

GRID CONNECTED SOLAR WIND HYBRID POWER BASED ON IOT

Shweta Dhage¹, Mohini Pranjale², Sachin Jambhulkar³, Nisha Warambhe⁴

¹ Student, Electronics & Telecommunication, Priyadarshini J L College of Engineering, Nagpur, Maharashtra, India

² Student, Electronics & Telecommunication, Priyadarshini J L College of Engineering, Nagpur, Maharashtra, Maharashtra, India

³ Student, Electronics & Telecommunication, Priyadarshini J L College of Engineering, Nagpur, Maharashtra, Maharashtra, India

⁴ Assitant Professor, Electronics Engineering , Priyadarshini J L College of Engineering, Nagpur, Maharashtra, Maharashtra, India

ABSTRACT

As demand of electricity is increasing, use renewable energy sources to generate more amount of energy in the industries and home appliances is also increasing. The solar and wind hybrid generation system are economical, freely available in the environment

The two main reason to design solar and wind hybrid generation system using the renewable energy source are power reliability in varying weather condition and cost. In the proposed system, we are introducing the reliability to deliver continuous supply of load and monitoring it with IOT interfacing.

The system consists of a wind turbine, PV solar, charge controller, battery, inverter, grid and IOT system for monitoring electrical parameters of the system . Advantage of IOT system is that the operator can know the updated electrical parameters from anywhere and anytime.

Keyword : - Solar Panel, Windmill, IOT, Renewable Energy

1. INTRODUCTION

The increasing demand for conventional energy sources like coal, natural gas and oil is forcing people towards the research and development of renewable energy sources or non-conventional energy sources. Renewable energy is energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Hybrid energy system is the combination of two energy sources for giving power to the load. In other word it can defined as “Energy system which is fabricated or designed to extract power by using two energy sources is called as the hybrid energy system.” Hybrid energy system has good reliability, efficiency, less emission, and lower cost. Hybrid energy system is combination of two or more renewable energy sources like wind, solar hydro, etc. This provide clean and eco-friendly energy. Due to extreme development in renewable energy technologies and continuously rise in prices of petroleum products, hybrid renewable energy system are gaining more importance of supplying the power to meet the today’s increasing energy demand. This hybrid system can be standalone or can be grid connected.

The grid connected hybrid system is more reliable to deliver continuous power because if there is any shortage of power or fault in the renewable energy sources then the load are directly connected to the grid. A wind turbine converts mechanical energy into electrical energy and it produces output voltage and these AC voltage is converted to DC by the help of AC to DC converter or rectifier. The PV cells converts light energy into electrical energy and produces DC output voltage. Solar cell can generate the electricity required in day while wind turbine can compensate the needs in the night by wind energy .The system consists of a wind turbine, a PV solar, charging

controller, battery, inverter to convert DC to AC of grid and IOT system for monitoring electrical parameters of system. Advantage of IOT system is that the operator can know the updated electrical parameters from anywhere and anytime.

BLOCK DIAGRAM:

