Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 5, May 2021: 2467 – 2473

Analysis and Simulation of Hybrid Power Generation Using Flywheel Generated Electrical Power for Integration with Solar Energy

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Abstract

In order to recover the worldwide energy demand better option is hybrid system. A combination of solar, wind, hydro etc. are the renewable energy sources used for hybrid system for present transmission distributing system. During this paper, we discussed about the power output of the hybrid installation which is affected by steadiness problem and different types of controllers used. The major problems that arises during hybrid power generation is stability and power standard. To overcome this problems many varieties of devices and different methods can be implemented. Nowadays the most usable method is hybrid system installation. The large amount of the relies upon the employment of varieties of controllers and its techniques which is employed for optimum power production in integrated system with better power standards.

Keywords: microcontroller, mppt, solarpanel, windturbine, lcd.

1. Introduction

Actual check out on renewable sources shows difficulty in administrating and balancing and lower manufacturing circumstances. As explained in that, the most of the hindrance in renewable energy sources are thanks to the non continuous and shifting manner, mainly in solar panels and wind turbine generating systems. Because of these purpose renewable sources are un-programmable, which influence the soundness, quality and protecting the electrical frame work, thermal power generating systems with specific relation to merge cycles through gas and its urge to satisfy regularly for power differentiation and neglecting the inequality in the network. Particularly the standard power plants ends up in major degeneration in entire performance. (efficiency, quality). Synchronization on networks and energy storage system integrating with the electrical grid is seems to be successful and corresponding solutions to beat the above recommended renewable energy sources limits. Energy storage system(ESS) is mainly found to answer the efficient delivering capacity, economic and maintain the supply of electricity. ESS are one of the most effective solutions available for an improved energy sources and its implementations. Particularly the foremost exciting energy saving technologies worthy to attain renewable sources and the targets are set by European Union(EU) where this technology levels are completely examined.

2. Existing Method

2.1 In an isolated areas the requirements for monitoring the solar energy system is difficult to make sure the stability of solar power delivery (i.e PV). This paper talks more about the software and hardware designing of PV system in the isolated areas. For data transmission purpose, the hybrid system is accompanied by a voltage sensor, current sensor, irradiation sensor, temperature sensor and finally GSM modem. An actual time recording

are employed by Real clock chip. The constructed system is applied in the area and the acceptable results are gained.

2.2 In an IOT network surroundings, with which all the devices are linked and knowledge is communicated, lengthened and the original services has been applicative to the standard energy system accordingly. For an alternative energy producing system, the efficient management services can be developed by (PV) photovoltaic monitoring system. In this IOT technology is widely used and it is feasible to built an effective checking system with minimum amount. In IOT based integrating system, IOT gateway were expanded and it is low cost. Raspberry pi hardware and Message Queuing Telemetry transfer(MQTT) protocols implemented in IOT networks and also in mobile phones. We will decrement the price by utilizing the (SUN) Smart Utility Network communication. SUN consists of license cleared band which is said to be 1Ghz sub band.

3. Proposed Methodology

This project mainly concentrates on hybrid power generation using flywheel generated electrical power for integration with solar energy. Many parts of the country have tended to develop economic power generation in Libya. Wind and alternative energy have gotten standard thanks to abundance, handiness and easy harnessing for electrical power generation. Attaining the un-electrified agricultural population is presently unfeasible through the lengthening of frame work. Seeing that the affiliation is budgetly impossible. The current work aims to fulfill the gap implemented in the existing method and to facilitate the flow interaction among the components microgrid(MG) and which is characterized by hybrid energy storage system (H-ESS)comprises of wind turbine and solar panel

