Solar Based Smart Home Lighting System

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Abstract- *Considering the problem of ac production we can design a system that can use solar energy. Due to the use of solar energy in household appliances it will reduce the use of ac mains. This process leads to the efficient use of renewable energy. This plan will be used to overcome the problem of power outages and reduce electricity bills. The system contains solar dc power that can be converted to ac power using a solar micro grid inverter. The synchronized output is given a small control and the supply source will be selected automatically depending on the load requirements and current status of the sources. An upgraded facility such as IoT will allow the user to control various devices per message. A daily report of power consumption by each source will be provided to the user via text message. Various parameters such as voltage, current, power consumption will be displayed on the LCD to provide notification of the current state of the system.*

Keywords- Solar energy, Arduino Uno, Voltage and Current Monitoring, DC Fan etc.

I. INTRODUCTION

In the current context of growing energy demand and growing environmental concerns, alternatives to non-renewable and polluting fossil fuels should be investigated. One such method is solar energy. Solar energy is the heat and light from the Sun that drives Earth's climate and supports life. Solar technology enables the controlled use of this energy source. Solar energy is the same concept of solar energy or refers specifically to converting sunlight into electricity through photovoltaic, concentrating solar thermal energy or various experimental technologies. Converting solar energy into other forms of energy does not bring about any visible pollution in the environment, making it very profitable. Other forms of electricity generation are strongly linked to pollution. We need to use solar energy, save our electricity and reduce our electricity bill. So here in this project solar power is chosen to achieve the project goal.

The term "smart grid" refers to the use of technologies and tools that help power resources better meet consumer needs more reliably and efficiently by effectively monitoring the need for power consumption and system conditions almost in real time. The smart grid integrates digital devices, software applications and dual connections that allow resources to track electrical activity with high accuracy, and apply intelligence to relays depending on the input mode. It may also allow services to record consumer electricity consumption at different times and provide users with power consumption data.

Considering the problem of ac supply generation, we aim to design a system, which can use solar energy. Due to the use of solar energy in household appliances the power grid will be reduced. This process leads to the efficient use of renewable energy. This plan will be used to overcome the problem of power outages and reduce electricity bills. The solar dc power system can be converted to ac power using a solar micro grid inverter. The synced output is given to the controller and the supply source will be selected automatically depending on the load requirements and resource status. An upgraded facility such as IoT will allow the user to control various devices per message. A daily report of power consumption by each source will be provided to the user via text message. Various parameters such as voltage, current, power consumption will be displayed on the LCD to provide system status notification.

II. EXISTING SYSTEM

Today's world demands more energy, but there is a limit to the resources available. To meet the growing demand for energy, we need to find new resources and distribute them efficiently. Figure 1 shows a traditional analog meter. These electricity meters use grid power to provide consumers with electricity.

Fig-1: Traditional analog electricity meter

III. PROPOSED SYSTEM

Fig-2: Grid tie solar system

As shown in fig.2 The solar grid tie system uses both solar energy and Grid power. The system contains a solar panel, which is used to generate solar energy. The Inverter takes input from the solar panel and Grid to adjust. The Inverter then transmits this synchronization output to various household appliances. With smart metering, we can harness the power of the sun's rays and measure the consumption of each source. The smart grid contains an energy grid that has both renewable and non-renewable energy sources such as the sun.

The proposed project, a smart home system based on IoT technology is able to manage the load. This program contains relays, power sources and load. Communication between the customer and the system is detected through the IoT module.

In the proposed project the drawing of your block for both sender and receiver is described below,

In our project there are two units. One is an active unit and the other is a monitoring unit.

- Operating unit solar panel is powered by battery with boost converter and relay.
- Boost converter is used to increase the output of the solar panel.
- EB power supply is supplied to the battery by the conductor and transmitter.
- EB radiation output is provided by the control via SCU. In this we can find the output of the Energy consumption. And the output of the solar panel is measured with the help of a DC volt measurement.
- The relay is used to control solar and EB emissions from the battery.
- Not only controls and this information is transmitted to PC via IoT.
- RS232 series communication cable. Used for PC and IoT connectivity.

