IOT BASED THE PREVENTION AND MAINTENANCE INDICATION OF SOLAR PANEL WITH MPPT SYSTEM

M.MURALIMOHANNAIK[1], Dr. B. OMPRAKASH[2], Dr. R. GANAPATHI[3]
[1]PG Student, Dept of Mechanical Engineering (AICE), JNTUA, AP, India,
[2]Assistant Professor, Dept of Mechanical Engineering, JNTUA, AP, India
[3]Professor, Dept of Mechanical Engineering, KODAD, TS, India.

Abstract: **Energy is very much essential for existence of our society. 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.**

This IOT 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 the IOT Application to achieve 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, for this light detecting resister is used.
This prototype model can also be extended to larger system also.

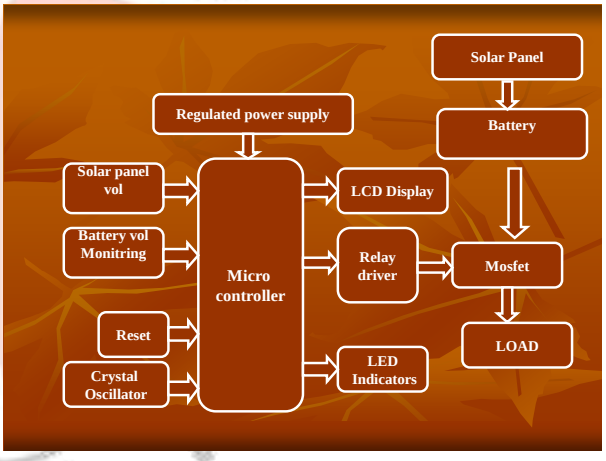
key words: **Performance, Solarpanel, Maximum power point tracker, Arduino.**

1.INTRODUCTION

Energy is very much essential for existence of our society. 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. This IOT 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 the IOT Application to achieve 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, forthis light detecting resister is used.

HARDWARE DESCRIPTION



Block Diagram Oflot Based The Prevention And Maintenance Indication Of Solar Panel With Mppt System

The main blocks of this project are:

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

Arduino Microcontroller

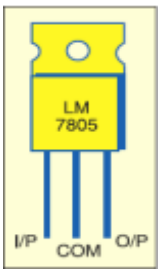
The microcontroller to be used to implement the required algorithm is the Arduino. The decision to use this microcontroller was made after carrying out research on it and

also on the 8051 microcontroller. The Arduino is relatively simple and is perfectly able to implement the type of algorithm that is used. On researching the 8051 microcontroller it was found that it is a lot more complicated than the Arduino and may prove hard to implement the algorithm, if it was chosen.

Arduino Board

Voltage Regulator

A voltage regulator (also called a 'regulator') with only three terminals appears to be a simple device, but it is in fact a very complex integrated circuit. It converts a varying input voltage into a constant 'regulated' output voltage. Voltage Regulators are available in a variety of outputs like 5V, 6V, 9V, 12V and 15V. The LM78XX series of voltage regulators are designed for positive input. For applications requiring negative input, the LM79XX series is used. Using a pair of 'voltage-divider' resistors can increase the output voltage of a regulator circuit.



Voltage Regulator

It is not possible to obtain a voltage lower than the stated rating. You cannot use a 12V regulator to make a 5V power supply. Voltage regulators are very robust. These can withstand over-current draw due to short circuits and also over-heating. In both cases, the regulator will cut off before any damage occurs. The only way to destroy a regulator is to apply reverse voltage to its input. Reverse polarity destroys the regulator almost instantly. Fig: shows voltage regulator.

LCD Module

2x16 Line Alphanumeric LCD Display

To display interactive messages we are using LCD Module. We examine an intelligent LCD display of two lines,16 characters per line that is interfaced to the controllers. The protocol (handshaking) for the display is as shown. Whereas D0 to D7th bit is the Data lines, RS, RW and EN pins are the control pins and remaining pins are +5V, -5V and GND to provide supply. Where RS is the Register Select, RW is the Read Write and EN is the Enable pin.

The display contains two internal byte-wide registers, one for commands (RS=0) and the second forcharacters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen.Port1 is used to furnish the command or data type, and ports 3.2 to3.4 furnish register select and read/write levels.

The display takes varying amounts of time to accomplish the functions as listed. LCD bit 7 is monitored for logic high (busy) to ensure the display is overwritten.

