

Realization Of An Energy Efficient Green Home With Hybrid Power System

Subin Raju¹, Jeffy Abraham²

¹ Scholar, Department of Electrical and Electronics Engg.;, College of Engineering Adoor, Kerala, India
² Scholar, Department of Electrical and Electronics Engg.;, College of Engineering Adoor, Kerala, India

ABSTRACT

In the present day scenario, lack of sufficient energy has become a common issue in all the sectors of our economy. The studies to sort out this issue has developed the idea of hybrid power systems. The purpose of this paper is to develop a green home with a hybrid power system in a most efficient way. The proposed unit comprises a solar panel as principal source, backup sources and a fully automated controlling system. The loads can fully benefit from renewable source, achieve savings and efficient management of energy present an environment friendly smart home which uses a hybrid power system. The proposed model chooses its energy sources without any user input and the overall system control is provided efficiently by using an interactive software.

Keywords: - smart home, solar panel, automated system, hybrid power system.

1. INTRODUCTION

In the present day scenario, non-renewable energy consumption increases excessively while we are concerned with reduction of the same. It seems that renewable energy sources of energy is the most efficient and sustainable solution. Hybrid power system incorporates renewable sources with storage system and a backup source improving the efficiency of the entire system in an environment friendly way [1]. Erstwhile, for such hybrid system a power management strategy was employed to control the power flow between the different sources of energy ensuring continuous supply to consumers without considering the weather conditions. In this article, we developed an interactive automated control strategy [2] based on the available energy and the weather conditions. The electric utilities are managed effectively.

1.1 Literature Survey

Global energy consumption increases excessively while we are confronted with a reduction of fossil energy resources and an important risk concerning the global warming [3]. It seems that renewable energy sources are one of the most efficient and reliable solutions for sustainable and proper energy [4]. It is proved that hybrid system gives a higher efficiency by the mixture of renewable source with storage system and backup source. These autonomous systems is the most attractive solutions for these electrical problems [5]. Usually for such hybrid system, a power management strategy is necessarily developed to control the power flow between the different energy sources ensuring continuous supply to consumers regardless of the weather conditions variation [6]. This type of control system can require a great design either for the renewable source, than for the storage and backup system [7].

A smart device is an ordinary appliance with a sophisticated computer installed to give it more functionality that can monitor so many aspects of daily routines. A smart home is useful for everyone and can also be used to enhance the everyday life at home. Accordingly, smart home consists of three parts, which are network, controlling devices and home automation. [8, 9]. The network is used for connecting the automation to the controlling devices and it can be wire and wireless. The controlling devices are used for managing the systems. And the home automation are device which control the physical environment.

2. HYBRID POWER SYSTEM

Hybrid power systems are designed for the generation and use of electrical power. They are independent of a large, centralized electricity grid and incorporate more than one type of power source. Renewable energy systems supplement traditional generators and, in combination with an intelligent control system, they provide energy that is economical, reliable and more environmentally sustainable. This system will reduce dependency on fuel.

Hybrid systems, as the name implies, combine two or more modes of electricity generation together, usually using renewable technologies such as solar photovoltaic (PV) and wind turbines. Hybrid systems provide a high level of energy security through the mix of generation methods, and often will incorporate a storage system (battery, Fuel cell) or small fossil fuelled generator to ensure maximum supply reliability and security. Sun is the ultimate source of energy. Here we make use of solar energy as one among the source of hybrid system.

3. GREEN HOME WITH HYBRID POWER SYSTEM

3.1 Green Home Setup

In the present day scenario, lack of sufficient energy has become a common issue in all the sectors of our economy. We tried to sort out this issue and has developed the idea of a green home with hybrid power systems. In this article, we present an environment friendly smart home which uses a hybrid power system. The proposed model chooses its energy sources without any user input and the overall system control is provided efficiently by using an interactive software.

The power system here employs a solar panel and a generator as its sources of energy. There is an inverter. The solar panel feeds both the inverter battery and the battery for the generator. The whole system is embedded into a controller unit. The control unit detects power failures and provides a predetermined value for controlling the amount of energy the battery can supply.

During a power failure, the inverter starts to work and when its supplying capacity approaches the pre-set value, the control shifts to the second battery, enabling the generator. The solar panel charges the batteries even when they are working. Hence charging of batteries and utilization of their power are achieved effectively. The electric utilities at the home are managed and controlled effectively. For a room, separate circuits are provided for serving the indoor and outdoor lighting. The intensity of indoor lightings are controlled according to the available light outside the room. The outdoor lightings serve as automatic night lamps. Speed of the fan is adjusted in accordance with the room temperature. A power plug is also provided to serve the heavy loads. The whole system is controlled either by using an interactive software or by a blue tooth module.

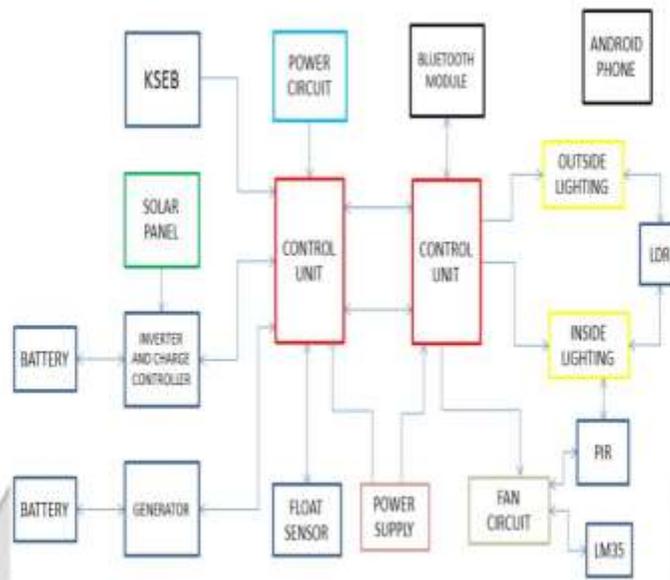


Fig -1 Block Diagram of Proposed System

3.2 Smart Controller and Software

Smart home controlling devices are used for managing the system. The examples of the controllers are smartphones, tablets etc. Moreover, systems may have computer which works as center of the evaluation unit.

