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DESIGN AND IMPLEMENTATION OF POWER SYSTEM MAINTANANCE USING IOT

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ABSTRACT

The technologies are developed at a faster space and we utilize the technology to meet our needs.

We know that every technological appliance we use in our day to day life requires a power supply to operate. But the electrical energy we use is not available for free of cost. But the natural energy which is present in our lives is utilized at a very low percentage. But utilizing that energy comes handy and requires no payment for the consumption of energy. We have multiple sources to generate energy and utilize them. So we employ the concept of providing multiple energy sources to the system. Whenever the voltage from a particular system is low, then the alternative renewable source (solar) is used. For transfer the operation of system we use we wireless communication (IOT).

Keywords: PIC16F877A Micro Controller, IOT, Voltage Ensor, Solar, Transformer, Bridge Rectifier, Driver Circuit.

I.INTRODUCTION

Solar is the first energy source in the world. It was in use much earlier before humans even learn how to light a fire. Many living things are dependent on solar energy from plants, aquatic life and the animals. The solar is mostly used in generating light and heat. The solar energy coming down to the planet is affected by the orbital path of the sun and its variations within the galaxy. In addition, it is affected by activity taking place in space and on the sun.

It was this energy that is believed to have been responsible for the breaking of ice during the ice age, which creates the separation of lands and sea. Solar energy is one the alternative energy source that is used most widely across the globe. About 70% of the sunlight gets reflected back into the space and we have only 30% of sunlight to meet up our energy demands.. Solar energy can be extracted either by Solar Thermal or using Photovoltaic (PV) Cells. Learn more about these methods here.

WIND ENERGY is one of the energy sources that have been in use for a very long time and for centuries. It was used in powering sailing ships, which made it possible for explorers to sail around their trade routes in distant lands. A single windmill can power the crop irrigation, and the family energy needs, water pumping and electric lights. However, in the present time there are several windmills that are used to generate required energy mostly for industrial uses.

Many of the wind turbines can capture much power all at once before feeding it to the power grid. This is commonly known as wind farms and has been in use for many years all round the world. It is only the United States that is going slow in terms of accepting this alternative energy source.

The standard formula for calculating energy to be expected from a wind turbine expressed in metric terms is:

Energy generation in units = $(1/2)\ pV^3AEH$

Wind power is renewable source of energy and reduces our alliance on foreign countries for supply of oil and gas. It does not cause any air pollution and have created several jobs in last few decades. Advancement in technologies has brought down the cost of setting up wind power plant.

Though wind power is non-polluting, the turbines may create a lot of noise, which indirectly contributes to noise pollution. In addition to that, if the natural frequency and the tower frequency match then the windmill system may bust. That limits the cut out frequency around 18 m/s.

However, from equation (1) it can be observed the system operation increases by one then the power generation will increase in power of three. Hence, in this work, the tower has been removed and tethered rotorcraft is employed in the wind energy conversion system to absorb the power in the wind.

Geothermal Energy 'Geo' means Earth and 'thermal' means energy. Geothermal energy means energy drawn or harnessed from beneath the earth. It is completely clean and renewable. Geothermal energy has been in used since last several years. The earth contains a molten rock called magma. Heat is continuously produced from there.

The temperature increases about 3 degrees Celsius, for every 100 meters you go below ground. Below, 10,000 meters the temperature is so high, that it can be used to boil water. Water makes its way deep inside the earth and hot rock boils that water.

The boiling water then produces steam which is captured by geothermal heat pumps. The steam turns the turbines which in turn activates generators. Read more about working of Geothermal energy here. Geothermal energy can be found anywhere on the earth.

Most countries tap this energy to generate electricity, using thermal mass flow meters, and power millions of homes.

II.PROPOSED METHOD

The system overcomes the drawback in the existing system. The system consists of two different energy sources. The EB supply and the solar panel supply are the two different sources. Both the source voltages are continuously compared using the Voltage sensors. The voltage sensors of two different sources are continuously compared by the controller.

