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Meter SCADA

Anjum R. Mulla, Pallavi A. Mane, Utkarsha U. Landge

Department of Electronics and Telecommunication Engineering

Sanjay Ghodawat Institute, Atigre, Maharashtra, India

Abstract-*Meter SCADA is a category of software application program for process control deals with the supervisory control of the energy meters, gathering of data in real time from remote location in order to control the energy consumption. Development of a Arduino Based electronic system situated at the Energy Meters of various location of Company and the same meter reading can be accessed by the Server place. This system will be helpful for getting the power consumption data on the set time every day , which will help to the management to find the actual production cost. Arduino counts the pulses from the meter and sends that pulses in the form of units to the server using NodeMcu WiFi module. Advantage of using WiFi module is to send the data to the server is that it can send data over large distance rather than Zigbee which works only for limited range.*

Keywords—*Energy submeter, NodeMcu WiFi module (ESP8266), Arduino board and server (PC).*

1) INTRODUCTION

Now a days the electricity is very important resource in the industrial areas. Today our country is in the developing state, so industrialisation is in rising state, due to which electricity consumption is also in increasing state. So in industries to get maximum profit with less electricity consumption by monitoring the energy meter readings.

In the industries whether it is small scale industry or large scale industry there are number of different manufacturing units which works on their own manufacturing processes. Different energy submeters are allocated to each manufacturing unit as each manufacturing unit consume different amount of electricity .

In all industries it is required to keep the record of raw materials required and record of power consumption to observe the investment for the production and outcome from it. In order to keep the records of total power consumption of industry, we have to keep the records of daily power consumption of each manufacturing unit. Still in some industries that work is done manually by visiting each manufacturing unit. Due to that manual work there is less possibility of keeping record of power consumption of each unit. So we have designed the project which is situated at the energy submeter which transfers the consumed electricity units on the server. So that it will gather energy meter readings of each unit on the server and also all the meter readings are available for the observer at any time.

2) DESIGN OF HARDWARE SYSTEM

2.1) System structure

In proposed work the system consist of arduino, Node Mcu WiFi board, energy meter , LCD Display, server (PC).

A energy meter is electronic digital meter in which there is no moving part so it is called as static energy meter .in energy meter proper functioning is achieved by ASIC (Application specified integrated circuits). ASIC is made with the helpof embedded system in addition to ASIC , analog circuits voltage and current transformers etc are also present in EEM to sample the current and voltage. Output of ASIC is available as pulses indicated by LED . this pulse are equal to average kilowatt hours . kilowatt hours is the unit of measurement .

Meter pulses is interfaced with arduino uno. Arduino uno operates on 5v and counts the pulses from the energy meter due to its simplicity and good features it is better than that of other . That counted pulses by the arduino are displayed on the liquid crystal display(LCD).LCD consist of two registers, command register and data register.

NodeMcu WiFi board(ESP8266) is used for data transmission over long distance.ESP8266 is the name of the microcontroller designed by Espressif systems. The ESP8266 itself is self contained WiFi networking solution offering as a bridge from existing microcontroller to WiFi and is also capable of running self contained applications. With the help of NodeMcu WiFi board we can send data through internet to server over wide range and securely. Depending on the type of load the electricity will be consumed accordingly

Block diagram:

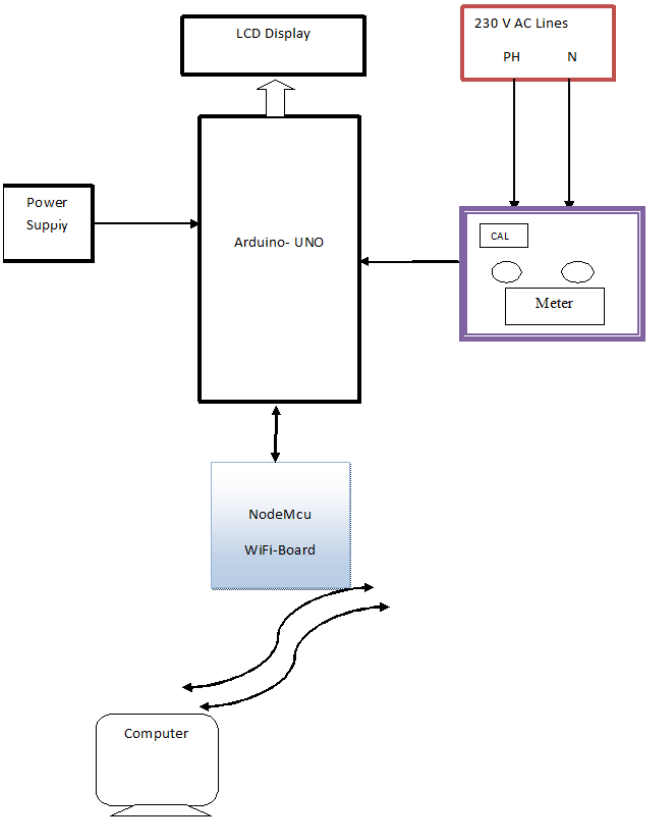

Figure 1. Block daigram

2.2) working:

In this project , energy meter is the main basic part. In some industries power is distributed by main MSEB board and some industries develop their own power. In case where power is distributed by the MSEB board, it is provided by their main MSEB meter. And then from that main MSEB meter, the electricity is distributed in different sectors of the industry. In each sector of the industry a energy submeter is allocated which takes electricity from the main MSEB meter.

