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Review on Integration of Solar and Hydro Power Plant Connected on Grid

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ABSTRACT: Renewable energy systems (RES) are an attractive option for electrifying the community as they are environmentally friendly, free and pervasive. The efficiency of these energy systems can be improved by their very low, parallel integration. In this article, water and solar energy systems are considered RES and are connected to the utility grid. Due to the intermittent nature of both water and photovoltaic energy sources, the utility network is connected to a system that provides a continuous flow of energy. The hydropower system uses a self-exciting induction generator and converters. The DC / AC converter serves as an interface for connecting the hydro turbine and the utility network to match the generated voltage to the utility network voltage.

The solar system is a combination of a PV array, a boost converter and a solar inverter. Both hydropower and solar power plants are controlled via a permanent current regulator. The analysis was designed to confirm the existence of the proposed system.

KEYWORDS*:* Renewable energy, solar and hydro, converter, AC & DC

I. INTRODUCTION

Recently, researchers are investigating solar- and water-based hybrid energy systems. This hybrid energy system can be implemented in areas where solar and water resources are moderate in nature. The problem with this hybrid system is that water and solar systems cannot generate electricity at the same time on summer / rainy days because one cannot generate electricity.To meet the power demand, the integration of the electrical network or the diesel generator is required. To power electricity in rural areas with this hybrid system.A system is proposed in which a hybrid energy production system based on water and solar energy is connected to the utility network. There is an abundance of solar energy available during peak summer times, but on rainy days it is difficult to generate electricity from solar energy. Similarly, hydropower generation results in better efficiency in rainy seasons. Thus, a parallel combination of these two energy systems has been used and is also connected to the DC grid. In summer, the grid-connected solar system will supply the load and the water system will be disconnected. On rainy days, the grid is connected to the mains and the solar system is switched off.

In other seasons, grid-connected solar and water systems are able to deliver electricity to the consumer. It is therefore a good opportunity to adopt the proposed system for the continuous supply of electricity to the consumer.

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II.LITERATURE REVIEW

1) R. A. Al Hasibi, S. P. Hadi, and S. Sarjiya, "Integrated and simultaneous model of power expansion design with distributed generation," International Review of Electrical Engineering (IREE), vol. 13, no. 2, 2018. 116–127.
This study deals with a grid-connected photovoltaic (PV) generation system. To make the PV generation system more flexible and expandable, the backstage circuit consists of a high-stage converter and a pulse width modulation (PWM) inverter.
2) H. Hilal, Riza, A. Prastawa, and T. Matsumura, "Managing Renewable Energy through Distributed Electricity Generation through Energy Management System Technology: A Summa Smart Micro Grid Case," Proceedings of the Conference on Power Engineering and Renewable Energy (ICPERE), 29 –31. p., Solo, Indonesia, October 2018
This article presents the application of a new method to provide a constant power to the electricity grid for a period of time (over an hour) from the production of renewable solar energy sources to the energy management system
3) Erinofiardi, P. Gokhale, A. Date et al., "A review of micro hydropower in Indonesia," Energy Procedia, vol. 110, 316–321, 2017.
The micro-hydropower plant may use a reaction or pulse turbine, depending on the available resources

III. SYSTEM DEVELOPMENT

A. Hydro power system:

Hybrid power generation is an energy production system that combines two or more plants with different energy sources. These generators are typically used for isolated networks, so that synergies can be achieved that provide economic and technical benefits. The basic configuration of a hybrid power generation system can be divided into three parts, namely a serial hybrid system, a parallel hybrid system, and a hybrid coupled system. The hybrid power plant discussed in this study is a renewable energy plant derived from solar and hydropower.The configuration used is a parallel hybrid system as it offers advantages in continuity and is not interdependent. The hydropower plant is a producer of pollution-free and environmentally friendly renewable energy. The plant converts the kinetic energy of the water into mechanical energy in the form of the rotation of a hydro turbine, which is then used to rotate a generator to generate electricity.Hydropower is the world's oldest energy conversion technology. Small-scale hydropower has generally been used since the early 20th century. The condition of water that can be used as an electricity generating resource is one that has a specific flow and altitude capacity, because the electricity produced by micro-hydropower also depends to a large extent on the height of the waterfall and the water discharge.The higher the flow capacity and the installation height, the greater the electrical energy that can be generated. The potential of micro-hydropower in irrigation canals shows that hydropower in irrigation canals can generate electricity using hydropower technology.

