



Solar Panel Dual Management System

Prof. Anand V. Sutar, Mr. Sumant Khetan, Mr. Akash kanase, Mr. Akash Karne, Mr. Akshay Irkar

Department of Electronics and Telecommunications,
Bharati Vidyapeeth College of Engineering, Belpada, Navi Mumbai, India

ABSTRACT

As we know that use of solar energy is increasing day by day so there should be efficient use of solar energy. But due to pollution there is wastage of energy i.e. due to deposition of soil on solar panel .so there is always need to clean the solar panel in fixed days. but some time there is no desirable amount of soil deposited on panel which can decrease the power upto certain level but the company or organization has to pay the cleaner for his visit. And theft cases of solar panel are also increasing day by day. so our project is a solution for this.

Keywords: Energy Conservation, Photovoltaic Cell, Theft Prevention

I. INTRODUCTION

About 65 GW of solar capacity is expected to be added globally in 2016, with Asian countries in the lead. Indian solar market appears in full bloom right now. But PhotoVoltaic systems have a potential performance problem of module soiling (dust or soot from local air pollution). It can reduce energy output significantly. Studies on module soiling show an average annual energy loss of 5% for arrays that are not periodically cleaned. Also in recent years we have seen lots of Solar Panel Theft Cases in various countries. So there is a need for smart solution to tackle those problems. So my project proposes a solution for 1) Theft prevention and 2) Maintenance Indication of solar panel using LinkIt ONE and Sensors (Dust Sensor, Current Sensor and Accelerometer). The solution provides Theft prevention for Solar Panel and also indicates the time for maintenance, thereby preventing frequent visits

and save transportation cost as well as increases the usage and efficiency of Solar Panel.

- 1) Theft Prevention: To achieve this we use the GPS and GPRS features of LinkIt ONE Board with accelerometer. If the Panel moves or unauthorized activity occurs then there is change in axis value of accelerometer which will be detected by LinkIt ONE. It will process the data and notify the GPS location of Panel for tracking on webserver as well as on webapp.
- 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 by LinkIt ONE using the sensor values. It will update this data on webserver which can be viewed to know the time for maintenance of Panel



Fig 1: LinkIt One Board

II. RESEARCH ELABORATIONS

A. STUDY OF LINKIT ONE BOARD

The Linkit ONE is a microcontroller developed and released by Mediatek and SeeedStudio. This was made for all the makers in this world for their wearables and IOT projects. The special thing about this chip is that it has Bluetooth, Wifi, GPS and GSM already present in a small package. It uses the same programming language as arduino making it easier to build and prototype projects. The pinout is somewhat similar to arduino so that all arduino shields are compatible with it. It also has an SD card slot, audio jack and separate sockets for I2c and UART. The following are the specifications of this board

B. STUDY OF CURRENT SENSOR

The ACS712 sensor reads the current value and converts it into a relevant voltage value. The value that links the two measurements is sensitivity which – for 5A model – has a typical value of 185mV/A. The sensor can measure positive and negative currents (range -5A...5A), and power supply is 5V for the sensor, and the middle sensing voltage is 2.5V when no current. It measures both AC and DC current. LinkIt ONE analogRead() function outputs a value between 0 (0V in input) and 1023 (5V in input) that is 0.0049V for each increment. We will use the following formula to convert the 0 ~1023 value to an ampere value.

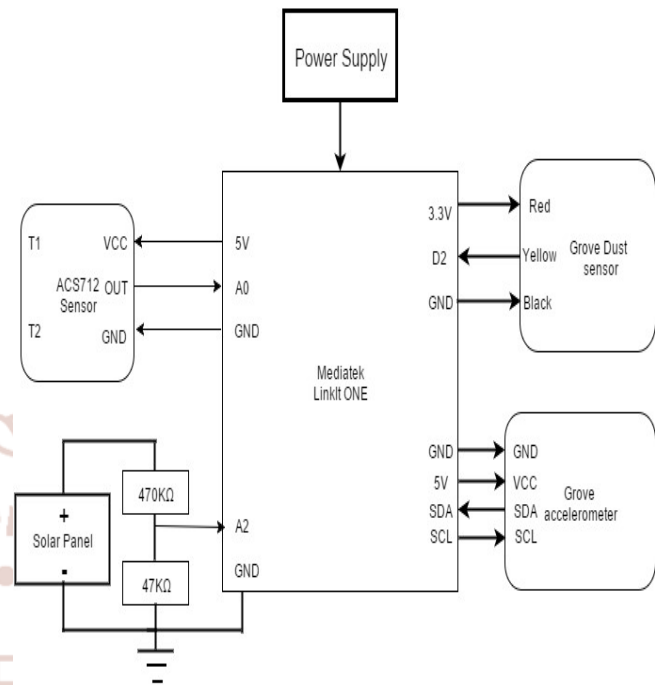
C. GROVE DUST SENSOR:

A good indication of air quality is given by dust sensor in an environment by measuring the dust concentration. By counting the low pulse occupancy time in a given time unit, a particulate matter level is measured. Thus, this sensor provides reliable data for air purification and it is responsible to PM of 1micrometre diameter.

D. GROVE ACCELEROMETER:

A indication of good air quality in environment is given by dust sensor by measuring the dust concentration. Now, by counting the low pulse occupancy time in given unit time particulate matter level in air is measured. Further this sensor provides reliable data for air purification and its response to PM of 1micrometer of diameter.

III. HARDWARE IMPLEMENTATION



Sensor Interfacing with Linkit ONE

Fig 5: Hardware setup

IV. WORKING

To achieve this we have used components listed above. Initially we have to interface all the sensors to the linkit board. As we know since the analog pins of Linkit ONE are tolerant up to 5V only, so we need to use a voltage divider network to bring down the voltage of the panel within the range of Linkit ONE (0-5V). In this we have used a fan as a load. The threshold value of current is decided by the user according to its use. This threshold is set in the linkit board. For example, if the dust deposition increases, the Grove dust sensor starts sending data serially to the linkit board. Due to the increase in the dust concentration, there is a change in the value of current which is measured by the current sensor. The current sensor converts it into a relevant voltage value and sends the data to the linkit board serially. The power value is calculated and the linkit board compares it with the threshold value. If it is less than the threshold, it sends an indication to the webserver. Once a panel is moved or unauthorized access happens, the device detects it using the accelerometer sensor. After this, the device starts sending only the GPS location of the panel with the battery for tracking and activity is indicated using alert variables on Ubidots.

Activity or monitoring can also be viewed on webapp. Once alert is high then click on track button to trace device GPS location.

CONCLUSION

Thus our project performs the work of maintenance indicatin and theft prevention using mediatech linkit one board. The notification will be updated on ubidots web server.

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