, provides efficient meter reading, avoid the billing error and reduce the maintenance cost. It displays the corresponding information on software for user and mainly it maintains the database of meter reading which received by the consumer energy meter.

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