B. Hybride system:

Researchers have recently investigated solar and water-based hybrid energy systems to make this hybrid energy system feasible in areas where solar and water resources are moderate in nature. To meet the power demand, the integration of the electrical network or the diesel generator is required. With this hybrid system, the electricity network can be integrated for the supply of electricity in rural areas, and a diesel generator can be installed for the supply of remote / isolated areas.A system is proposed in which a hybrid energy production system based on water and solar energy is connected to the utility network. There is an abundance of solar energy available during peak summer times, but on rainy days it is difficult to generate electricity from solar energy.Similarly, hydropower generation results in better efficiency in rainy seasons. Thus, a parallel combination of these two energy systems has been used and is also connected to the AC grid. In summer, the grid-connected solar system will supply the load and the water system will be disconnected. On rainy days, the grid is connected to the mains and the solar system is switched off. In other seasons, grid-connected solar and water systems are able to deliver electricity to the consumer. It is therefore a good opportunity to adopt the proposed system for the continuous supply of electricity to the consumer

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C. Solar Energy System.

When sunlight falls on the solar cells, a large number of photons collide with the p-type region of silicon. The pair of electron and hole are separated after absorbing the energy of the photon. The electron travels from the p-type region to the n-type region under the action of an electric field at the p-n transition.
Furthermore, the diode is inverted biased to increase this electric field. So this current starts to flow in the circuit of each solar cell. We combine the currents of all the solar cells in a solar cell to get significant power. In solar power plants, a large number of solar cells are connected to receive a high voltage.
The electrical energy from the combined effort of the solar cells is stored in lithium-ion batteries, which are powered at night without sunlight.
According to the power demand, several photovoltaic modules are electrically connected to form a PV array and achieve higher power. Different types of PV systems exist according to work
Direct PV Systems: These systems only supply the load when the sun is shining. The electricity generated is not stored, so the batteries are missing. The inverter may or may not be used depending on the type of load
Off-grid systems: This type of system is usually used in places where there is no power or unreliable power from the mains. The off-grid solar system is not connected to any electrical supply
Grid connected systems: These solar power systems are tied with grids so that the excess required power can be accessed from the grid. They may or may not be backed by batteries

Block diagram:

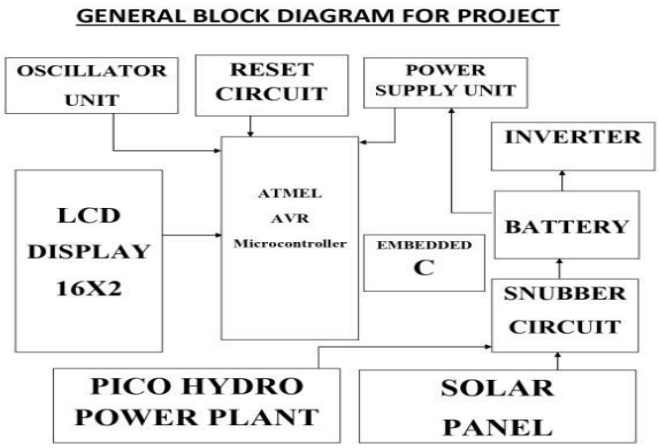

Fig1.1 Block diagram of project

IV. RESULT

Solar energy and water are free renewable sources in nature. This source is capable of generating electricity, and as fossil fuels are declining day by day, we use these alternating sources to meet our requirements.

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V.CONCLUSION

In a hybrid power plant, we generate electricity using two different sources and connect that electricity to the grid.

