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# A SURVEY OF IMPLEMENTING SMART SOLAR POWER SYSTEM USING ANDROID WITH ARDUINO

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**ABSTRACT -** Solar energy is a renewable energy source. Here this paper describes how the solar energy can be utilized efficiently. Solar energy is gathered using solar tracking system. It will be stored in the battery. This stored energy can be utilized for high prioritized devices rather than all the connected devices in case of a power surge. This can be accomplished using the proposed priority system which will enable the user to have the devices are prioritized .The prioritized devices will be powered ON even in case of a power surge by obtaining power from a secondary battery. If the battery does not sufficient power then the power will be obtained to the main power supply. All this will be controlled by the Arduino board .Here ATMEGA 2560 can be used due to its high number of shields and modules which can be easily attached and made to work with the board.

**KEYWORDS**: Solar Energy, Arduino, Priority, Android

## I. INTRODUCTION

Electricity has become an essential in today's world. To generate power required to satisfy the needs of the ever increasing population, we need to rely on a variety of resources which includes both exhaustible and non-exhaustible .Exhaustible resources like coal are reaching their exhaustion point ,so we need to focus more on effective harnessing and utilization of power obtained from non-exhaustible energy. The major energy source is the sun whose energy is harnessed using the solar cells. While there is regular progress in the reception of solar energy, there is little progress in the utilization of it. This project is proposed to efficiently use the harnessed solar energy in a smart manner. This will be accomplished using an Arduino and Android.

The Arduino microcontroller board will control and monitor the solar energy received by the panels. If the energy is low, the system will try to keep only the prioritised devices powered ON. The priority of devices will be assigned by developed priority system. This will system will help the user to prioritize the devices using the solar energy in a real time manner. Hence when the solar power is low, it will not be used by all the connected devices but rather only by the high priority devices.If the energy is less to even run the high priority device then the system will try to take energy from a pre placed battery. When the battery runs out of energy the power is taken from the main power supply. All these actions will automatically done by the system and user will be notified of these changes immediately. The user will only have to prioritize the devices on his android device according to his needs. The android will communicate with the Arduino using a Bluetooth module (HC-05). This will be a two way communication with priority orders given from the android by the user and change notifications from the Arduino to the Android.

## II. COMPONENTS OF SMART SOLAR POWER SYSTEM

### A. Arduino Board

Arduino is an open source team, which has developed microcontroller boards and embedded software based on Atmel AVR chips. They have many variants in their microcontroller boards including the popular Arduino UNO and the big board Arduino MEGA. The board we can use here is Arduino mega 2560. It consists 70 I/O pins in which 16 pins have analog to digital conversion function and remaining 54 pins perform digital read/write function. It has 4 inbuilt serial tx and rx ,also we could construct software serials through software. The board uses 16MHZ as clock. The programming is done using Arduino IDE software. The programming language is similar to embedded c and has many libraries for easier interface with other shields. The arduino is the master brain of this project. It is the decision making hardware to control solar tracking system, to send and receive to and from android interface through Bluetooth medium, to check the available power and to take action to perform load distribution. Figure 1 shows the structure of Arduino mega 2560 board

***Fig.1. Arduino Mega 2560 Board***

**B. Bluetooth Module**

Bluetooth module is the intermediate hardware between android and Arduino. The Bluetooth module used here is HC-05. The baud rate is about 9600b/s and the range of this module is about 10 to 50 m.The frequency band used in this module is 2.4GHZ . Figure 2 shows the structure of Bluetooth module.


*Fig.2. Bluetooth module*

**C. Android Device**

Android device has the android application installed mobile phone which is used to control the devices through the bluetooth interface with Arduino .The android application was developed using MIT APP INVENTOR .This android application also notifies the user on actions taken by the Arduino .This provides a GUI with the user enabling ease of use. This device uses the latest operating system and is compatible with every device .This application occupies a memory of 1.25MB .The remaining power in the battery of the system is notified to the user through GUI

**D. Solar Tracking System**

Solar tracking system is used to obtain high electric density from a solar input. This tracking system moves along with the sun's movement enabling a better efficient way of gathering solar energy. The solar panel and the sun should be at 90 degree enabling a high efficient throughput. The solar tracking system uses a servo motor to rotate the panels.

## III. RELATED CONCEPTS OF ARDUINO SYSTEM

This paper includes the concept of prioritizing among the connected devices. The device may be of any load. The Arduino checks the power used by the load and the available power for the devices from the solar panel and the battery. The user can allocate the devices as important at any time. The Arduino calculates the remaining power in the power source and acts according to the available power and the priority. When the ranked devices requesting more power (i.e) the source could not deliver the power required by the devices ,then the Arduino switches the source power from solar/battery setup to mains so that the important devices keep running without being interruption. Thus ensuring the high priority devices keep running at any cause.

The priority concept utilizes the power of micro controller enabling a smart switching ON and OFF among the devices based on the priority allocated by the user. This priority concept is used during the power surge condition to efficient utilize the remaining energy. The android user uses the android GUI to allocate the priorities of the devices. Real time allocation of priority is allowed to the user. Figure 3 shows the structure of structure of Arduino system

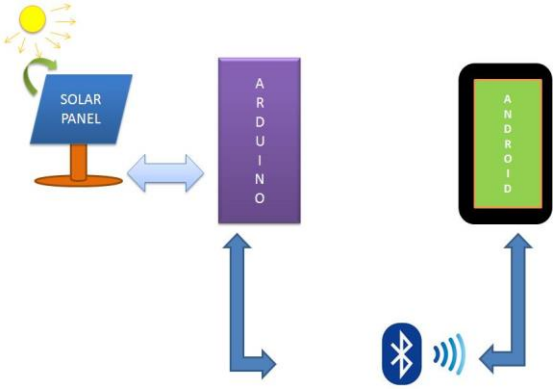


*Fig.3. Structure of Arduino system*

## IV. CONCLUSION

In this paper the proposed system ensures the effective energy reception from the sun and smart utilization of solar power among the devices. This system also ensures the usage of the power among required and non required devices. Thus increases the load utilization factor from the available power.

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