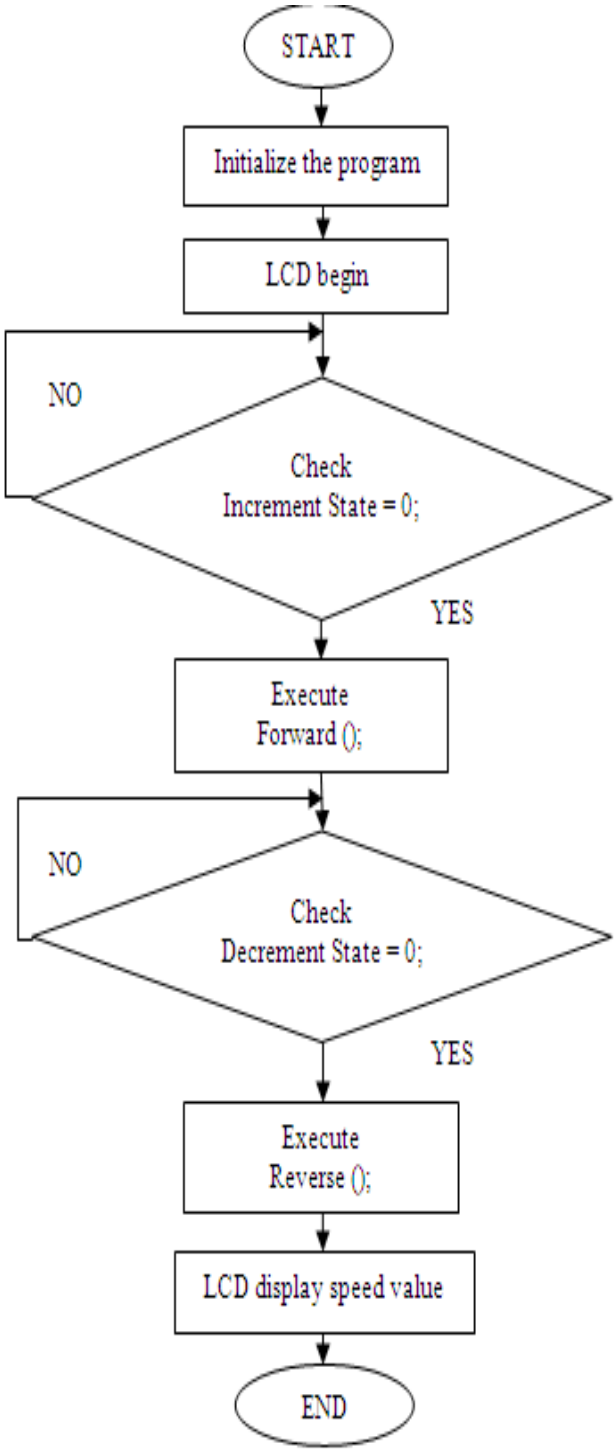
Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging

purpose. The most common type of LCD controller is HITACHI 44780 which provides a simple interface between the controller & an LCD. These LCD's are very simple to interface with the controller as well as are cost effective.

SOFTWARE DESCRIPTION

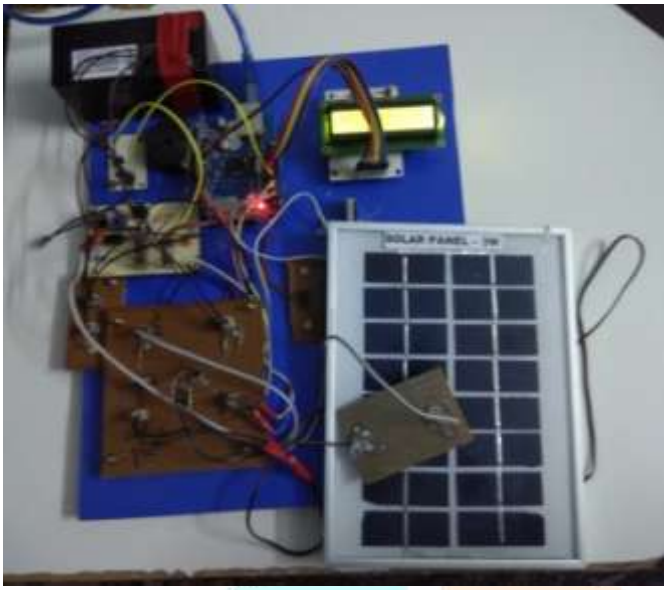
This project is implemented using following software's:

- Express PCB – for designing circuit
- Arduino compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part



Flow Chart of Arduino

PROJECT DESCRIPTION



Overview of Project

- Make sure that the slider button is in the on position and the LED indicator is glowing to indicate that the inverter kit is in ON condition.
- Rechargeable battery which is connected to the kit via diode (to make the current unidirectional) will get charged.
- IC4047 will get DC voltage from battery and it will convert it into square wave with 50Hz frequency. (It is already selected in astable mode so it will give square wave o/p at 10th and 11th pin)
- IRF540 (MOSFET) is working as an amplifier. Here two MOSFETs are used to get low voltage ac from 10th and 11th pin of IC4047. This MOSFET will convert it into 12V AC and feed it to step up transformer.
- The step up transformer will convert 12V ac into 230V ac and feed it to 0watt, 230V bulb. In between the bulb and the transformer one 0.1uf,600V capacitor is placed to filter out the harmonics from ac voltage.
- So, finally the bulb will go.

RESULTS

The project "**IOT BASED THE PREVENTION AND MAINTENANCE INDICATION OF SOLAR PANEL WITH MPPT SYSTEM**" where Consumers can easily monitor the battery voltage and solar panel voltage. According to the referral voltage action is taken by microcontroller.

CONCLUSION

The MPPT based charge controllers are best suitable for wind and solar systems as they track the maximum power in case of power fluctuations at the input side due to environmental condition variation. Hence it is recommended to use the MPPT based charge controllers. 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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