The Future of Energy: Spidronized Solar Cells

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This project is the result of the investigation of “spidrons”, which are plane geometric figures that consist of an alternate sequence of isosceles and equilateral triangles. The purpose was to find how useful could it be a solar cell in “spidron nest” form. The hypothesis was that it was possible to create a digital model using a “spidron nest” design to verify the viability of it as a solar cell and prove that it will be more effective than a conventional one. Using the program Rhinoceros, the Spidron Nest was designed in 3D. Due to its characteristic folding, it was designed at three different folding angles: 22°, 37° and 52°, resulting in the 22° angle being the most efficient. Then, the simulation of the sun rays hitting the cell through the 12 hours of the day was created. Also, the simulation was used to calculate what would be the theoretical effectiveness of a “spidron nest” solar cell vs. the effectivity of a conventional solar cell. Many factors were considered: same amount of watts, maximum and minimum hours of effectivity and occupied area. Some existing formulas were used to facilitate the construction of a “spidron” and it was found that the triangles respectively to the next one in the succession have a 43% of reduction. It was estimated that at a day of full sunlight a “spidron nest” solar cell will produce 7.3 kWh of energy, meanwhile the conventional solar cell will only produce 5.6 kWh. Therefore, the hypothesis was accepted.

Awards Won:
American Mathematical Society: First Award of $2,000