

**DESIGN AND DEVELOPMENT OF MULTIPLE CONCENTRATORS  
FOR PHOTOVOLTAIC POWER GENERATION**

**Design Project**

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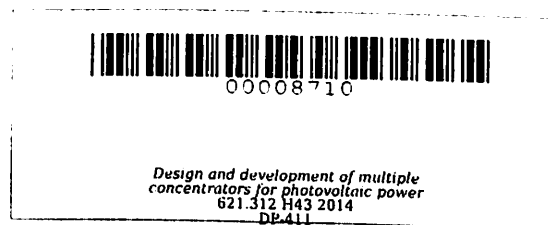
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**DESIGN AND DEVELOPMENT OF MULTIPLE CONCENTRATORS FOR  
PHOTOVOLTAIC POWER GENERATION**

Undergraduate Design Project  
Submitted to the Faculty of the  
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Bachelor of Science in Electrical Engineering



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## **ABSTRACT**

**HERNANDEZ, GLENN R. and MENDOZA, IAN ROSE AARON F.,**Design and Development of Multiple Concentrators for Photovoltaic Power Generation. Undergraduate Design Project. Bachelor of Science in Electrical Engineering. Cavite State University, Indang, Cavite. April, 2014. Adviser: Engr. Leonardo A. Estero.

The design and development of multiple concentrators for photovoltaic power generation was conducted from the October 2012 until October 2013. The study was conducted to design, develop and construct multiple concentrators for photovoltaic power generation to improve the power accumulated from a photovoltaic panel.

The system was composed of three main concentrators and a solar panel. The concentrators were: the mirror array, Fresnel lens and compound parabolic concentrator. The solar panel was fixed with the compound parabolic concentrator. A 9V battery was used as the power source for the gizduino microcontroller and for the stepper motor installed in the mirror array. The concentrators were place at the rooftop of Engineering Science Building from August 12 to 15 and from September 2 to 5, 2013 to test the accuracy and efficiency of the system at different weather conditions. The data recording was done from 7 am to 5 pm at an interval of 30 minutes.

The design was presented to the thesis adviser, technical critic and research panel during the preliminary evaluation conducted at College of Engineering and Information Technology Building on October , 2013.

The system was evaluated by comparing the data recorded from the solar panel with multiple concentrators and the solar panel directly exposed to sun light. The

efficiency of the project was evaluated by computing the real time average power and compared it to the maximum theoretical power.

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## **INTRODUCTION**

Sunlight has always been a perpetual source of energy. Sun has always been there since the age of human race begun. Using this knowledge as a basis, different inventions and innovations were created.

Converting sunlight into electricity is not economically attractive because of the high cost of solar cells. But using concentrated sunlight reduces the cost of solar power by requiring fewer solar cells to generate a given amount of electricity. Plus, with efficiency less than 20%, today's technology of Photovoltaic (PV) has a lot of room for improvement better usage of this solar energy.

Solar pumped laser is one of the many ways of taking advantage of this massive amount of solar energy. Laser is a group of synchronized photons that when hit the photovoltaic cell, may theoretically produce maximum output wattage.