CHAPTER 1

INTRODUCTION

1.1 Project background

The concern of environmental issue nowadays causing rising in demand of renewable energy that is cheaper and sustainable with less emission. Solar energy is an option that offered promising result in cater on the problem. PV system is module used to harness solar energy. PV system that built in form of array solar panel where harnessing solar energy take place.

As generally recognized, many applications require voltage bucking boosting converters, such as portable devices, car electronic devices, etc. This is because the battery has quite large variations in output voltage, and hence, the additional switching power supply is indispensable for processing the varied input voltage so as to generate the stabilized output voltage. There are several types of non isolated voltage buck boosting converter such as buck–boost converter, single ended primary inductor converter ,Cuk converter, Zeta converter, Luo converter and its derivatives, etc. (Jeevan Naik, 2014)

A non-inverting buck-boost converter is essentially a cascaded combination of a buck converter followed by a boost converter, where a single inductor-capacitor is used for both . As the name implies, this converter does not invert the polarities of the output voltage in relation to the polarities of the input. This converter requires the use of two active switches and is designed by combining a buck converter and boost converter design in the same topology. (Lipika Nanda and Sushree Sibani Das, 2013)

A MPPT is utilized for removing the greatest power from the sunlight based PV module and exchanging that energy to the load. A dc-dc converter (step up or stepdown) fills the need of exchanging maximum power from the sunlight based PV module to the load. A dc/dc converter goes about as an interface between the load and the module .

However, the PV system is facing problems with the insulating and varying climate issues that causing inefficiency and vary in generated power output of the system [1-2]. The sensitivity of certain electrical appliance toward variation of power input generated by solar energy not suitable to be used as power source. Because of that, DC-DC converter is needed in order to regulate the power output from the PV system.

1.2 Problem statement

The worlds are seeking for alternative energy power source for better living nowadays which known as renewable energy. It is because renewable energy sources are abundance and natural. As a result, the energy is cheaper and suitable with the environment. For instance, solar energy is energy that harnessed from the sun light using PV system and it can be considered as the best renewable energy option existed nowadays.

However, there is two major problems that may related with PV system. First, the efficiency of solar electric power generation is low especially when system is exposed to low irradiation conditions. Second, the amount of electrical power generated by solar PV system is vary according to weather conditions. These problem occurred because of unstable weather condition or the light intensity that exposed to the solar panel is changed by time. These situations can affect the viability of the solar system to be used for certain

electrical appliance, because of these appliances sensitivity towards the change in power input.

For an effective PV solar system, it need to build with buck-boost converter with micro controller. It is because, buck-boost converter is a dc-dc converter that can amplified and lowered the amount of power output by changing duty cycle. By having the buck-boost converter system, it will help in controlling the power output from the PV solar system which is vary depends on light intensity exposed. As a result, the power generated by the PV solar system can be used by the electrical appliances according to its suitable power input.

1.3 Objective

The main objective of this project is to develop an efficient PV system using buck boost converter with arduino controller. To accomplish that, the aim to achieve the following project the specific objectives is

1) To design and develop a buck boost converter for PV solar system.
2) To design and implement an arduino microcontroller for the developed buck boost converter.
3) To analyse the performance of the developed system using both simulation and prototype.