Power Generation Using Hybrid Renewable Energy Resources

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Abstract: Now a day, with increasing concern of depletion of fossil fuel reserves and global warming, there is a great demand of using sustainable energy as alternative to preserve and save the earth for future generations. Hydro, wind, geothermal, biogas and tidal power are some of many alternative power sources which have a great potential to meet our energy demands, but they need a lot of space and a huge initial investment, whereas piezo and solar power can also meet our energy demands and also needs less space and initial investment is also low. We will be generating power from vibration energy by using piezoelectric sensors solar energy by using solar panels and wind energy by using windmill. This project demonstrates the Solar-Wind- Piezo Hybrid Power system that harnesses the renewable energies in Sun, Wind and Piezo to generate electricity. System control relies mainly on micro controller. It guarantee the ideal usage of resources and therefore upgrades the efficiency as compared with their individual mode of generation. Also it expands the reliability and minimizes the dependence on one single source.

Index Terms **- piezo-electricity, Hybrid power system, buck boost converter, ATMega328.**

I. INTRODUCTION

Energy is present everywhere in our surrounding, it totally depends on us that we utilize this energy for practical or devastating purpose. Energy can be classified into conventional and non-conventional energy. The traditional sources of energy are generally non-sustainable sources of energy, which are being used since a long time. These sources of energy are being used broadly in such a way that their known reserves have been exhaustted to a great extent. These traditional sources are generally fossil fuels. Their use leads to increased greenhouse gas emissions and other environmental damage. Renewable Energy has many advantages that make it a desirable energy source, especially in parts of the world where the transmission infrastructure is not fully evolved. It is standard and can be installed comparatively quickly, so it is easy to match electricity supply and demand. The increased integration of sustainable power generation technologies is of essential importance in conserving natural resources and reducing CO^2 emissions.

The fuels, Solar, tidal and Wind are free and profuse, which eliminates or reduces the need to purchase, ship, and store expensive fuels. It is adaptable with the power generated, households use can use appliances, such as lighting and refrigeration, schools can use computers, televisions and projectors, and industries can access a dependable power source. Perhaps most importantly, the generator does not produce any harmful emissions in the process of generating the electricity, unlike many other generation sources.

Industry, utilities, municipalities and private individuals are all looking for tailor-made solutions that will enable them to achieve economic and ecologic targets, while at the same time ensuring increasingly independent, decentralized, grid-connected power supply. The future lies in environmentally acquiescent on-site power generation systems that can be interconnected to respond flexibly to operating demands and therefore remain commercially viable. In other words, the future lies in hybrid systems.

Energy produced by using solar, tides, geothermal heat, wind, and biomass together with animal waste, farm, and human waste is known as non-conventional energy. All these sources are renewable or unbounded and do not cause environmental pollution. Moreover, they do not require heavy expenditure. So in this paper we are trying to harness Vibration,

Solar energy and Wind energy further use them to generate power. Since all three has sources have their own disadvantages so we make it a combination of all three energies so as to remove the limitations and increase the efficiency.

