

IoT Based Smart Home Using Renewable Solar Energy

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Abstract -The Internet of Things has a vision in which the internet extends into the real world embracing everyday objects. The IoT allows objects to be sensed and/or controlled remotely over existing network infrastructure, creating opportunities for pure integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. This technology has many applications like Solar cities, Smart villages, Micro grids and Solar Street lights and so on. As Renewable energy grew at a rate faster than any other time in history during this period. The proposed system refers to the online display of the power usage of solar energy as a renewable energy. This monitoring is done through arduino. Smart Monitoring displays daily usage of renewable energy. This helps the user to control the switching of the devices with the help of app using IOT.

Key Words: IoT , Relay ,Current Sensor ,Voltage Sensor, Node MCU, Solar Panel, atmega328p,blynk app.

1. INTRODUCTION

Automation is today's fact, where more things are being completed every day automatically. The home automation system conception remains for several years. The control of the appliances when completely taken over by the machines, the process of monitoring and controlling becomes more eventful. Renewable energy is generally defined as energy that comes from resources which are naturally available such as sunlight, wind, rain, tides, waves and geothermal heat. Renewable energy replaces conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services. This project is fully based on renewable energy resources. The energy consumption in home areas is greater as more home equipments are used. For solving this home energy problem, we consider energy saving and another one is energy renewable sources. At the same time we also have to save the home energy cost. For this, two things must be considered and these are energy consumption and energy generation. Also we are going to apply IOT concept by using Wi-Fi module.

Its era of technology world is becoming faster and easier due to this reason our homes also should become part of it. Setting in any part of world we can operate our home just by our smart phone. Isn't it a great idea, yes with the help of node MCU and Blynk app it's possible.

Here we use the concept called IOT. Using the concept of internet of things we design our project to make human life reliable. With the help of IOT things can be too easy. Main aim of this project is to atomize ruler homes in less cost.

1.1 Basic Concept

Proposed system block diagram is shown in figure 1. It consists of microcontroller, ESP8266 Wi-Fi module, Blynk app ,Battery, Solar panel ,voltage sensor, current sensor , LCD display home appliances. It is illustration of how we have implemented the project and the various parts involved in it. In this system, it has two main sections i.e. energy consumption and energy generation.

Energy consumption: This section contains home equipment and lights which are controlled with the help of IoT and communication unit Wi-Fi.

Energy generation: this section contains solar panel which is used to generate energy from the sunlight. here voltage sensor and current sensor are used to measure the voltage and current produced from the panel and it will be displayed on the LCD display with the help of arduino.

The major objectives of project are as:

- (1) Generation of electrical energy using renewable energy source
- (2) Home Automation using IOT

1.2 Specifications

Table -1: Components

Sl.No	Specifications	Description
1	Solar panel	10 watt
2	Arduino	Atmega328p
3	Node MCU	ESP8266
4	Battery Type	Rechargeable battery
5	Sensor Type	Voltage sensor Current sensor
6	LCD Display	16 x 2

2. WORKING

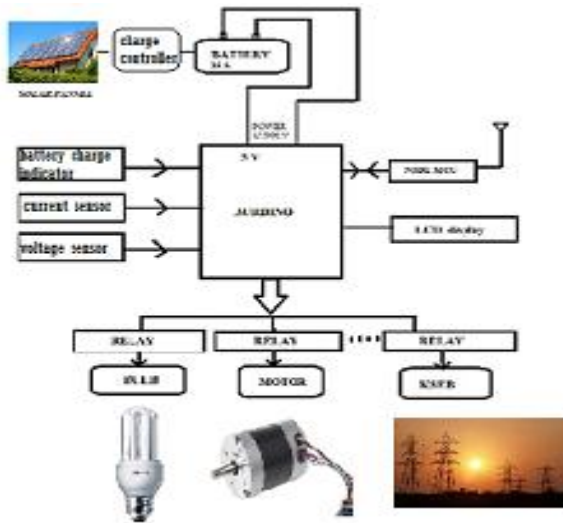


Fig -1: block diagram

Once the circuit is assembled, it is ready to deploy along with the solar panel. When sunlight falls on solar panel photo voltaic cell(solar panel) generate the voltage, this voltage is a variable voltage. Then Its Output is given to the Dc booster, which can gives constant voltage to battery and battery can save the energy. The attached IOT device developed in this project monitors its various parameters. The device is powered from the inverter battery. The system consist of a current sensor, voltage sensor, battery ,charge level indicator and an smart home system .These sensors senses the parameters and is been transferred to the central microcontroller(Arduino).The collected data is been processed on arduino and the data's needed to be uploaded to the server is been transferred to the node MCU module. The system continuously monitors the current and voltage levels and the battery charge level. If the battery charge level is low the solar charges the battery and when the battery becomes full it is been noticed in the UI and the notification is been sent to the owners mobile. We can control the home appliances from the web page. The commands we are provided to the webpage is been transferred to the arduino via the node MCU module and arduino activate the corresponding relays. It also consist of a change over relay circuit which feeds the power into the electricity board.

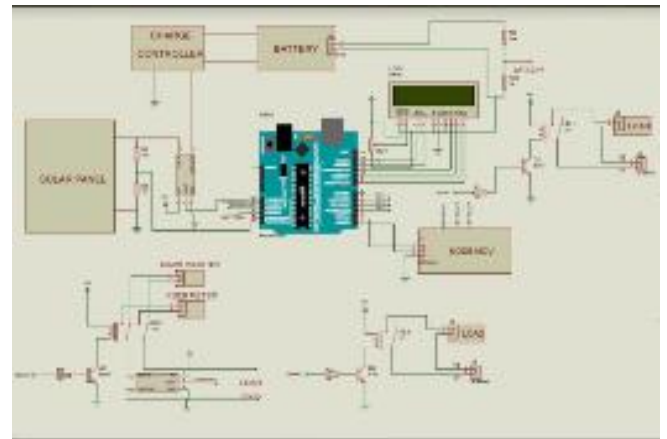


Fig -2: circuit diagram

2.1 Battery Charging Estimation

we have taken a 10W solar panel and 12v ,7 Ah battery so current produced

$$I = P/V$$

$$= 10/12 = 0.833 \text{ A.}$$

$$\text{So Charging Time} = 7/0.833$$

$$= 8.5 \text{ hours.}$$

3. CONCLUSION

As to save the energy cost we used renewable energy source. In this system two things are important and i.e. energy consumption and energy generation. The energy consumption includes the energy uses of home equipments based on Wi-Fi and Wi-Fi send this collected data to home server. Energy generation is based on solar panel. Renewable energy gateway (REG) is suitable for both the consumption and generation. Hence by taking both consumption and generation, the home server optimizes home energy use. Wi-Fi technology provide home security and its cost is more effective as compared to previously existing system. Hence we can conclude that the required objectives of renewable energy based home automation system using IOT have been achieved. Finally, the proposed system is better from the scalability and flexibility point of view than the previously existing home automation system

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