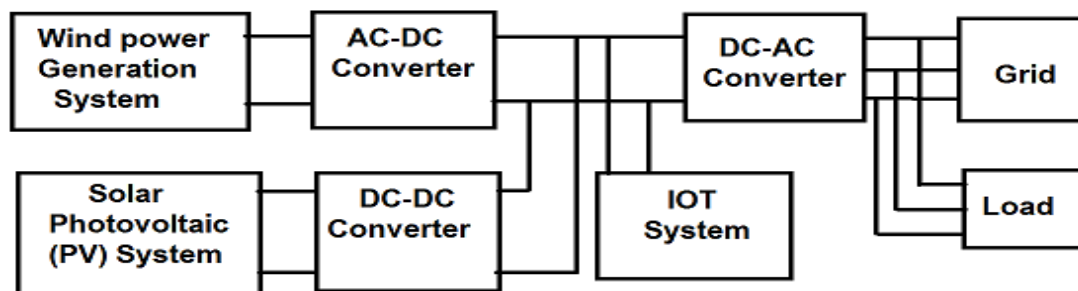


Fig :1.1

Solar Panel: Solar power is the cleanest, most reliable form of energy available, and it can be used in several forms to help power your home or industries. Solar powered photovoltaic (PV) panels convert the sun rays into electrical energy by exciting electrons in silicon cells using the photons of light from the sun. Most of the solar panels are placed on the roof to get sun rays on panel. The solar panels also known as modules contain photovoltaic cells made from silicon that transform incoming sunlight into electricity rather than heat. The energy of solar depends on the installation panel on home and industries

Windmill: Wind power converts the kinetic energy in wind to generated electricity or mechanical power. There are currently two different kinds of wind turbines horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT). Converting wind to mechanical energy wind is converted by the blades of wind turbines. The HAWT are the most common displaying the propeller or 'fan-style' blades and VAWT are usually in an 'egg-beater' style blades.

Charging Controller: A charge controller, charge regulator or battery regulator limits the rate at which electric current is added to or drawn from electric batteries. It prevents over charging and may protect against over voltage which can reduce battery performance or lifespan. And safety risk. It is used to maintain the proper charging voltage on the batteries.

Inverter: Inverter is an electronic device or circuitry that changes direct current (DC) to alternating current (AC). A typical power inverter device or circuit requires a relatively stable DC power source capable of supplying enough current for the intended power demand. An inverter can produce a square wave, modified sine wave, pulse width modulation (PWM).

Grid: An electrical grid is an interconnected network for delivering electricity from producers to consumers. It consists of generating stations that produce electrical power, high voltage transmission lines that carry power from distant sources to demand centres, and distribution that connect individual customers.

IOT : The internet of things (IOT) is the network of physical devices, vehicles home appliances and other items embedded with electronics software, sensors, actuators and connectivity which enables these objects to connect and exchange data.

CIRCUIT DIAGRAM:

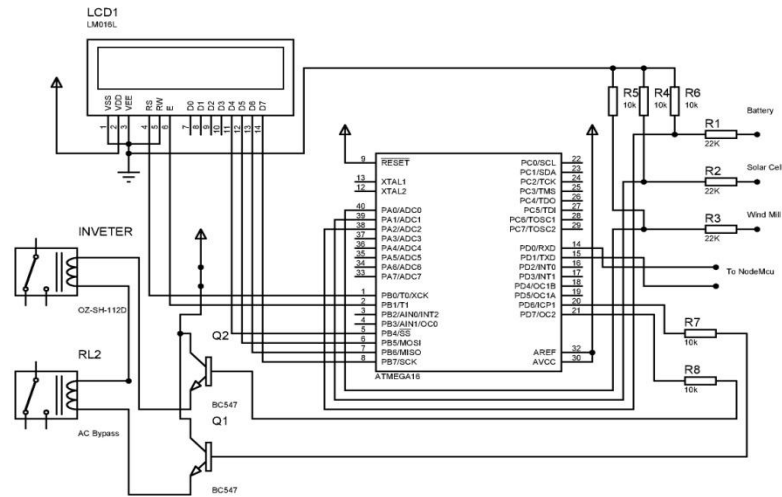


Fig:1.2

PCB LAYOUT :