IV. MOTIVATION

Solar energy systems absorb sunlight and convert it into electricity for us to use. Every second, the sun sends out 42 trillion kilocalories of energy to the Earth. If we could turn 100% of this solar energy into electricity, we could produce one year of energy for the entire planet in one hour. For this we need a source from which to store this energy. We use a battery, but batteries are the most vulnerable part of the system. No battery can overcome faulty charging system errors. Best battery performance is achieved when battery features are matched to a charging source. This is the function of the charging control system. Without the use of smart phone increases in quantity. If we can create a combination between this solar charger and a smart phone it will be much easier for users to use the system. Given all this we are encouraged to do this work as it will help our people in many ways.

V. OBJECTIVES

Now a cell phone is a part of our daily routine. We can control all the electrical appliances in our home such as increasing light intensity, Fan etc. during the shortfall in mobile phone applications (mobile telnet). In this project, we describe how to control and design a home electronics control system based on a microcontroller. We create a system that can open and close without switching. We can use this program in any major office, industry, store or university classroom etc. It is also used to protect our home or workplace. The following are the objectives of this project to ensure that it meets the objective.

- Design a home solar application management system using an IoT device.
- Designing a circuit that can effectively control the various electrical components connected to a smart control system.
- Design a circuit that can ONLY turn on and off the solar system using a mobile phone through applications.
- Explore our system designed for a variety of electrical and electronic components and resolve any errors.

Block Diagram

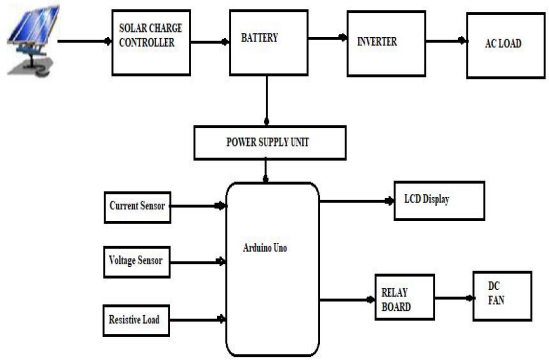

Fig-3: Block Diagram of system

VI. WORKING

The system used consists of an Arduino controller as the main processing unit of the whole system and all components are connected to a small controller.

First, Arduino has a test of whether the grid provides you or not. When the grid is turned on then the synchronizer converter picks up the input from the solar panel and grid. The Inverter provides the output of the solar and grid output. This inverter provides output, which includes solar power and power from the grid. This output is then reduced and supplied to the Arduino una using a signal-conditioning circuit. This circuit conditioning circuit consists of a current circuit and a voltage sensing.

With the help of the Arduino you have and the mind used in the code, the input current and voltage are measured and displayed on the LCD. The driving circuit consists of a driver, a relay. These devices are used to drive household appliances.

The IoT module is used to provide daily power report support. It makes the system smart and easy to use.

When the grid (MSEB) fails to provide power, then the Arduino has to change the source from the grid to the sun. The output from these sources is also transmitted to the signal status cycle in Arduino uno. The process after this is similar to the operation as described above. In this way, the system provides an intelligent and cost-effective way to supply electricity.

VII. SMART SOLAR HOME SYSTEM

Solar PV system is solar energy technology. The PV system has the following components:

a) PV modules, connected to the inverter.
b) A converter, which converts a direct current (DC) system into an alternating current (AC) and vice versa.
c) Batteries to provide backup power or backup power in the event of a power outage or grid termination.
d) Charging controller, depending on the current short circuit of the panel.
e) Security device. Previously all solar systems could not be provided with safety equipment. With this paper a new part of the solar system is introduced by me. This will definitely help to extend the life span of the solar system. The effect of this device will be a great help to the solar system.

