Development of Hybrid Power Generation Model Using Rain Water, Solar and Wind

[1] Sunita S Malaj, [2] Sujata.S.Kamate

[1][2] Assistant Professor, Hirasugar Institute of Technology, Nidasoshi, India

***Abstract*--- Here in this paper we are presenting design of a hybrid power system model that is mainly designed to meet the increasing energy demand through nonconventional energy sources. In this hybrid model, Solar, Wind and Rain water resources have been used to generate electricity. This configuration allows the three sources to supply the load separately or simultaneously depending on the availability of energy sources. The objectives are to convert the solar, wind and rain water into electricity and to optimize the energy requirement using these nonconventional energy resources. It reduces the environmental pollution using clean or environmental friendly technology and creates awareness among people regarding renewable energy resources.**

***Index terms*---Solar Panel, Hydel energy, Wind Turbine, Mini or Micro Hydro power**

I. INTRODUCTION

Energy is one of the most fundamental elements of our Universe and vital for the progress of any nation. Renewable energy is the energy that comes from natural resources such as sunlight, wind, rain, tides waves and geothermal heat which are continually replenished. Power consumption is steadily increasing for past few years. Power utilities in many countries around the world are diverting their attention towards more energy efficient and renewable electric power sources. Generation of power through any stand alone energy system cannot meet the requirements, Due to this there is a need to correlate different types of energy systems to supply economical and reliable power, the generating system is known as Hybrid Power Systems. Hybrid power systems are mainly needed for Excess grazing of traditional fuels like coal, gas, diesel, petrol, etc, However to the nuclear power stations, many precautions are to be taken to lessen the risk occurrence in the environment. Over 20,000 million people in 80,000 villages of India were unelectrified due to the problems in locations, transmission economy, running and installation cost.

II. BLOCK DIAGRAM OF PROPOSED WORK

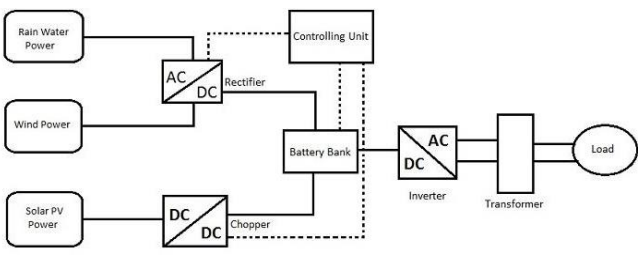


Figure 1 : Block Diagram of the hybrid power system model Block

Diagram Description

We are using following power electronic devices for energy type conversions and voltage level transfers as shown in above figure1. They are

Chopper Source: It is used to obtain variable DC voltage design from fixed DC voltage.

Rectifier: It is to convert the AC form of energy into DC form.

Inverter: It is to convert the DC form of energy into AC form.

Cyclo Converter: It converts the constant AC energy into Variable AC Energy.

Transformer: It transfers the level of voltage i.e from low to high or vice-versa without changing frequency.

Controlling Unit: It is used to integrate all the energy from different sources and controlling all the components in the hybrid power system.

In the block diagram shown in figure1, Solar panel, wind turbines and water turbines are used for power generation.

1. Solar power system consists of three major blocks namely solar panels, PV Cells and batteries. The DC power generated using solar panel can be stored in Batteries and can be used for inverter to feed AC Loads.

2. Wind turbine can define as a fan consisting of 2 or 3 blades that rotate due to blowing wind such that the axis rotation must align with the direction of blowing wind. Ac power is converted to DC using rectifier, this power is stored in batteries and this will be used in inverter to run the AC loads with the help of controlling unit.

3. The power generated by Rain water is stored on roof, this water hits the turbine and EMF is generated and generated power is stored onto the batteries under the monitoring of controlling unit and it can be used for AC loads.

III. METHODOLOGY

Solar Panel Rain Water

Wind

Figure 2 : Hardware Design of IOT hybrid Power generation Model

HARDWARE DESCRIPTION

Solar Energy:

Solar energy, radiant light and heat from the sun has been harnessed by humans since ancient times using a range of ever-evolving technologies. Solar radiation along with secondary solar-powered resources such as wind and wave power, hydroelectricity and bio-mass ,account foremost of the available renewable energy on earth, only a minuscule fraction of the available solar energy is used. Solar powered electrical generation relies on heat engines and photovoltaic. A partial list of solar applications include space heating and cooling through solar architecture, potable water via distillation and disinfection ,day lighting ,solar hot water ,solar cooking and high temperature process heat for industrial purposes. the most common way is to use solar panels to harvest the solar energy.

Hydel Energy:

Energy in the flowing water can be used to produce electricity.Waves result from the interaction of the wind with the surface of the sea and represent a transfer of energy from wind to sea.Energy can be extracted from tides by creating a reservoir or basin behind a barrage and then passing tidal waters through turbines in the barrage to generate electricity.

Mini or Micro Hydro power

Hydropower is one of the best,cheapest and cleanest sources of energy .The energy from small hydro power plants will serve the remote areas independently.

Energy from the sea-Ocean thermal, tidal and wave energy.

In Oceans and the seas ,large amounts of solar energy are stored. On an average 60 million square meter of the tropical seas absorb solar radiation equivalent to the heat content of 245 billion barrels of Oil, a large source of energy can be made available to the tropical countries as well as to other countries, if the energy can be tapped which is felt by scientists. OTEC (Ocean thermal energy conversion) is the process of harnessing this energy, which uses the temperature differences between the surface of the ocean and the depths of about 1000m to operate a heat engine which produces electric.