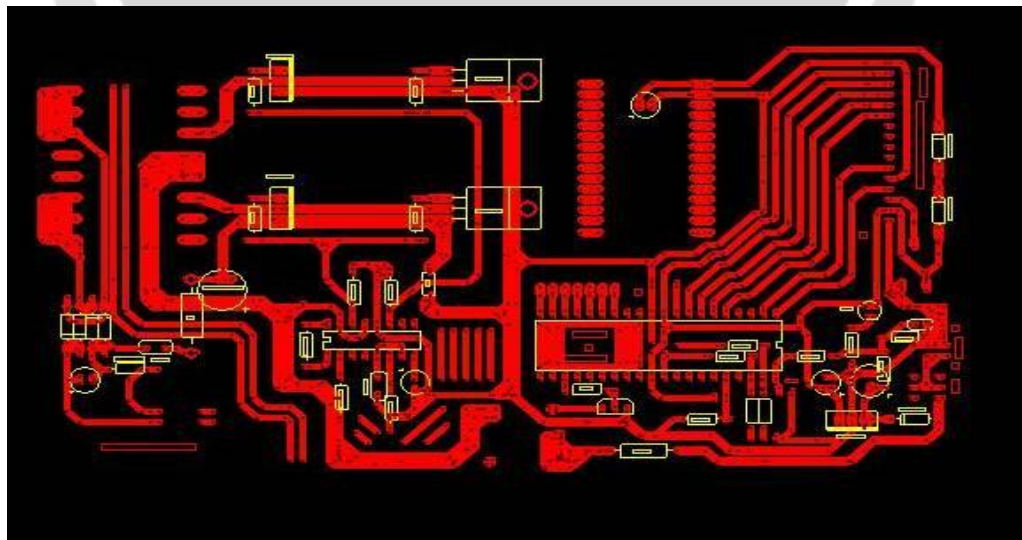


Fig:1.3

WORKING OF PROJECT:**Fig:1.4**

Solar-Wind hybrid Power system is the combined power generating system by wind mill and solar energy panel. It also includes a battery which is used to store the energy generated from both the sources. Using this system power generation by windmill when wind source is available and generation from PV module when light radiation is available can be achieved. Both units can be generated power when both sources are available. By providing the battery uninterrupted power supply is possible when both sources are idle.

The power generated from wind mill is of AC voltage which is converted through AC-DC rectifier. A special type of converter is used to step up or step down through MOSFET switching called “SEPIC” converter for wind mill. For solar system cuk converter is used for the regulation. The micro controller incorporated in this scheme, which regularly refers the operation of sources and switches the corresponding converters and fed into change the battery or to the load through inverters. The output of the inverter is connected with the load and after that the voltage is stepped up by a transformer. The driver circuit is used to give the gate signal for the MOSFET of converters. Hybrid systems are usually built for design of systems with lowest possible cost and also with maximum reliability. The high cost of solar PV cells makes it less competent for larger capacity designs.

OUTPUT OF PROJECT:

APPLICATION:

1. No pollution.
2. clean and pure energy.
3. long term warranty.
4. long term sustainability.
5. cost saving.
6. provide uninterrupted power supply to the equipment.
7. efficient and easy installation longer life.
8. low maintenance cost
9. very high reliability.
10. Operational in all weather.
11. can be used for 24-hour power generation

CONCLUSION :

In the present work a solar PV Wind Hybrid Energy System was implemented. A portion of the energy requirement for a private house, farm house, a small company, an educational institution or an apartment house depending on the need at the site where use has been supplied with the electricity generated from the wind and solar power. It reduces the dependence on single source and has a increased reliability. Hence we could improve the efficiency of the system as compared with their individual mode of generation

REFERENCES

- [1] *Kalaiarasi. D, A. Anusha*, "Enhancement Of Hybrid Power System Using IOT," in the International Journal of the Advanced Research Trends in Engineering and Technology (IJARTET) ,Vol 3,Special Issue 19 ,April 2016.
- [2] *Ashish. S. Ingole, Roshan. S. Rakhonde* "Hybrid Power Generation System using Wind energy and Solar energy," in International Journal of Scientific and Research Publications, Volume 5, Issue 3, March 2015 1, ISSN 2250-3153.
- [3] *Pragya Nema, Saroj Rangnekar* "A current and future state of art development of hybrid energy system using wind and PV-solar "in November 2008.
- [4] *Wei Zhou, Hoxing Yang* "A Novel Optimization sizing model for hybrid solar-wind power generation system" in International Journal in, vol. 81, Number 1. 2007