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DYNAMIC CHANGE OVER OF HYBRID CHARGING FOR EXISTING UPS

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Abstract- This system is a system which is used to charge the battery with the maximum utilization of solar energy. This system consists of two relays. It is used for the switching modes of charging a battery. The voltage obtained from the solar panel is being sensed by the voltage sensor. Here the voltage should be within a certain limit. If the voltage is between (10-14V), then both the relays will be operating, besides the battery will charge through the solar energy. This mode is said to be solar mode. In other case, if the voltage from the solar panel is below 10V, the charge of the battery will be switched to EB mode. The voltage from the solar panel and different mode of the battery are displayed through the LCD display. When the EB mains are turned off, the voltage from the battery is discharged through this system. This project aims to make a simple solar charge controller which can be connected to the existing UPS and can act as a smart UPS. Solar panels will not supply the regulated voltage for charging the battery. Hence, an external charge controller is used to have the desired constant voltage. Development of this project as a product can eliminate the cost of the hybrid inverter.

Keywords:PIC16f877a

I. INTRODUCTION

Gone are the days when you look up at the sun and curse yourself for being out on a hot sunny day. It is the simple application of solar cells. They are the only way we can convert sunlight into electricity directly and day by day they are getting better ,smaller and cheaper.In today's world, power is a very important necessity in our lives. Solar energy isn't something new. Every hour the energy available from the sun is more than what human's require for an entire year. Solar power is a renewable source of energy, which has become increasingly popular in modern times. Solar power is generated using solar panels, which do not require any major mechanical parts, such as wind turbines. These mechanical parts can break down and cause maintenance issues and can also be quite noisy. However, there is a drawback to solar power – energy can only be produce when the sun is shining.

To overcome this, usually solar panels are coupled with back up rechargeable batteries, which can store excess power generated during the day and use it to provide energy to systems when there is no sun shining. In this way solar power can be used to power houses and other large scale systems. However, reliable power is not easily available everywhere. Here, we are concentrating to develop an alternative source of power for rural India where power supply is very erratic and unreliable. The basic concept is to store the energy in a rechargeable battery which can be used later on for small power applications such as torches. A number of viable ways do presently exist to charge a battery. Our motivation is to decrease from the increasing power cuts faced in the state as well as in many parts of the country. Due to that there is not enough time to even charge the battery for sufficient power cuts. One of them, on which we are going to concentrate, is to charge a battery by making the use of solar energy. A very crude and simple way to charge a battery is by connecting the solar panel directly to the battery terminal. Nothing can dare challenge the sun when it comes to radiation energy. Here we charge the battery by the maximum usage of solar power. This is used for domestic purpose were the cost of hybrid inverter can be easily eliminated.

II. EXISTING CHARGE CONTROLLER SYSTEM

The Charge Controller controls the flow of charge from PV panels to the DC bus. The controller operates in two modes - MPPT mode and VOC mode and the battery voltage determines the mode of operation. The load demand occurs only when the inverter is switched ON and it supplies the local loads from the DC bus. The battery may charge or discharge depending on the PV power and load demand. If the battery voltage is below the reference limit, the MPPT mode is employed to extract the maximum power from the PV panels. If the load is heavy enough to cause discharge of the battery, the PV panel provides the maximum available power to the load and the rest is supplied by the battery.

Operation of Existing Block Diagram

If the battery voltage exceeds the reference limit, the Voltage Control mode is employed to prevent overcharging of the battery. The operating point of the PV panels is changed accordingly to obtain a constant output voltage at the battery terminals. The rate at which the battery continues to absorb charge or the current through the battery gradually slows down because the voltage is maintained constant. A voltage band is used to prevent shuttling between the two modes.

Problem of Existing System

In Existing System MPPT (Maximum power point tracking) is used. The system is very complicate and they are large in size.

III. PROPOSED SYSTEM

This system eliminate the serious disadvantages of the existing system. It consists of voltage sensor with the combination of variable pot and potential divider circuit. The voltage from the solar panel are step-down and give reference of the pic microcontroller 16f877a. According to the program the controller decides the charging mode of battery whether it is in EB mode or Solar mode. The controller displays the voltage level of solar panel and charging mode of the battery. When the battery voltage level is full the controller to stops the charging of the battery. The block diagram of Smart Solar-UPS System is shown below. It consists of step-down transformer, rectifier circuit, voltage sensor, PIC 16f877a controller circuit, relay unit, existing UPS, and battery. The voltage from solar panel is continuously sense by using voltage sensor. The sensor output is given to reference voltage of controller. The transformer step-down 230V AC to 12AC and the rectifier circuit converts AC voltage to DC voltage (5V and 12V DC). The 5V DC is the operating voltage of PIC controller and 12V DC is the operating voltage of the relay unit. The relay unit consists of two relays, it is used to changing the charging of the modes of battery.