Construction Of Micro Hydro Plate

Figure 3: Construction of micro hydro plate

Construction details of a micro hydro plant are site specific. Micro hydro systems are made up of a number of components. Most important include the intake where water is diverted from the natural stream ,river or perhaps a waterfall. The intake structure such as a catch box is required to screen out floating debris and fish ,using a screen or array of bars to keep out large objects. Ice must also be resisted in temperature climates by this structure. The intake may have a gate to allow the system to be dewatered for inspection and maintenance. the water is then tunneled to the power house building containing a turbine by the intake.

IV. PRACTICAL IMPLEMENTATION

Figure 4

(i) Electricity generated from solar **(ii)Electricity generated from rain water**

iii) Electricity generated from Wind

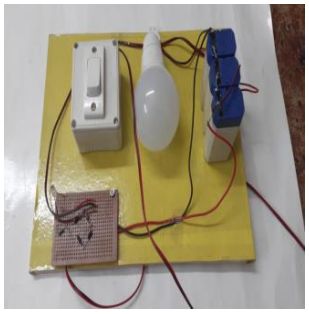
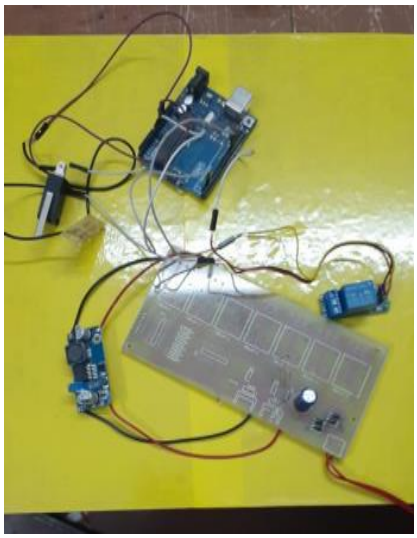


Figure 5

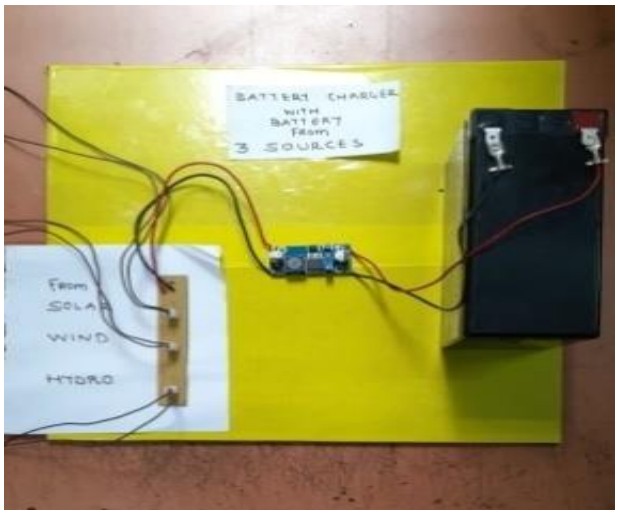
(i) Electricity generated from Solar, wind and Rain Water Resources Which is stored used for in battery. purposes

(ii)Electricity generated from Solar, Wind and Rain Water Resources Domestic



iii) Electricity generated from Solar, Wind and Rain Water Resources used for Agricultural Purposes

V. RESULT



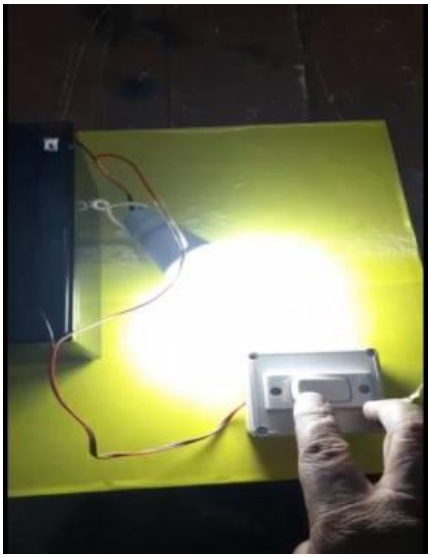


Figure 6 : Result

This Hybrid power generation model using solar, wind and hydel is designed to deliver power to switch on the loads like water pump.The system uses hydel and solar energy for rural electrification. Hydel wind and solar energy is treated as non-renewable source of energy. The system also uses switches to control the devices.

Outputs :

Solar Power generation from 3v dc to 12v dc according to sun intensity. If continoys sunlight constant 12v dc is obtained.

Hydro power generation from v dc to 12v dc depending upon the water pressure upon it.

Wind power generation, power generation depending upon the wind acting on it from 3v dc to 12v dc. If a constant wind of appropriate pressure is allowed to act on the wind blades then a 12 v dc can be obtained.

VI. CONCLUSION

By this work many villages can be lighted. For villages which are much away from the construction site of larger power generating stations such as hydro and nuclear ,can be provided power. To satisfy the increasing demand of electricity with clean hybrid power station by solar wind and rain water can be provided.. The generated electricity from solar, wind and rain water is used for agricultural purposes.

VII. FUTURE SCOPE

The maximum allowed output power of an inverter depends on two factors. The maximum current rating of the transformer primary and the current rating of the driving transistors. For eg. To get a 100 watt output using 12v car battery the primary current will be ~8A,(100/12) because P=V X I .So the primary of the transformer must be rated above 8A.Also,here each final driver transistors must be rated above 4A.Here two will be conducting parallel in each half cycle ,so I=-8/2=4A.

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