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Solar Panel Prevention and Maintenance Indication Using IOT-Based MPPT System

*** [1]B.OmPrakash, [2]R.Ganapathi**
[1]*ANURAG Engineering College, Kodada, Telangana, India.*
[2]*JNTUA College of Engineering, Ananthapuramu, A.P, India.*
*Corresponding Author Email: omprakash1715@gmail.com

Abstract: *Energy is absolutely crucial to the functioning of our modern society. Because of the limited reserves and negative impact on the environment, finding a replacement for conventional fuel or reducing its continuous consumption is crucial and essential. The functions of this IoT are sensor-based maintenance indication of solar panels and protection against theft. When dust accumulates on a solar panel, it reduces its efficiency. To solve this issue, an IoT-based maintenance warning system is implemented using a sensor placed in a strategic location, with an accompanying Android application designed to deter theft. A solar cell equipped with an MPPT (Maximum power point Tracking) technology is used to draw the most energy possible from the sun. Since this resistor detects light, the system's efficiency will improve. This preliminary model can be generalized to cover a wider range of systems.*

Keywords: *Performance, Solar panel, MPPT, Arduino.*

1. INTRODUCTION

Water Energy is absolutely crucial to the functioning of our modern society. Because of the limited reserves and negative impact on the environment, finding a replacement for conventional fuel or reducing its continuous consumption is crucial and essential. The functions of this IoT are sensor-based maintenance indication of solar panels and protection against theft. When dust accumulates on a solar panel, it reduces its efficiency. To solve this issue, an IoT-based maintenance warning system is implemented using a sensor placed in a strategic location, with an accompanying Android application designed to deter theft. To get the most out of the sun's energy, A solar panel that uses MPPT technology (Maximum power point tracking) We employ a point-tracking (or PT) method. The use of a light-detecting resister will improve the system's performance.

2. HARDWARE DESCRIPTION

The main blocks of this project are:

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

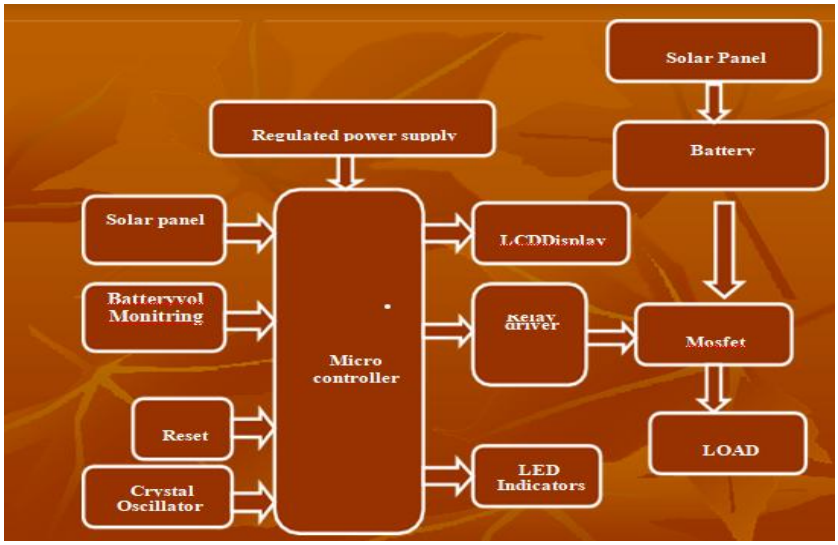

FIGURE 1. Block Diagram of IOT Based the Prevention and Maintenance Indication Of Solar Panel With MPPT System

3. Arduino Micro controller

The Arduino microcontroller will be used to implement the necessary algorithm. After comparing it to the 8051 microcontroller, it was decided to utilize this one instead. Arduino is easily capable of implementing the used method because to its simplicity. Learning More About the 8051The method may be difficult to implement on this microcontroller because it is much more sophisticated than the Arduino.

4. INPUT/OUTPUT BOARD (ARDUINO)

FIGURE 2. Arduino Board

5. VOLTAGE REGULATOR

Even though it simply has three connections, a voltage regulator (or "regulator") is actually a highly sophisticated integrated circuit. It takes in a voltage that may fluctuate and produces one that is stable, or "regulated." The outputs of voltage regulators can range from 5V to 9V to 12V to 15V. The LM78XX family of regulators requires a positive input voltage. The LM79XX series is employed in situations where a negative input is required. Regulator circuit output voltage can be raised by using two 'voltage-divider' resistors.

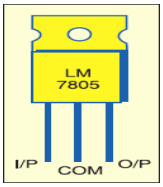

FIGURE 3. Voltage Regulator

Will stop before any real harm is done. Applying negative voltage to a regulator's input is the only guaranteed way to fry it. The regulator will be destroyed relatively instantaneously if the polarity is reversed. Voltage regulator depicted in figure. Time required by the display to complete the given functions varies. Display overwriting is controlled by checking LCD bit 7 for logic high (busy). Liquid Crystal Display also called as LCD is very helpful in providing user inter face as well as for debugging purpose. The most common type of LCD controller is HITACHI 44780 which provides a simple.

