

## **Smart phone Solar Tracker**

### **Introduction**

This paper reviews the design of a DIY solar panel with a tracking capacity, which is controlled by a smart phone. The smart phone tracks the altitude angle of the sun and also the movement of the sun. The solar cells are said to have optimum performance when the angle of incidence is equal to zero during sunshine [1]. Due to this, the solar panel are adjusted frequently to receive optimum sunlight, which maximizes its efficiency. The phone uses its GPS and sensors to track the position and location of the sun. Understanding the principle of the device would be necessary for the solar panel to function optimally. This paper reviews how a sun Photometer works and its various applications.

### **Sun Photometer**

“A sun photometer is electronic device that measures direct sunlight over a narrow range of wavelengths” [2]. There are two different types of sun photometer, which work with different principles. These principles also determine how costly the instruments can be. Sun photometers that make use of interference filters which limits the range of sunlight to one or two nanometers, would cost more than photometers which make use of LEDs as detectors [2]. Most photometers are used to measure Aerosol Optical thickness (AOT) [3]. Aerosols have been discovered to contribute to the earth's temperature due to the nature of scattering and absorption of light [4]. Due to the increased concern of Global warming the aerosol concentration in the atmosphere is monitored constantly. Listed below are some photometers which work both manually and automatically with different principles;

### **Implementation of Sun Photometer**

#### **Calitoo sun photometer:**

They are designed to measure the maximum flow of sun at the green and red and the maximum voltage reading is recorded with a voltmeter and with these values used to estimate the aerosol concentration in the atmosphere [5]. Only sunlight arriving from the sun and not sunlight scattered from molecules and aerosols [3]. As such, the sun photometer is focused on the sun directly to a small aperture that has an “interference filter” to filter out scattered sunlight [2].

#### **Globe sun photometer:**

These are sun photometers which use LEDs as sunlight detectors. The advantage of using LEDs is that they are cheaper but the disadvantage is that LEDs respond to a broader range of wavelengths than detectors that have interference filters. These LEDs respond to red or green light and this creates a little current that is amplified by a trans impedance amplifiers that produces an output voltage proportional to the input.

## **CE 318 Automatic Sun tracking Photometer**

This is a very accurate sun photometer it possess a solar powered autonomous control. It measures the sun and sky radiance in order to determine water vapor, ozone and aerosol concentration. This photometer incorporates a series of interference filters which generally makes it more sensitive and stable. This filters are located on a rotating wheel each having a detector. This results in consecutive measurement of each band. This photometer possesses microprocessors, zenith and azimuth stepping motors with measurement sequences utilizing sun-seeking and sun tracking devices which guides the photometer. These properties make it the most accurate autonomous sun photometer compared to others [6].

## **Commercial Application for Sun Photometer**

This device is a measurement device used by oceanographers, pilots and Geographers for the main purpose of measuring the column ozone, water vapor, NO<sub>2</sub> content, atmospheric turbidity measurement, solar UV spectrum analysis, Aerosol and optical depth measurement [7]. The growing need to constantly monitor the concentration of this elements in the atmosphere due to global warming would lead to a rise and improvement in the use of this device.

## **Future**

As the need to increase the efficiency of solar panel increases, they would be an increase to use sun photometer technology to develop efficient solar panels that tracks the sunlight intensity, this would be integrated with microcontrollers like that used in the CE 318 sun photometer to measure the appropriate angle needed for the solar panel to constantly receive optimum sunlight [2].

### **Work cite**

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