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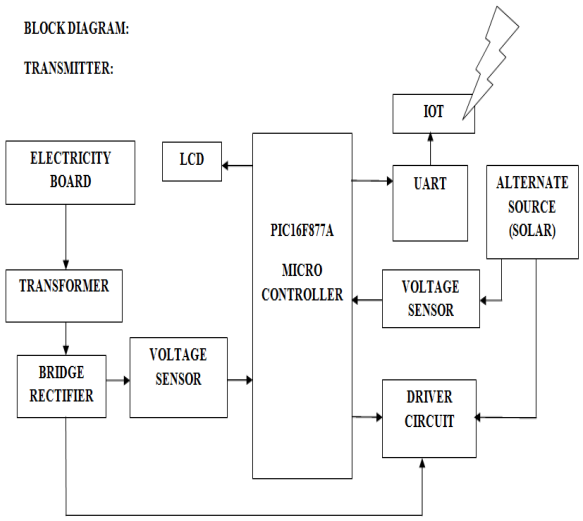


Figure 1Block diagram with various system components

Based on the voltage level the source is connected. The sources are connected using Driver circuit. The driver circuit connects the two different sources based on the signal transmitted by the user. The voltage values and the source connection details are updated to the server using IOT.

III.DESIGN SPECIFICATION

A solar PV system design can be done in four steps:

- Load estimation
- Estimation of number of PV panels
- Estimation of battery bank
- Cost estimation of the system.
- Base condition:2 CFLs(18 watts each),2 fans (60watts each) for 6hrs a day.

a. The total energy requirement of the system (total load) i.e Total connected load to PV panel system

= No. of units × rating of equipment

= 2× 18 + 2 × 60 = 156 watts

b. Total watt-hours rating of the system = Total connected load (watts) × Operating hours

= 156 × 6 = 936 watt-hours

c. Actual power output of a PV panel

= Peak power rating × operating factor

= 40 × 0.75 = 30 watt

d. The power used at the end use is less (due to lower combined efficiency of the system

= Actual power output of a panel ×

combined efficiency

= 30 × 0.81 = 24.3 watts (VA)

= 24.3 watts

e. Energy produced by one 40 Wp panel in a day

= Actual power output × 8 hours/day

(peak equivalent)

= 24.3 × 8 = 194.4 watts-hour

f. Number of solar panels required to satisfy given estimated daily load :

= (Total watt-hour rating (daily

load)/(Daily energy produced by a

panel)

=936/194.4 = 4.81 = 5 (round figure)

g. Inverter size is to be calculated as :

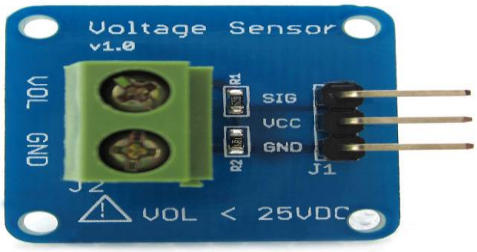
- Total connected load to PV panel system

= 156 watts

- Inverter are available with rating of 100, 200, 500 VA, etc.
- Therefore, the choice of the inverter should be 200 VA.

AC VOLTAGE SENSOR

The Voltage Sensor block represents an ideal voltage sensor, that is, a device that converts voltage measured between two points of an electrical circuit into a physical signal proportional to the voltage. Connections + and – are electrical conserving ports through which the sensor is connected to the circuit. Connection V is a physical signal port that outputs the measurement result.



The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers.

Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections). Pin description is shown in the table below.

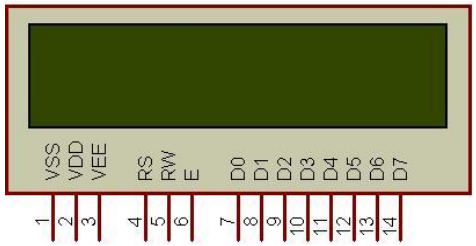


Figure 2: Character LCD type HD44780 Pin diagram

IV.MODELLING OF PROPOSED SYSTEM

IOT

Iot has evolved from the convergence of wireless technologies, micro- electromechanical systems (MEMS) and the Internet. The concept may also be referred to as the Internet of Everything. The internet of things (IoT) is the internetworking of physical devices, vehicles, buildings and other items— embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.

UART data to GPRS based online data. Data may be updated to a specific site or a social network by which the user can able to access the data.

V. DISCUSSIONS AND CONCLUSION

- Automatic synchronization of power system using wireless communication project can be applicable to all the generating stations like thermal, solar, hydro, gas, wind etc., Where fast synchronization is required.
- This project is suitable for certain kind of industrial load which is directly connected to the grid.
- Fast automatic synchronization of power system can be achieved by implementing our project in the existing power system. We can replace the Power Line Carrier Communication with the existing IOT technology. The system becomes more economical.

VI.FUTURE SCOPE

In this project the synchronization is done in low voltage. So, in future this project can be applied for high voltage. While implementing this project in real time, iot communication requires modems over a certain interval of distance.

Our project can be modified by replacing the Mobile and iot communication with Optical Fibre Communication for its high data rate and speed in future.

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