This paper proposes a Home Automation system that employs the integration of cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home. This system uses a consolidation of a mobile phone application, handheld wireless remote, and PC based program to provide a means of user interface to the consumer [10].

In the proposed model, the whole system is controlled either by using an interactive software or by a blue tooth module. An android application is developed for providing a user friendly control of the proposed system.

3.3 Advantages of the system

A. Survivability

Power delivered by the main source viz., solar panel can be stored using batteries. And can be used to increase the resilience of a smart house in the presence of power outages due to the main source. As a measure for resilience the term survivability, which is specified as the probability that power is continuously available during a power outage until the main source is repaired and charged again.

B. Industrial Applications

The proposed system can be installed in industries which requires large units of power continuously. It can be installed in industries where large furnaces, machines of large power requirement are employed.

C. Domestic Applications

For any domestic applications, the consumers always urge for un-interrupted power supply. This system is designed in an effective way to meet the needs of the consumers. The user friendly software provides an efficient control of the system.

3.4 Challenges to the system

1. High Cost Of Intelligence

Although smart homes have many properties that makes human's lives convenient, these smart properties are in a higher price tag. The cost of an intelligent home is high because some of the technology is relatively new [11].

2. High Cost Of Installation

The cost of installation seems to be relatively high due to the components employed. Moreover it can vary depending on the factors like location and size of the installation, weather conditions etc.

4. CONCLUSION

It is proved that hybrid system gives a higher efficiency by the mixture of renewable source with storage system and backup source. This paper based on the meaning of smart home and the details of smart home elements. Smart home is more than just a home controlled by the central evaluation unit like a smart device. The name term green home seems to be more suitable for the proposed system as it makes use of renewable sources of energy. With smart homes, the way people live will obviously become more efficient and comfortable.

5. ACKNOWLEDGEMENT

We extend our gratitude to **Dr. John George**, Professor and Head of the Department, Department of Electrical and Electronics Engineering, College of Engineering, Adoor for permitting us to do this proposal as a project. We also express our heartfelt thanks to all the lab technicians for their enormous help in the progress of our project work. This acknowledgment will stand incomplete if our friends and classmates aren't thanked whose constant encouragement and timely criticism helped us to a great extent and fuelled our destination. We also express our gratitude to our beloved parents for encouraging and supporting us throughout the course of this project. We make this opportunity to thank all who have helped us directly or indirectly through this endeavor. Acknowledge any person/authorities in this section.

6. REFERENCES

- [1] Randa KALLEL, Ghada BOUKETT A Y A and Lotfi KRICHEN "Demand side management of an isolated hybrid energy production unit supplying domestic loads".
- [2] Meensika Sripan, Xuanxia Lin, Ponchan Petchlorlean and Mahasak-Ketcham "Research and Thinking of Smart Home Technology" International Conference on Systems and Electronic Engineering (ICSEE'2012) December 18-19,2012- Phuket-(Thailand).
- [3] S. Abedi, A. Alimardani, G. B. Gharehpetian, G .H. Riahy, and S. H. Hosseinian, "A comprehensive method for optimal power management and design of hybrid RES-based autonomous energy systems," Renewable and Sustainable Energy Reviews 16 (2012) 1577- 1587.

- [4] A. Abdelkati, A. Masmoudi, and L. Krichen, "Experimental investigation on the performance of an autonomous wind energy conversion system. *Electrical Power and Energy Systems* 44 (2013) 581-590.
- [5] M. Taghizadeh, M. Mardaneh, M. S. Sadeghi, " Fuzzy based frequency control in an isolated network employing parallel operated fuel cell/ultra-capacitor systems," *Journal of Renewable and Sustainable Energy* 5 (2013) 041815
- [6] D. Liu, J. Guo, Y. Huang, and W. Wang, " An active power control strategy for wind farm based on predictions of wind turbine's maximum generation capacity," *Journal of Renewable and Sustainable Energy* 5 (2013) 013121.
- [7] R. Kallel, G. Boukettaya and L. Krichen, "Power management of an isolated hybrid energy". the 10th IEEE International MultiConference on Systems, Signals and Devices (SSD'13Mars 2013, Hammamet-Tunisia
- [8] Saisakul Chernbumroong, Anthony S. Atkins and Hongnian Yu, 2010, "Perception of Smart Home Technologies to Assist Elderly People", The 4th International Conference on Software, Knowledge, Information Management and Applications (SKIMA 2010), Paro, Bhutan, pp. 1-7.
- [9] Li Jiang, Da-You Liu and Bo Yang, "Smart Home Research", 2004, Proceedings of the Third International Conference on Machine Learning and Cybernetics, August 26-29, Shanghai, pp. 659-663.
- [10] Deepali Javale, Mohd. Mohsin, Shreerang Nandanwar "Home Automation and Security System Using Android ADK" in *International Journal of Electronics Communication and Computer Technology (IJECCT)* Volume 3 Issue 2 (March 2013)
- [11] Paul Lin, "Disadvantages of a Smart Home" [Online], Available: http://www.ehow.co.uk/list_7631272_disadvantages-smarthome.html [2012, October 19].

