

SOLAR BASED HOME AUTOMATION USING ANDROID APPLICATION

M.SENTHIL KUMAR , N.DINESHKUMAR , G.RAMESHKUMAR , S.AYYAPPAN

Abstract — Solar as an input sources for the load like fan and light. The boost converter is used to step up the voltage from the pv panel and stored in the battery. Charge controller plays an important role as the batteries over all life depends mainly on it. That energy can regulate and controlled by the driver and given to the load. Home automation not only helps to reduced human efforts but it's also energy efficient and time saving. The mobile device and system can be communicated with each other from long range via Wi-Fi. The mobile application can be loaded and interface with system from any compatible device. The load can be operated and controlled by the user from anywhere. The user can also see the result on android mobile application from anywhere.

Keywords — Solar Panel Battery, Boost Converter , Wi-Fi Module , Arduino Uno, Inverter.

I. INTRODUCTION

Renewable energy resource like solar and wind generator is best option of home appliances. In my project we can chose to a solar is suitable for our project. The solar can be stored by battery. Solar power have been advantage of being less maintenance and pollution free but their main draw back is high cost. The mobile phone is the most important part of human lives. The mobile phone can be used to communicate with a control electrical switches like fan; light and etc., Wi-Fi given transmit to a radio waves technology. This signal passes through a Wi-Fi signal to the Arduino controller. The Arduino operates the received information and performance operation. The Arduino is open-source hardware and in case of any

load demand the Arduino processor send the signal to the converter. The load is controlled by using android application. We can easily create automation with charge controlling system through our mobile handset and get a simple way to operate this. The renewable energy sources connected to the bus through dc-ac converters. These sources are generated as per the load requirement. The generating dc current is converted into ac with the help of inverter and distributed to the home appliances.

In our country most of the people are living in rural areas where national grid transmission line is not reached till now. The existing electric grids are not capable of fulfilling the requirement of electricity. In this project was mainly used through rural and urban area. In my project electric load is control by android mobile phone like ON/OFF purpose.

II. SYSTEM BLOCK DIAGRAM

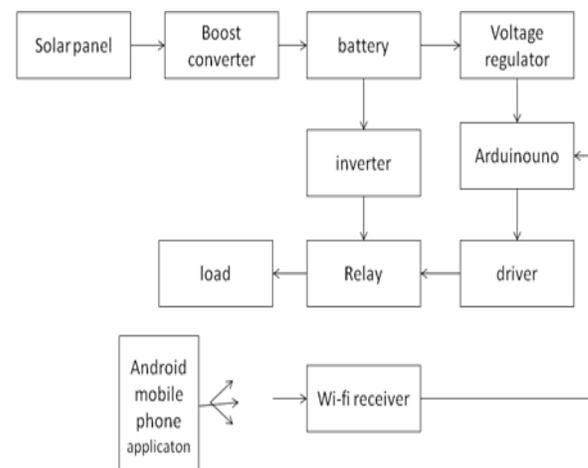


Figure 2.1 : Block diagram

A 12V solar panel is connected to the boost converter to step up the voltage. The voltage is stored in a battery. The energy is converted into AC by inverter and given to the relay, a relay is an

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protective device connected to ac load. The voltage regulator taking input supply from battery and given to the Arduino UNO. The Arduino operating at 5v connected to the driver for controlling purpose. The android mobile phone connected with Wi-Fi receiver through wireless communication. The receiving signal is passed to the Arduino, so the load can be controlled by the mobile application to turn ON & OFF.

III. COMPONENTS

1) PV SOLAR PANEL

A photovoltaic (PV) system directly converts sunlight into electricity. The basic device of a PV system is the PV cell. Cells may be grouped to form panels or arrays. The voltage and current available at the terminals of a PV device may directly feed small loads such as lighting systems and dc motors. In a PV solar system, the modules, often called PV panels, are the power generating devices. For a large scale PV system a number of PV modules are connected in series to form a 'String', and these strings connect in parallel to form an 'Array'. However, the PV modules, or panels, are comprised of a number of PV cells also connected in series and shunt configuration. These PV cells are a formation of p-n junctions from the doping of p-type and n-type substrates that are able to produce DC current and DC junction voltage upon the incidence of light due to the photovoltaic effect on semiconductors. As a result of the series and shunt combination of the cells in a module, the PV module can be equally characterized with an increased level of current and voltage.

2) WIFI MODULE(ESP 8266)

This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. ESP8266 offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor. The modules integrate all of the RF components required, removing need to perform expensive RF design and test. It simply connecting Arduino interface.

3) BATTERY

An electrical battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices. The output voltage of this battery is 12V. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device.

4) ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. Simply connected it to a computer with a USB cable or power it with a AC-to-DC adapter.

5) VOLTAGE REGULATOR

The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. Voltage regulator ICs are available with fixed (typically 5, 12 and 15V) or variable output voltages. One of these is local on card regulation, eliminating the distribution problems associated with single point regulation.

6) RELAY

A relay is an electrically operated switches many relays use an electromagnet to mechanically operate a switch. The coil of a relay passes a relatively large current, typically 10mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages.

7) DRIVER

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. Applications include relay drivers, hammer drivers, lamp drivers, display

drivers (LED gas discharge), line drivers, and logic buffers.

8) BOOST CONVERTER

A boost converter (step-up converter) is a DC-to-DC power converter that steps up voltage from a solar output voltage. The voltage was a stored by the battery.