BLOCK DIAGRAM

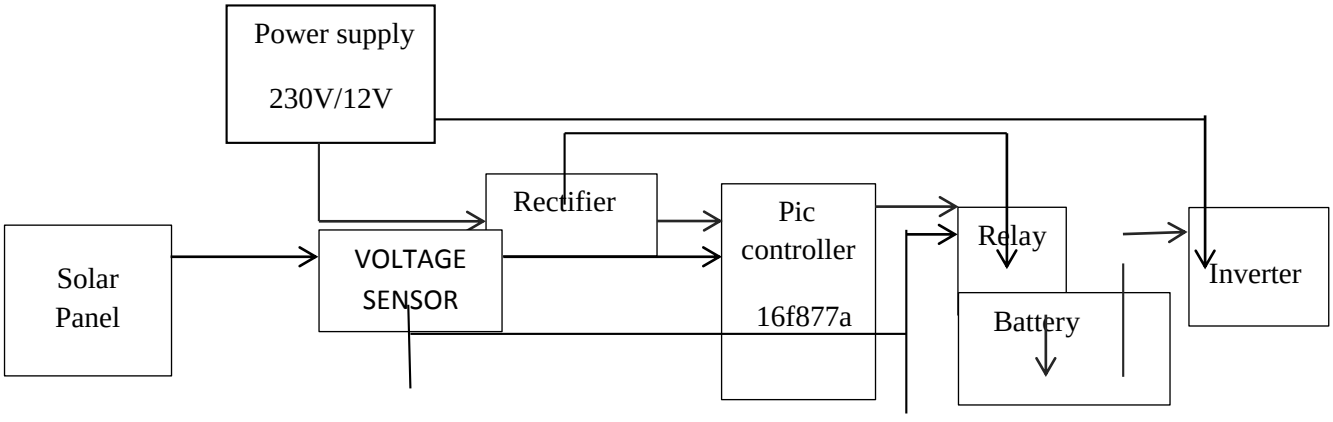

Figure 1 Block Diagram of Proposed System

Operation of Proposed System

The hardware implementation and working of the Smart Solar UPS system and its respective function are shown below in respective blocks.

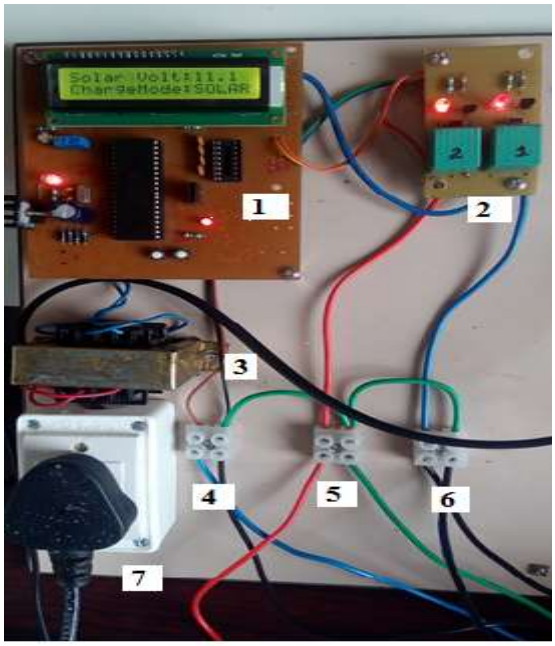

Figure 2 Charge on Solar Mode

1. Controller Board
2. Relay Unit
3. Transformer (230V/12V AC)
4. Solar Panel Input
5. Battery Input
6. UPS Input
7. 230V AC Input

Charge on Solar Mode

When the solar voltage is in-between 10V to 14V, the battery charges under the solar mode. The LCD displays the solar volt and the charge mode of the battery

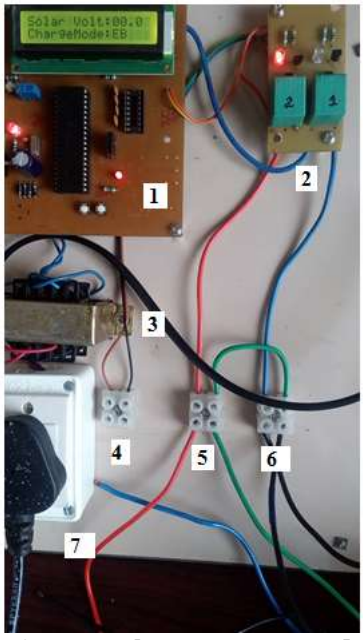

Figure 3 Charge on EB Mode

1. Controller Board
2. Relay Unit
3. Transformer (230V/12V AC)
4. Solar Panel input
4. Battery Input
6. UPS Input
7. 230V AC Input

Charge on EB Mode

When the solar voltage is below 10V, the battery charges under the EB mode. The LCD displays the solar volt and the charge mode.

HARDWARE RESULT

Figure 4 Hardware Implementation and Working

1.Smart Solar - UPS System
2.Existing UPS
3.Load
4.Battery
5.Solar Panel

IV. CONCLUSION

To charge the battery with the maximum utilization of solar energy. Compactness and low cost are the two recent trends practiced. In such case our project can decreases the size of charge controller with low cost. And also displays all the parameter such as solar volt and charging mode of the battery. Thus it is used for domestic purposes where the cost of hybrid inverter is eliminated.

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