II. DESIGN METHODOLOGY

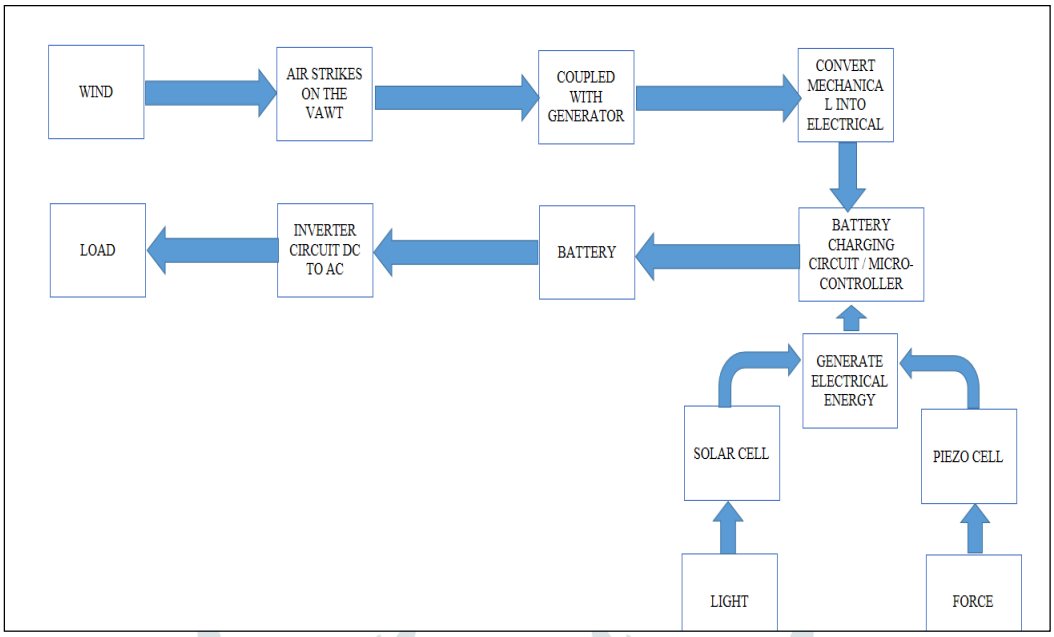
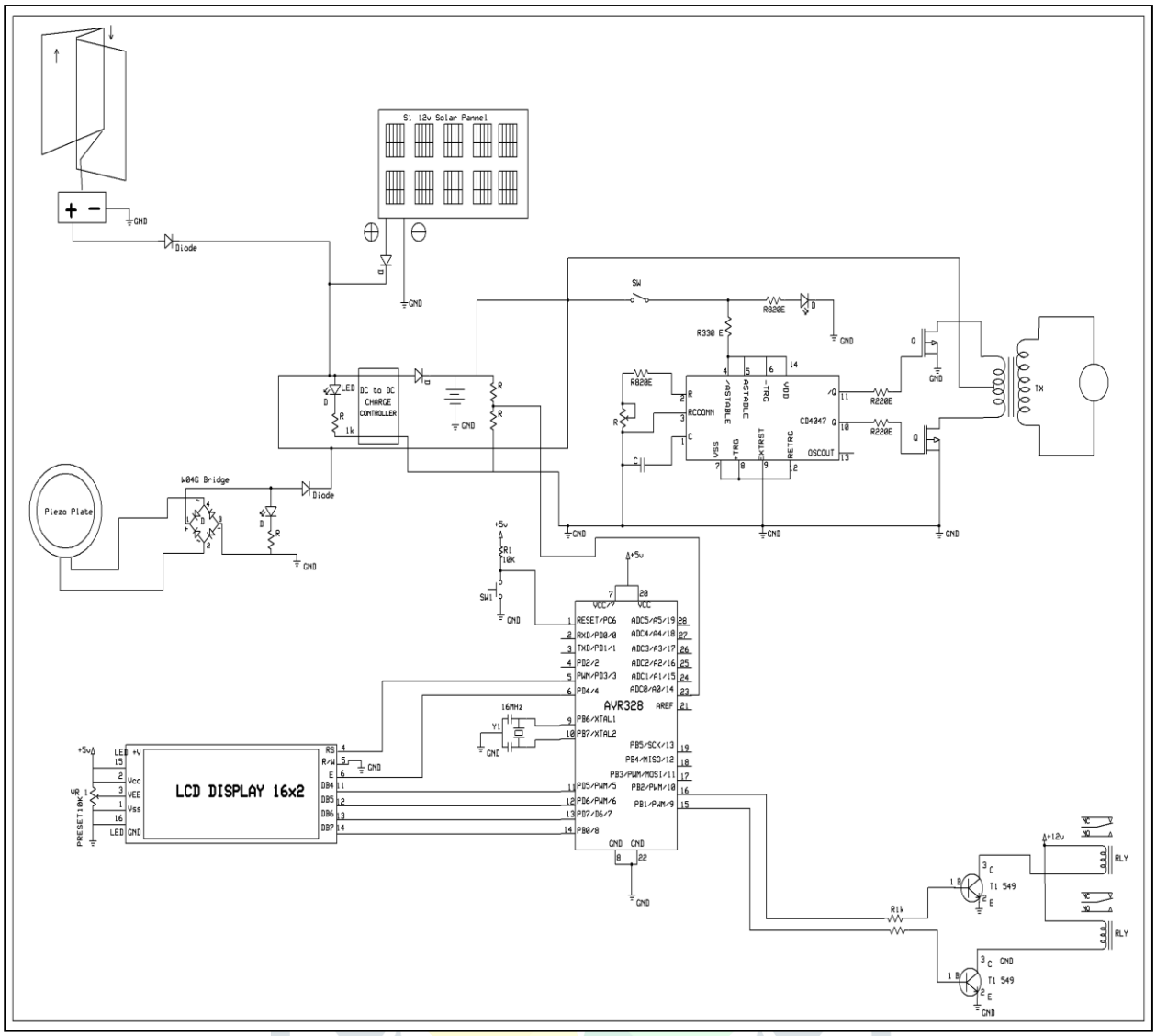


