

Study of the Factors Affecting on Performance of Solar PV System

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Abstract—this paper is directed on the study of the various factors which are responsible for affecting the performance of a solar PV system. The study is done on the factors which directly or indirectly affect the power output of Solar PV systems. paper provides study of the photovoltaic system's performance and the factors affecting it such as temperature , partial shading, shading and dust on PV panel .shading may be due to shade of the long trees standing nearby the system, shade from the other parallel row of the panel, the shade due to birds sitting on the panel etc. Dust is also an important factor that degrades the panel rating. The temperature effect on the current and thus the power rating of the panel is also considered.

Keywords-Solar PV System ,temperature effect,shading effect andDust effect.

I. INTRODUCTION

Solar Energy is one of the most important sources of renewableEnergy,especially in Vidarbha due toits geographical condition.Solar energy is cleanest form of generation and it is unlimited also it has the largestavailability compared to other energy sources. The amount of energy given by sun to the earth in a day is more than sufficient to handle the total energy needs of the earth in complete one year. There are many ways to convert solar energy into other useful form of energy. Conventional way is AC electricity generation by steam turbine instead of fossil fuel. Heat is extracted fromfocused ray of solar energy from sun which is used toproduce steam and apart is stored in thermally insulatedtanks for use during non-availability of sunshine or duringnight time. Another way is use of Solar photovoltaic systems, it uses silicon or certain other types of semiconductor materials which convertthe light energy absorbed from incident sunlight into DC electricity. Also recently concept of inverterless solar generation also comes in focus which is advanced technique for future,in solar PV system when photons of light hit on the cell, theytransfer their energy, which is supplied to the charge carriers this is actual working of solar PV based generation[1]. There are certain factors which affect the performance of solar PV system.

II.FACTORS AFFECTING ON SOLAR PV OUTPUT

The efficiency of solar panel is dependent on various operating conditions and factors such as dust deposited on the panel, partial shading on it, and operating temperature of solar panel etc. In this paper the study of Solar PV systemis done under following three conditions:

1. Temperature
2. Shading on Solar PV System
3. Effect of Dust on Solar PV System.

III.STUDY OF REQUIRED EXPERIMENTAL SETUP

The “data logger” is required which is used for recording of data from the panel. The hardware interfaces along with the computer through “com-port using the RS232 as shown in figure1.

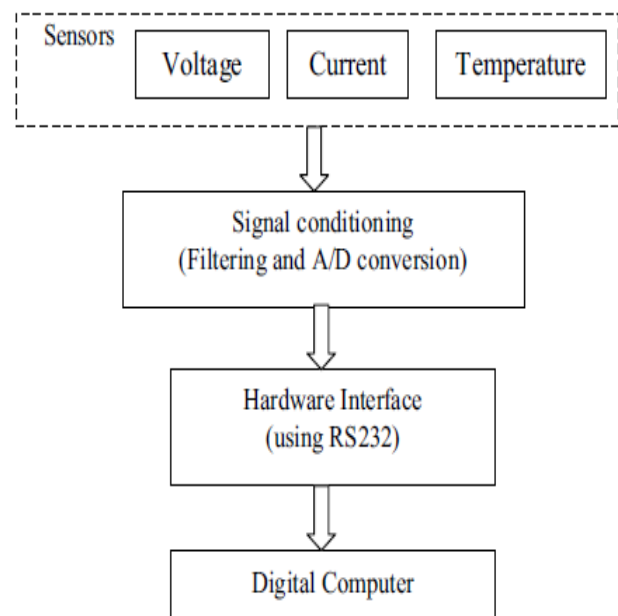


Fig.1 Required hardware

The various effects will obtain if above mentioned hardware connect with solar PV system[3].

III.EFFECT OF TEMPERATURE ON THE PVOUTPUT

As the temperature increases,the magnitude of current decreases. Thus, current is inversely proportional to the temperature as shown in figure 2.

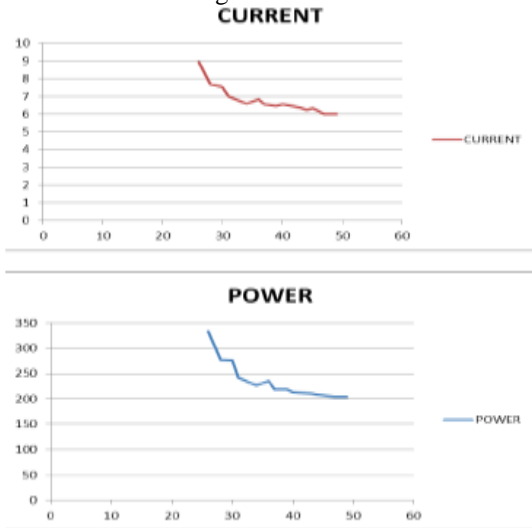


Fig.2Temperature effect on power

II. EFFECT OF SHADING ON THE PV OUTPUT

The shading effect onthe panelis as observe in figure 3.it shows that power is reduces due to effect of shading and when approximately 10% ofthe panel is shaded called as partial shading[2]. It is observe from the figure4that the considerable and largeamount of power is being reduced due to shading. The result of this study is thatif approx. 10% of shading done on the panel, so total loss approximately 25% of the power.