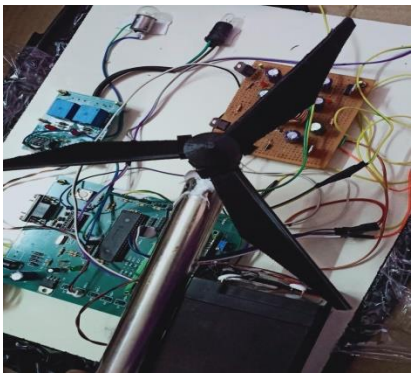

Fig.1 Proposed model

4. Block Description

The diagram shows a Hybrid Electricity Generation Using a Fly Wheel system, as a resistor circuit is employed to measure voltage and a current flowing to load from the solar array. we already know that the solar arrays are dc power sources. A Liquid crystal display is used to show the price of the current-voltage as well as power of the solar battery. 5volt dc power is employed to produce operating voltages to the microcontroller and a liquid display is used to observe the parameter of the solar array and battery.

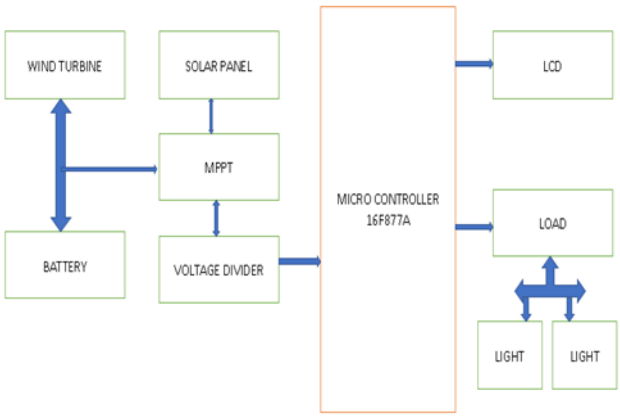

Fig. 2 Block Diagram

4.1 MICROCONTROLLER:

The PIC microcontroller PIC16f877a is one among the foremost eminent microcontrollers within the industry. For coding or programming this microcontroller is much easier and suitable for usage. The main advantage is that it is often used for write and erase operation because it uses non-volatile storage technology. This technology is used for the functioning process of solar panel and wind turbine.

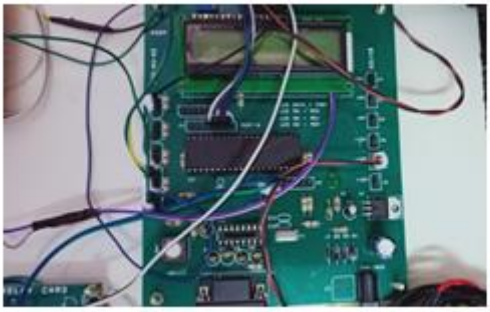

Fig.3 Microcontroller

4.2 LCD:

LCD stands for liquid Crystal display, could be a device that's employed for data exposing purpose. LCD modules are frequently employed in many embedded projects as it has its low cost, availability, economical and user-friendly. 16×2 LCD has 16 Columns and a pair of Rows. As we know, there are so many combinations available in LCD, such as 8×1, 8×2, 10×2, 16×1, etc. The most commonly used LCD is 16*2 . Because it consists of (16×2=32) totally 32 characters and every character are created from 5×8 Pixel Dots.

4.3 MPPT:

MPPT charge controller examine the output of solar panel and equate it with battery voltage then attach the most effective power that solar panel can produce to charge the battery and changes it to the simplest voltage to induce highest current into the battery. It may give power to a DC load, which is attached to the battery. It's accustomed maximize power from solar battery and turbine.

4.4 SOLAR PANEL AND WIND TURBINE:

Solar panels are used to absorb sunlight as a source of energy to get electricity. A solar panel is a combination of photovoltaic solar cells available in several voltages and wattages. Flywheel energy storage accomplish the electric motors to handle the turbine to spin at a high speed then it is stored by converting electrical power into mechanical power. Whenever mandatory flywheels are made to operate generators to gain more power. In addition ,the wind turbine system works in the extremely vacuum surroundings and it is signified as low grating loss, low wind resistance, lifetime, not affecting the environment, and needing less maintenance