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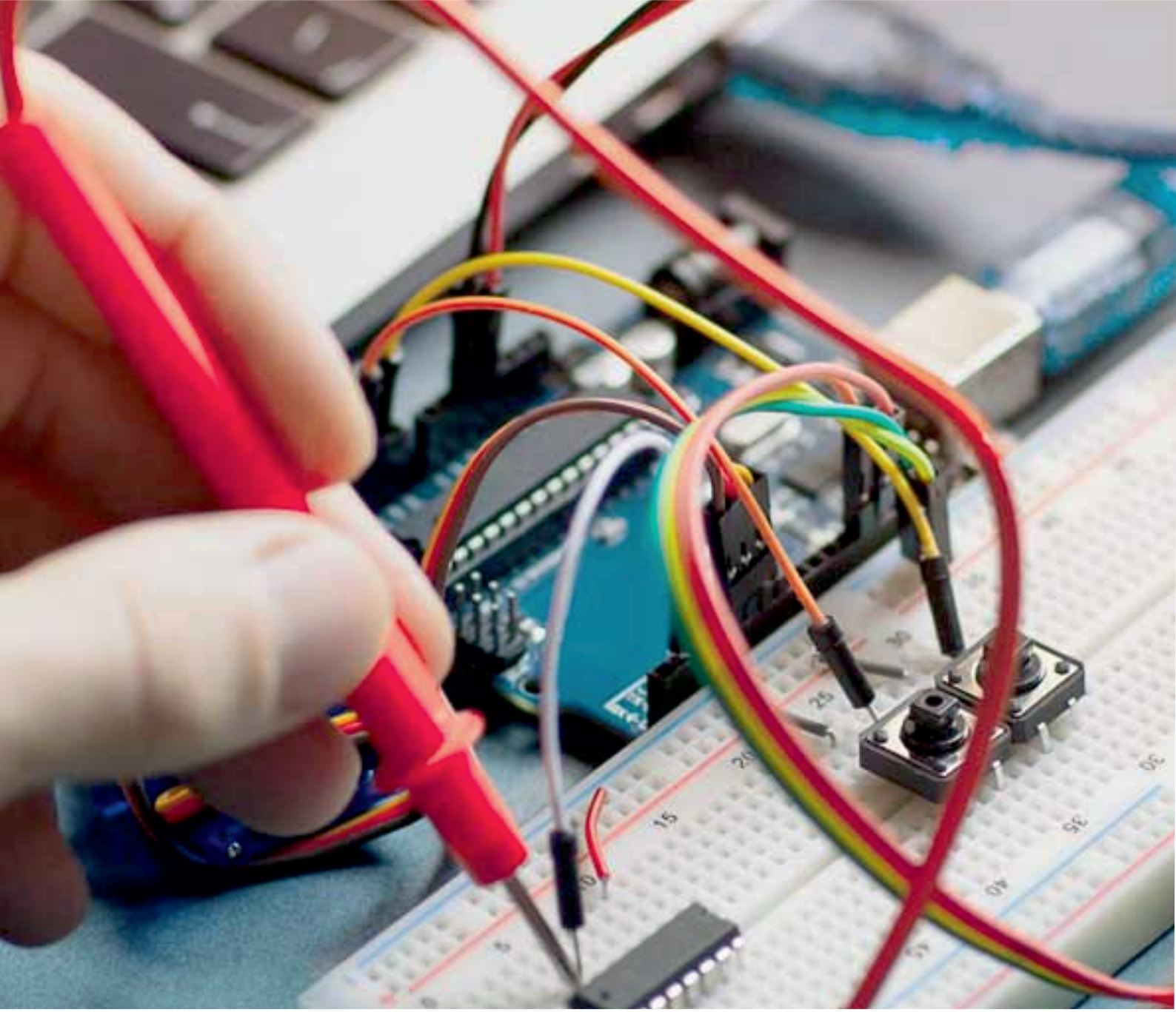

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