Basic unit of power is watts. 1000 watts is 1kilowatt. If we use 1 kilowatt in 1 hour , it is considered as 1 unit of energy consumed . These meters measure the instantaneous voltage and currents, calculate its product and gives instantaneous power . This power is integrated over a period which gives the energy utilized over that time period . In electronic digital energy meter, the input data is compared with the reference data (voltage) and finally a voltage rate will be given to the output. This output is then converted into digital data by A/D converter present in ASIC. Digital data is then converted into average value. Average value or mean value is measuring unit of power. Output of ASIC is available as pulses indicated by LED. From that continuously blinking LED, pulses are drawn. That pulses are given to the analog pin A0 of arduino board. That arduino will count that drawned pulses from the meter. As per the standard specification of the meter it will count one unit for 3200 pulses. So in arduino when it counts 3200 pulses it will display it as one unit on the LCD display. A 16*2 liquid crystal display (LCD) is interfaced with the arduino board as shown in the block diagram. LCD is used in 4 bit mode. Data transmission is done in upper 4 bit mode. In which D7, D6, D5, D4 are used for data transmission and that pins are connected to the digital pin number 2, 3, 4, 5 of arduino respectively.

After counting the pulses from the energy meter, to send that counted pulses in terms of units to the server is the main purpose of this project. We can send this counted data of arduino to the server using different methods like using zigbee, using GSM or any other methods. But instead of using zigbee and GSM we can go with very advantageous method such as using NodeMcu WiFi board. The main advantage of using WiFi module is that we can send data over large distance than zigbee. So in order to send arduino data to the server we have to interface arduino to the ESP8266 WiFi board. There are several methods available to interface arduino to WiFi module. In this project we are using method as sending arduino data to the webpage using WiFi. For this we need an IP address of either global or local server. Here we are using local server. ESP8266's Vcc and GND of arduino is connected with 3.3V. By using software serial library here, we have allowed serial communication and made them Rx and Tx.

First of all we need to connect our WiFi module to WiFi router for network connectivity. Then we will configure the local server, send the data to web and finally close the connection. After which the power consumption of each unit or sector will be available on the server and easily available for the observer at any time.

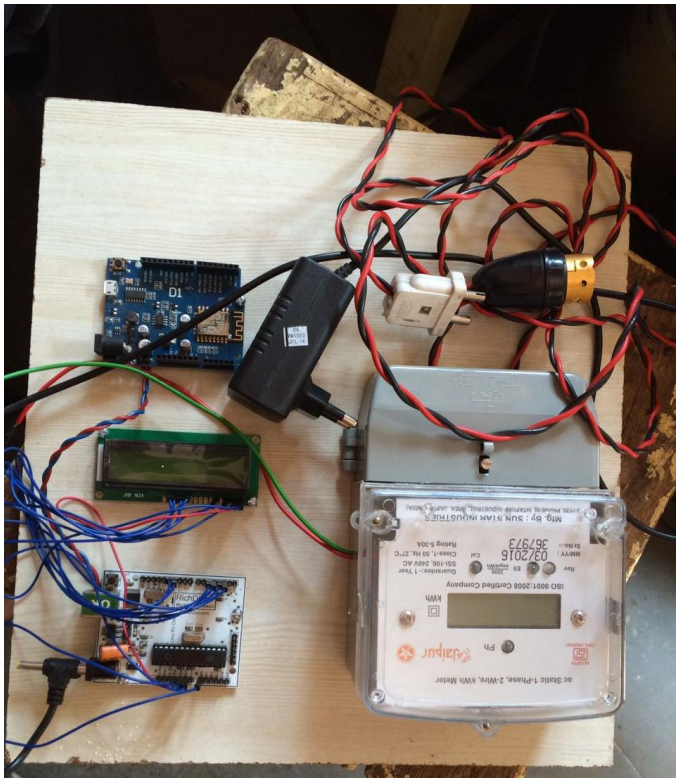

Figure2. Hardware of Excavator moniyoring system

3. REFERANCE

1] Arduino tips, tricks and technique by lady ada.

2]Design and development of energy meter by Abhinandan Jain, Dilip kumar, Jyoti kedia.

3] EDGEFX.in kits and solutions.

4]Sending data from arduino to webpage using WiFi by Saddam.

4. CONCLUSION

The meter scada system play the important role in remote monitoring of the energy consumption of the meters situated at different sectors of industry and also stores the records of daily power consumptions of each meter on the computer.