

# Maintenance Indication of Solar Panel and Theft Prevention

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## ABSTRACT

Solar energy is playing a pivotal role in compensating the electrical energy. As we all know that there is short fall in this energy due to more demand and decline trends of conventional source of energies and exhaustion of fuels like coal, petroleum, natural gases. To cope up with this trend of energy photovoltaic installation is being done in an electrical system to compensate and enhance the energy. An photovoltaic installation in an electrical system made from the assembly of various photovoltaic units that uses solar energy to produce the electricity in a cheaper way from sun power. Till now the use and scope of solar energy is limited and has not reached up to masses. Moreover the efficiency of the system is also low due to which the output is not sufficient as compared to input, as in some installed case of solar panel it has been observed that efficiency is not more than 27%. To make it versatile and more useful for the masses newer trends and innovations will help.

## METHOD AND IMPLEMENTATION

### Parts of proposed system

The main blocks of this project are:

- Micro controller (Arduino)
- Reset button
- Crystal oscillator
- Regulated power supply (RPS)
- LED indicator
- Solar panel
- MOSFET

## Description of components

### Arduino

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop Computer. It's an open-source physical computing platform based on a simple microcontroller board, and a Development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can communicate with software running on your computer (e.g. Flash, Processing.)

### Regulated power supply (RPS)

The DC power supply is practically converted to each and every stage in an electronic system. Thus a common requirement for all these phases will be the DC power supply. All low power system can be run with a battery. But, for a long time operating devices, batteries could prove to be costly and complicated. The

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## INTRODUCTION

It is important and urgent to find alternative source to replace conventional fuel or to reduce its continuous consumption due to their limited reservoirs and bad impact on environment. So we have to find alternative source of energy. The proposed work performs the function are maintenance indication of solar panel using sensor and theft prevention. The efficiency of solar panel reduces due to dust deposited on the solar panel. To overcome this problem, a sensor is placed to alert for maintenance, based on Android Application developed for both maintenance and theft prevention. For maximum power extraction from the sun, a photovoltaic cell with MPPT (Maximum power point Tracking) system is used. This will increase the system efficiency.

best method used is in the form of an unregulated power supply – a combination of a transformer, rectifier and a filter.

### Solar panel

Solar Cells can be electrically connected together exactly the same way as batteries. Currents add when connected in parallel and stay the same when connected in series, while voltages add when connected in series and stay the same when connected in parallel. Modules of cells can be added together in the same fashion.

Individual solar cells are connected together in series to form a solar panel. The P side of one cell is connected to the N side of the next cell, and so on. As mentioned above, voltages add together to form higher voltages. Current stays the same for the whole panel as for one single cell.

Individual solar panels are connected in parallel to form a solar array. The voltage stays the same for the whole array as for the individual panels. The currents from the individual panels add together to form higher currents.

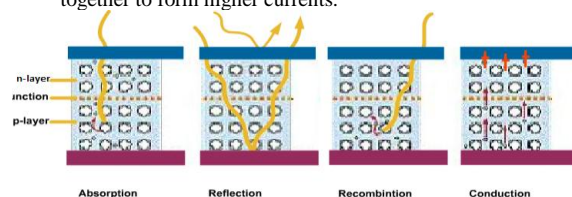


Figure 1 – Operation of a solar cell



#### Software Description

This project is implemented using following softwares:

- Express PCB – for designing circuit

- Arduino compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

tracking on web server as well as on mobile app. Alert action is defined on web server like email alert or sms.

#### IMPLEMENTATION

1) Theft Prevention: To achieve this we use the GPS and GPRS features with accelerometer. If the Panel moves or unauthorized activity occurs then there is change in axis value of accelerometer which will be detected. It will process the data and notify the GPS location of Panel for

2) Maintenance Indication: To achieve this function we use Dust, Voltage and Current Sensors. So when the deposition of dust on Panel increases the efficiency start to reduce, this can be monitored using the sensor values. It will update this data on webservice which can be viewed to know the time for maintenance of Panel.

#### CONCLUSION

The project “THE PREVENTION AND MAINTENANCE INDICATION OF SOLAR PANEL” where Consumers can easily monitor the battery voltage and solar panel voltage. According to the referral voltage action is taken by microcontroller. Use of microcontroller based systems provides huge computational capability and reduction in the hardware. Microcontroller is a mini computer and brings much more accuracy in the control of MOSFET and IGBT. The MPPT charge controller operates with high efficiency (90% or even higher) as compared to existing charge controllers.

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