CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Zaheer A. Mohiuddin

Project Number
J0724

Project Title
Effect of Direction and Tilt Angle of Solar Cells on Power Generated

Abstract

Objectives/Goals
As fuel prices go up, solar cells can be used as an alternative source of energy. My objective was to find out the best direction and tilt angle to place a set of solar cells to maximize the voltage.

Methods/Materials
I used a few solar cells connected in a series, a volt meter to measure the volts, a protractor to measure the angle, a compass to find the direction, and a wooden stand where the solar cell was placed. First I gathered all my materials. After that I placed my solar cell on a stand. I used a protractor to set the angle of the solar cell, and a compass to set the direction of the solar cell. After that I took the reading of my voltage meter at various angles and directions. I then repeated this procedure at different times of the day. Finally I collected the data and compared.

Results
My results were that the solar cell captured the most sunlight facing South at a 60° vertical angle at noon. The highest reading was 4.3 volts. The highest readings were mostly recorded in the south direction.

Conclusions/Discussion
The conclusion I reached was that the solar cell would capture the most sunlight if the solar cell was facing South and if it was at a vertical angle of 40° to 70° at 2:00 PM. The combination of a direction facing south and a tilt angle of 40° to 70° provides the best set-up for maximum power generated in the solar cell. According to some research, the tilt angle should be different during different times of the year. I took readings every hour from 11 AM to 4 PM for different tilt angles and sun directions. The directions used varied from South East 60° to South West 60°.

I performed this experiment in December. At this time of the year, the sun is in the southern hemisphere. During the summer months, when the sun is in the northern hemisphere, I expect slightly different direction and tilt angle. I would also like to experiment on cloudy days. This experiment was done in San Francisco Bay Area at latitude of 37° N. I expect the different results if the experiment were performed in a different location such as Los Angeles or in Seattle.

Summary Statement
To find out the best direction and tilt angle to place a set of solar cells to maximize the voltage.

Help Received
Father helped with wooden stand.