Infrared Alignment and Photon Densification Apparatus for Energy Optimization

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This is a solar module positioning and concentration system that optimizes alignment and photon manipulation. Although commonly dismissed as economically inefficient, green energy's shortcomings can be solved through applied physics concepts and engineering innovation. Applied physics concepts from the fields of electricity and optics, when employed to photovoltaic energy sources, can rectify inefficiencies and increase power yields. Physics principles relating to optics allow for the enhancement of solar flux or panel surface density, resulting in significantly enhanced power yields. The purpose of this project was to address the increasing demand for clean and portable power worldwide. The project began by researching available solar tracking technology and utilizing a new approach with IR pyro-electric sensors. I patented and designed an apparatus containing the solar module and searched for a way to integrate the PIR-driven rotary mechanism with the solar cell data produced. I innovated by employing a FPGA system with a built-in CLB that can be programmed with binary transistor-transistor logic to control each separate duty cycle while adjusting the PIR mechanism. As the photon refraction unit is dependent on alignment accuracy, it will maintain a constant 90-degree incidence angle between the sun and photovoltaic cell in order to harvest maximum power. The net result is a product capable of extracting 12.5 times more energy than conventional solar panels, making solar power cost competitive with fossil fuels.

Awards Won:

Third Award of $1,000