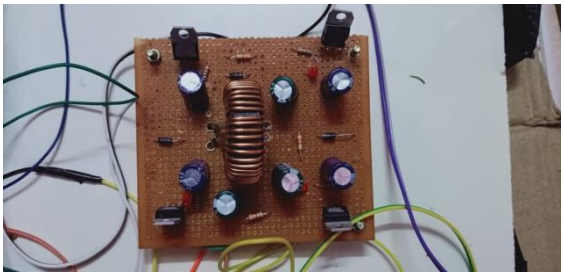

Fig.4 MPPT

4.5 PROTEUS 8 PROFESSIONAL:

Proteus 8 professional is particularly used for simulation purpose. This circuit diagram is implemented using proteus 8 professional. Easy to handle the proteus software and its eco-friendly. It is primarily used for electronic design automation.

4.5.1 FEATURES:

- Eco friendly.
- Schematic picture.
- Microcontroller image.
- PCB design process.
- 3D Verification.

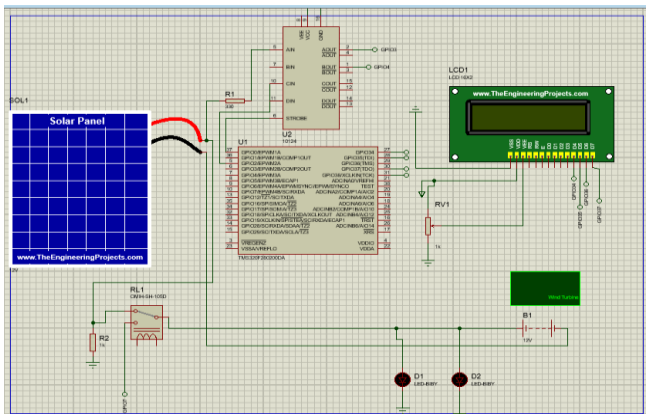

Fig 5. Circuit Diagram

4.5.2 ADVANTAGES:

- Intellectual layout design.
- Integrated circuit image.
- Exact investigation.
- Software remedying.
- PCB designing.

V. RESULT

P_{LOAD}= 4W (bulb) ; Max. $P_{BATTERY}$= 12W

Solar power + wind power <= 4	Blub will glow until the battery power drain below 4W.
Solar power + wind power > 4	Blub will glow continuously if excess power comes is used to charge battery until the battery power get 12W.

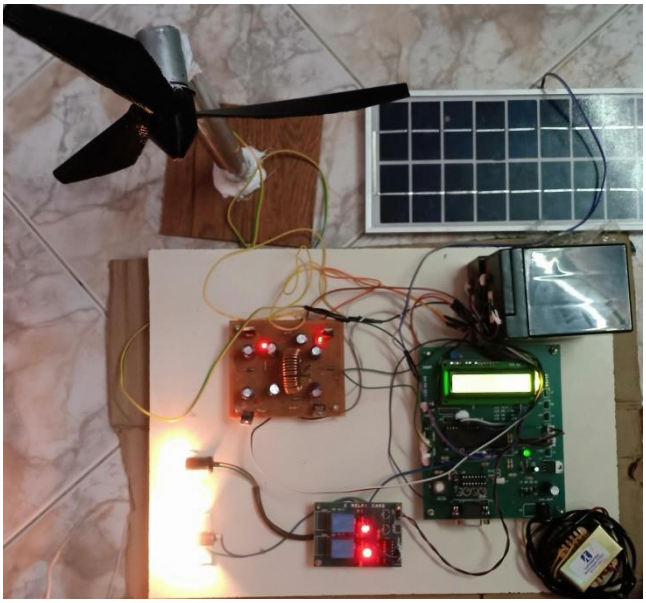

Fig 6. Final Image

5 . Conclusion

The conclusion provides the outcome of components sizing, power flow control approach and climatic circumstances are also taken into consideration. Hybridization has permitted for merging effective attributes in base storage technologies as their application scales while extending. Particularly, attaining the top level of the flywheel working process, which normally used in power quality utilization, and which finds in energy systems and also implementation with an applicable outcome in integrated energy system applications.

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