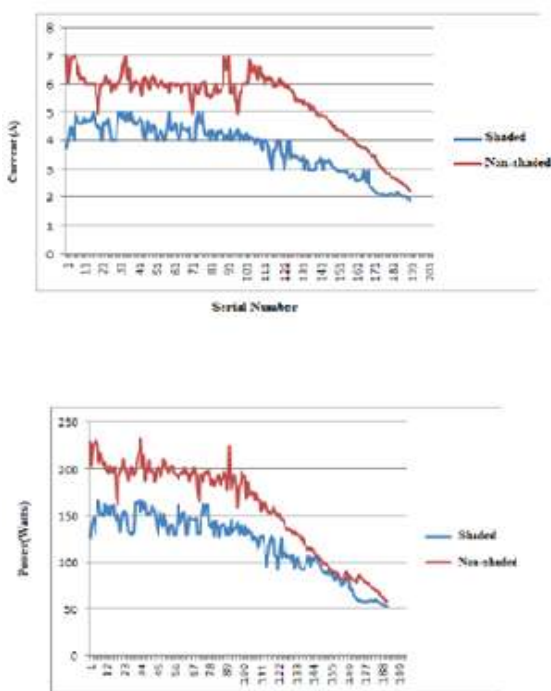


Fig.3 Shading effect on solar power generation

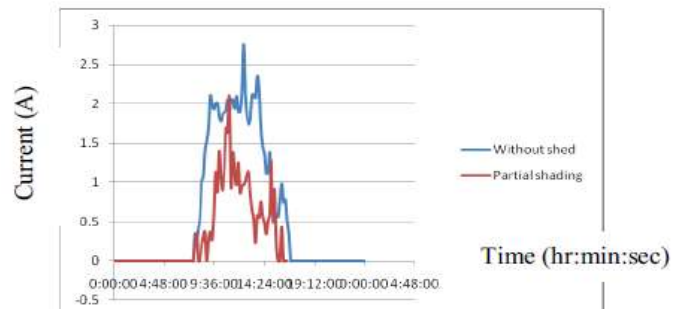


Fig4Partial shading effect on solar power generation

IV.EFFECT OF DUST ON THE PV OUTPUT

Dust is one of the other factors that need to be considered. The dust decrease theincoming irradiance is encountered which further contributeto the reduction in power generation as shown in figure.5. Thiseffect of dust mainly depends on the latitude and longitude ofthe installation of the system [4].

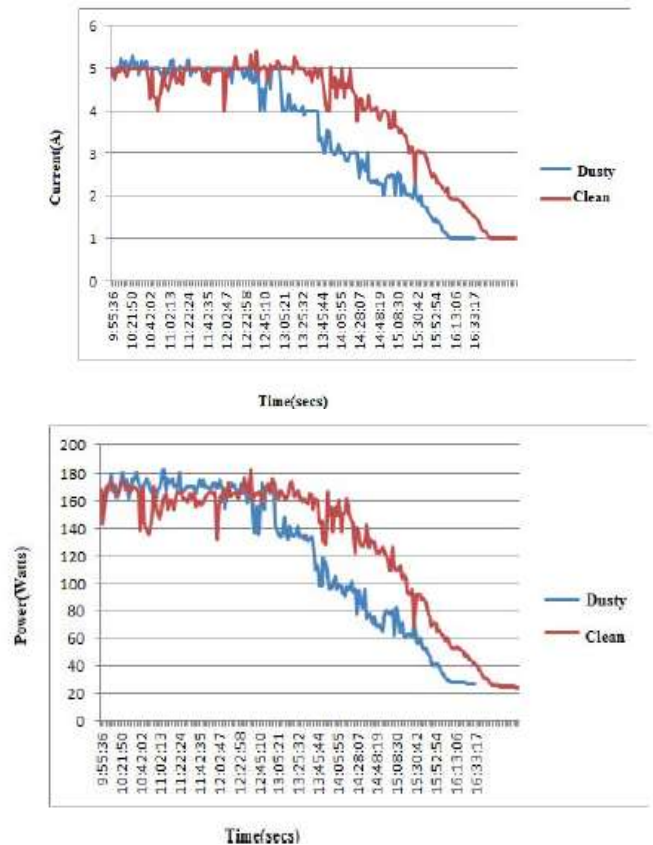


Fig5. Effect of dust on solar power generation

V.CONCLUSION

We could study that the solar powergeneration is greatly affected by:

- (i) Temperature effect
- (ii) Shading condition
- (iii) Dust on the panel

In future we can collectdata of real systemand further used for accurate modeling, prediction orforecasting of the

solar PV panel in real climatic conditions. Further the study can be extended for the effect of various latitude and longitude of the location on solar power generation [3]. Also we will try to obtain maximum output from solar generation

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