Improving the Energy Produced by a Flexible Solar Cell

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The goal of this research was to improve the energy produced by a flexible solar cell. A focus was placed on using the ability of the flexible solar cell to conform to surfaces to see if the power produced could be improved. As the sun moves through the sky, if the solar cell is bent in such a way that some part of the surface is receiving direct sunlight for a longer period of time, it was hypothesized that the solar cell would produce more power. To test this hypothesis, flat, convex, and concave solar cells were tested by changing their orientation relative to the sun. Voltage and current readings were taken at each orientation, the average power was calculated, and the hypothesis was supported by the data. First, the flat solar cells produced the most average power when directly facing the sun. The convex solar cells, bent with a low and medium curve had the greatest improvement in average power over the flat solar cells, 20.6% and 5.6%. This data lead to the engineering goal for this project, to build an automated solar tracker. Using an Arduino computer, a servo motor, and a lux meter, a solar tracking device was constructed to sense the changing position of the sun and orient the solar cell. Overall, these two approaches, a passive system with a low or medium convex deflected solar cell or an active solar tracker could be used to improve the energy produced by a flexible solar cell.

Awards Won:

Fourth Award of $500

Carnegie Mellon University Leonard Gelfand Center for Service Learning and Outreach: Third Award of $1000.00

Arizona State University: Arizona State University Intel ISEF Scholarship