6. LCD MODULE

FIGURE 4. 2x 16 Line Alphanumeric LCD Display

We use an LCD Module to show dynamic messages. We have a look at a controller-interfaced intelligent LCD panel with two lines and 16 characters per line. The displayed protocol (handshake) is as depicted. Data lines (D0-D7), RS, RW, and EN for controls, and +5V, -5V, and GND for power are the other pins. The Register Select (RS) pin, the Read/Write (RW) pin, and the Enable (EN) pin. One byte is reserved for commands (RS=0) while the other is reserved for displaying characters (RS=1). It also has a user-programmable RAM section (the character RAM) that may be used to produce any character that can be generated with a dot matrix. Display RAM address 00h will be used to differentiate between these two data sections, as indicated by the hex command byte 80.Port1 supplies the command or data type, while Ports 3.2–3.4 supply the register select and read/write levels, respectively.

7. SOFT WARE DESCRIPTION

This project is implemented using following software's:

- Express PCB–for designing circuit
- Arduino compiler –for compilation part
- Proteus7(Embedded C)–for simulation part

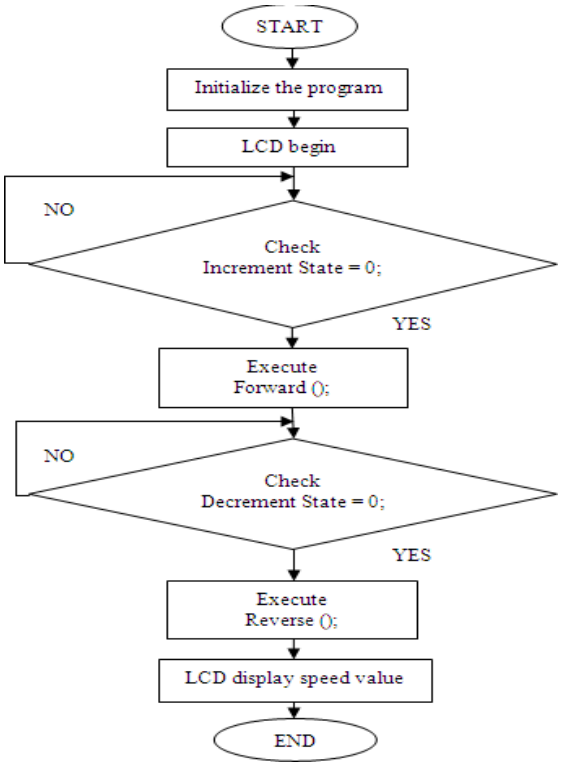

FIGURE 5. Flow Chart of Arduino

8. PROJECT DESCRIPTION

- That the inverter kit's LED indicator light is on and the slider switch is in the "on" position.
- Through a diode (which creates a one-way flow of current) and the kit, a rechargeable battery can be charged.
- The IC4047 is designed to take direct current (DC) voltage from a battery and transform it into a square wave at 50 hertz (Hz). (It has been set to as table mode, therefore square wave output can be expected at the 10th and 11th pin.).
- The amplifier is an IRF540 (MOSFET). Here, low voltage ac is extracted from IC4047's 10th and 11th pins using two MOSFETs. This MOSFET will take the 5V DC and feed it into a step-up transformer to produce 12V AC.
- The 0 watt, 230V bulb will get power from the step up transformer after being transformed from 12V ac. One 0.1uf, 600V capacitor is inserted between the light bulb and the transformer to remove ac harmonics. The light bulb will soon burn out.

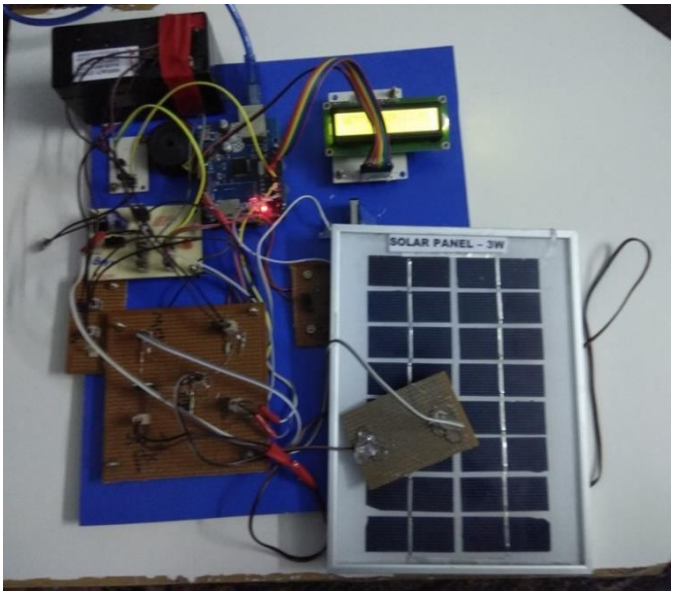

FIGURE 6. Overview of Project

9. RESULTS

Indicators for the maintenance and prevention of solar panels using the Internet of Things. WITH MPPT SYSTEM," a user-friendly interface is provided for checking the status of the solar panel and battery voltage. The microcontroller then acts in response to the reference voltage.

10. CONCLUSIONS

Charge controllers based on maximum power point tracking (MPPT) are ideal for wind and solar systems because they automatically adjust for input power fluctuations caused by changes in the surrounding environment. Therefore, charge controllers based on maximum power point tracking are highly suggested. Microcontroller-based systems allow for significant hardware savings and increased computational power. The control of MOSFETs and IGBTs is greatly improved by the use of microcontrollers, which are essentially little computers. In comparison to standard charge controllers, the MPPT charge controller has a very high efficiency rate (90% or above).

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