VIII. APPLICATIONS

- ***Residential Application***

Remote homes in sunny areas can get reliable electricity to meet basic needs with a simple system that includes a PV panel, a rechargeable battery to store energy taken during daylight hours, a controller (or charging controller), and the necessary wiring and switches. Such systems are often called solar home systems (SHS).

- ***Commercial Application***

In an office building, the roof areas can be covered with glass PV modules, which can be slightly exposed to provide shady light. In the industry or warehouse, large roof areas are the best place for solar modules. If the roof is flat, then arrays can be installed using techniques that do not break the roof membrane of the roof. Also, skylights can be lightly covered with PV.

- ***Industrial Application***

Solar energy is also often used to signal transportation, such as beachfront boilers, lighthouses, airplane lanterns, and an increase in road traffic signals. Solar panels are used to power environmental monitoring systems and systems to prevent corrosion of pipes, heads, bridges, and other structures. With larger power loads, it can be very expensive to repair a mixed power system that includes PV and a small diesel generator.

- ***Remote Applications***

Remote buildings, such as schools, community halls, and clinics, can benefit from solar power. In developing regions, centralized power plants can supply electricity to homes via a local cable network, or serve as a battery charging

station where members of the public can bring batteries for recharge.

IX. ADVANTAGES

1. Significantly reduce your utility bill.
2. The system is reliable.
3. High accuracy.
4. Highly accurate system.

X. MERITS

- The system can control household appliances remotely.
- Provides assistance and assistance especially to the disabled and the elderly.
- The system is secure to access any unauthorized user.
- The system is highly flexible and analytical. Any number of electronic devices can be added if needed.
- The total cost of implementing the system is very cheap and the average person can afford it
- An internet connection is not required.

1. Implementation Model of Proposed System

The result of this project is that electricity bills are reduced by supplying solar energy to all household appliances and by the following are shown a wide range of solar emissions, boost output, date and time displayed on the computer in zigbee modes. The outgoing display is shown below,

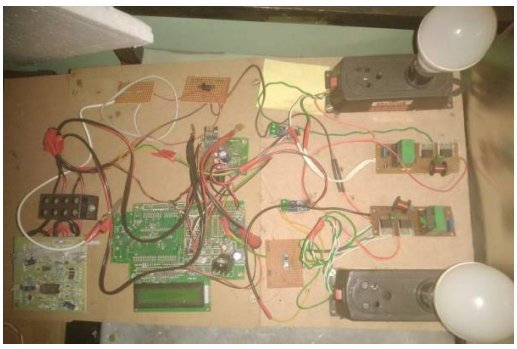

Fig. 4. Project Images

The output of the proposed desired algorithms is almost identical to the distribution of customer's power consumption capabilities, as well as the cost-effective power consumption schedule. The proposed algorithm for optimizing the performance of the machine also speeds up the construction of the desired work schedule in accordance with the computer process. Future work seeks to investigate game theory-based planning in order to reduce the maximum reach-average of a smart community based on the proposed planning process for this project. For the future use GSM or GPRS technology instead of the ZIGBEE technology currently used in our project.

XI. CONCLUSION

Using renewable energy technology is one of the recommended ways to reduce the impact on the environment. Due to frequent power outages it is important to use renewable energy and monitor it. Monitoring directs the user to analyze the use of renewable energy. This program is costly. The efficiency of the system is about 95% .This makes efficient use of renewable energy. The temperature sensor helps to analyze solar energy conservation. It therefore reduces electricity issues.

By using this safety device, we can extend the life of our solar system. It is impossible to make the solar system overcrowded. Using this new device will also be able to make the solar system work more efficiently. Currently, solar systems are experiencing some difficulties due to the lack of a security device. With this proposed device, efficiency, longevity and performance of the home solar system will be increased. It will also save money over time due to the longer life of the system.

XII. FUTURE SCOPE

This project can be further developed, using the results of the current project, i.e. the monitored values obtained help predict future values of the estimated parameters. Predicting the amount of solar energy will be stored on the battery.

XIII. ACKNOWLEDGMENT

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