Figure 1.1: Block diagram of the proposed hybrid generation system.

In this project we are trying to generate green energy from the renewable energy sources such as Solar and Wind Energy. By using this Hybrid Power Generation pollution free earthing system and to maintain the level of non-renewable energy resources is obtained. By using the solar and wind energy generation system the global warming will be reduced. In this project generation of energy by using domestic Solar panels and domestic wind mill arrangement is made. The battery is used to store the generating energy and gives required timings. Thus generating the green energy from the natural resources.

The output of these energy is collected and controller where it will help battery from over voltages. Battery is used to store the energy. The output of the battery is given to buck converter where it will step up the dc to a specific value in order to have higher output. A boost converter (step-up converter) is a power converter with an output DC voltage greater than its input DC voltage. It is a class of switching-mode power supply (SMPS) containing at least two semiconductor switches (a diode and a transistor) and at least one energy storage element. Filters made of capacitors (sometimes in combination with inductors) are normally added to the output of the converter to reduce output voltage ripple.

The output of this is given to inverter where it converts DC voltage into single phase AC voltage. And this generated energy is given to electrical load.



VI. IMPLEMENTATION OF SYSTEM

Initially we collected the components as mentioned above from various dealers as per the project requirement. Next we started assembling the necessary information required for the same. We then connected the equipment one by one in order. Firstly we began with the solar plate mounting and connected the solar plate to the necessary current limiting and the diode configuration. Later we connected the windmill to the already connected circuit as per the circuit diagram. Next we connected the piezo cell configuration to the circuit. We installed a full bridge diode rectifier since the piezo cell generated energy while compression and the release.

We collected the energy in the battery with the necessary led indicators. Then we connected the inverter configuration since the connected load is the AC load. We also installed a buck-boost converter to raise the voltage level and to maintain the voltage in both the halves of the cycle. We also used microcontroller to control the overcharging and the undercharging of the battery so as to protect the battery. Then the relay devices were used to activate the required function thereby perpetuating the information. In this way we obtain the pure AC sinusoidal output which is able to drive the load.

XLVI. to validate the obtained results.

VII. CONCLUSION

In the present article hybrid systems with renewable energy sources are considered. They are classified and some special features and problems on their design, management and simulation are reviewed. In recent years, a trend to a decrease in the cost of renewable energy technologies has been observed, which comes together with the arisen tendency towards distributed generation of energy. Those two factors provide the opportunity many solutions to be reconsidered. The state of the art shows that in the near future in the structures of the hybrid systems will appeared the fuel cells and the SMES. The FACTS technologies will interfered with the traditional power electronic converters. Research work in this field shows that further studies should be conducted in the sphere of HSRES with different configuration comprising a great number of sources and producing both electricity and heat. Using an existing computer model of hybrid systems or creating a new ones allows an extensive research on their work under different conditions and configurations and facilitates their design. It is advisable to use flexible experimental systems in order to validate the obtained results.

VIII. FUTURE TRENDS AND LIMITATIONS

The renewable technologies have come a long way in terms of research and development. However there are still certain barriers in terms of their efficiency and optimal use. Some challenges faced by the designer like renewable energy sources, such as solar Photovoltaic and Fuel Cells. They need advanced technology to tackle more amount of useful power from them. The poor efficiency of solar is major obstacle in encouraging its use, manufacturing cost of renewable energy sources needs an important reduction because the high capital price leads to an increased payback time. It should be verified that there should be minimum quantity of power loss in the power electronic devices. The storage technologies need to increase their life-cycle through advanced technologies.

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