

Solar Home and Street Light Design

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ABSTRACT

The present work is based on a stand-alone photovoltaic system. A model has been made with detailed connection using 1 solar panel and 1 battery. This stand-alone system can meet both the demands of home as well as street lighting electricity supply.

Keyword: Photovoltaic system, Stand alone system, Solar panel, Transistor and PN junction diode.

1. INTRODUCTION

In the present day of modernized technology where power crisis has become a serious issue, to be concerned, generation of power has reached to be height. It's well known that in the present world the use of conventional energy is the most efficient sources of energy, that means it's have been using natural resources (like coal, bio fuel petroleum etc.) to generate electricity, but this natural resources are exhaustible. They take millions of years to form. It can be presumed that once this sources are exhausted they cannot be procured in many generation to come. So naturally power generated by non-conventional method become a challenging part of research. The main concerned that the demand of electricity is increasingly leaps and bound. In the year of 2009, 165627 MW of electricity was produced in our country but it's calculated that the demand will reached to 80, 00000 MW in the year of 2030. So, it is assumable that the demand of electricity is increased rapidly. So generation of electricity by non-renewable method has been a concern. Already different project have been launched by many country for the production of energy from non-conventional sources. Keeping this in mind our present work has been constructed. The present technique is based on roof -top installation of solar photovoltaic stand-alone system [1]. In the present world a detailed modelling of solar energy generation and energy distribution on a household system has been implemented. This experimental work has also been carried to show how a photovoltaic system can meet the demand of our home electrical requirements and also street lighting system.

2. METHODOLOGY

A model of house has been developed with the help of wood boxes. It has been painted and made it ready for further work. After completing the house a solar panel [2] (3 watt) has been installed at its roof. Before installing it permanently two wires has been shouldered on the plate which indicated its positive and negative terminals. After shouldering a rechargeable battery has been connected. Connecting the positive terminal of the plate with the positive side of the battery and the negative terminal to the respective side of the battery.

Transistor [3] circuits are used to make the street light automatic, so that they can operate automatically and switch on at night and off in the presence of sunlight. Furthermore some resistors were used to light up bulbs and a fan which we installed beforehand inside our house, giving a more realistic feel to it.

We also installed switches one for the lights inside the house other for the lights at the balcony of the house and one for the fan which we installed at the first floor of our model home. A U.S.B port has been used and connected it to the positive side of the battery. Which could be used to charge any cell phones which use a U.S.B type at a charging port? All the switches and extra wires are delicately hidden at the back of the house giving it a clean and realistic look and feel.

3. COMPONENTS REQUIRED

- 1) 3 W.P Solar module.
- 2) 6 Volt, 5 A.H. V.R.L.A BATTERY.
- 3) P-N Junction Diode.
- 4) L.E.D (1 Watt) (White, Red, Blue)
- 5) Resistor (1 kilo ohms, 0.25 watt ,560ohms,0.25 watt, 2.2 ohms 0.5 watt)
- 6) Transistor (D 882)
- 7) USB socket.

1) 3 watt power (w.p) solar module:-
3 w.p solar module [5] means 3 watt-peak module. This type of modules gives open circuit.

Other important materials used are:

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3 w.p solar module [5] means 3 watt-peak module. This type of modules gives open circuit.

Specification

Voltage ($V_{o.c}$) - 10.48 volt.

Short circuit Current ($I_{s.c}$) - 350 m.A (0.35 Amp.), and they give 250m.A current to charged, in the peak time of a sunny day.

2) Battery

Basically in the solar systems mainly tubular battery is generally used. But in there we are just trying to show that how a photovoltaic system [6] worked.

In this reason we are used in this project a small battery rating about 6 volt, 5 A.H. V.R.L.A battery means 6 volt, 5 A.H. valve regulated lead acid battery. This battery Initial current about 1.2 Amps.

Generally this battery is about 30 W.h. battery.

3) P-N junction diode

A P-N junction diode (IN4007) [7] is been used as a blocking diode in this project. This diode worked as a blocking the current when battery is not charging, mainly in the night time. This diode is made by silicon so it is cut-Off voltage is 0.7v and this no (IN4007) of diode is generally is known max. Passed current is about 1amp. (Approx.).

4) L.E.D: 20pcs L.E.D lights is been used in this project for lighting home & street light. 3 colors of L.E.D lights were used, which consisted verities like Red, blue, & white in the home lighting & only white light in the street light.

5) Resistor

some resistor rating about 1 K ohms, 0.25 watt,550 ohms, 0.25 watt & 2.2 ohms, 0.5 watt for working this project.

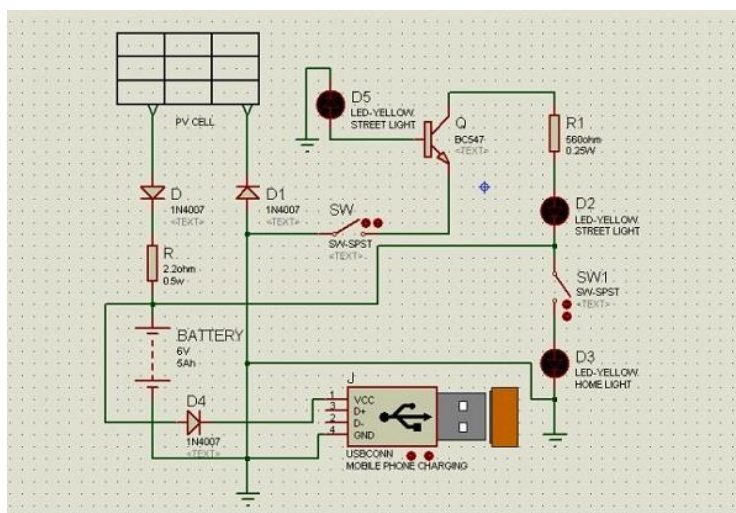
6) Transistor

1 pcs., of Transistor is been used for street lighting, for doing Dusk to Dark system's light only for street lighting system.

7) U.S.B. Socket

1 pcs of U.S.B socket is been used in this project for charging our all types of mobile phone also.

4. CIRCUIT DIAGRAM



Generally in photovoltaic (P.V) system in between solar p.v module & battery there is a C.C.U (Charge controller unit) [8]. In that case we used 2 pieces of diode for controlling the circuit. But if it has to be worked above 10w.p. and 12 volt photovoltaic system then the charge controller is needed to be replaced for controlling the circuit.

5. APPLICATION

This type of photovoltaic system is known as solar stand-alone system, can be used for home lighting system & also street lighting system for saving energy for future generation.

6. CONCLUSION

The present work will kindle some hope in the minds of the readers & we hope that we are not going to be plunged in darkness after the fossils fuels are totally exhausted.

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