9) INVERTER

An inverter is an electrical device that converts direct current to alternating current. Inverters are commonly used to supply AC power from DC sources such as solar panels or batteries.

IV. SOFTWARE DESIGN

1) ANDROID APPLICATION

Android is an operating system for smart phone devices on which we can run our application. Android provides healthy array of connectivity option including Wi-Fi connection. it provides access to a wide range of useful libraries and tools that can be used to build rich applications. To design our system we use a latest android version, which supports application of our system without creating any application.

V. SOLAR OUTPUT WAVEFORM

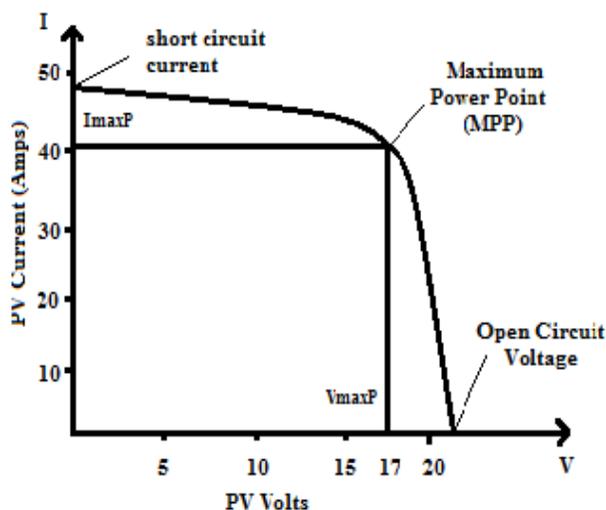


Figure 4.1 : Photovoltaic Array Voltage/Current Characteristic

This graph shows the photovoltaic array voltage (power volts) and photovoltaic current (pv current) characteristics. The short circuit current occurs at the maximum current ($I_{n \max}$ Power) and the open

circuit voltage occurs at the maximum voltage ($V_{\max P}$). The point which coincides between the photovoltaic current and the photovoltaic voltage is the maximum power point which is used to get the maximum available power produced in the photovoltaic array.

VI. CONCLUSION

In future the world will have to depend on renewable energy. The only source available around is sunlight energy into electrical energy by using solar system. So in this paper we designed and implemented a solar based home automation control by android application. This system primarily aimed to reduce human effort. Total implementation cost of the project very cheap and it is affordable by a common person.

REFERENCES

- [1] Alkar, and Buhur ,U .(2005). "An internet based wireless Home Automation system for Multifunctional Devices". IEEE Consumer Electronics, 51(4),1169-1174.
- [2] Rifatshahriyar, Enamulhoque, s.m.sohan, Iftekharnaim; "Remote controlling oh home appliances using mobile telephony", International journal of smart home, Vol.2, No.3,july,2008.
- [3] Il-Kyu Hwang, Member, IEEE and Dae-Sung Lee, Jin-Woks Bleak; "Home Network Configuring Scheme for All Electric Appliances Using ZigBee- based Integrated Remote Controller", IEEE Transactions on Consumer Electronics, Vol. 55, No. 3, Aug 2009
- [4] Guangming Song, Member, IEEE, Zhigang Wei, Weijuan Zhang and Aiguo Song, Member, IEEE "Design of a Networked Monitoring System for Home Automation", IEEE Transactions on Consumer Electronics, Vol. 53, No. 3, Aug 2007.
- [5] Juing-Huei Su, Chyi-Shyong Lee, and Wei-Chen Wu, "The design and implementation of a low-cost and programmable home automation module," IEEE Trans. Consumer Electronics, Vol. 52, No. 4, pp. 1239 - 1244, Nov 2006.
- [6] M. BilgehanTosun, M. KaanOzcan, and Ali ZiyaAlkar, K. Elissa, "A GSM, internet and speech controlled wireless interactive home automation system", IEEE Trans. Consumer Electronics, Vol. 52, No. 3, pp. 837-843, Aug 2006.
- [7] Taewan Kim, Hakjoon Lee, and Yunmo Chung; "Advanced Universal Remote Controller for Home Automation and Security", IEEE Trans. Consumer Electronics, Vol. 56, No. 4, pp. 837-843, Aug 2010.
- [8] Ali ZiyaAlkar, John Roach, DilekBaysal; "IP Based Home Automation System", IEEE Transactions on Consumer Electronics, Vol. 56, No. 4, November 2010
- [9] Massimo Aliberti, "Green Networking in Home and Building Automation Systems through Power State

- Switching”, IEEE Transactions on Consumer Electronics, Vol. 57, No. 2, May 2011
- [10] H. Lee and K. Park, “Remote controllable and energy-saving room architecture based on ZigBee communication, ”IEEE Trans. Consumer Electron., vol. 55, no. 1, pp. 264–268, 2009.
- [11] Sriskanthan, N., Tan, F., Karande; “Bluetooth based home automation system’, Microprocessor. Microsystem. 2002, 26, (6),pp. 281–289
- [12] J. E. G. Salas, R. M. Caporal, Senior, E. B. Huerta, J. J. Rodriguez and J. J. R. Magdaleno; “A Smart Switch to Connect and Disconnect Electrical Devices at Home by Using Internet”, IEEE Latin America transaction, Vol. 14, NO. 4, APRIL 2016.