



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

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| Name(s) Ava M. Killoran | Project Number J0110 |
| Project Title New Wind Turbine Blade Design Improves Turbine Output Compared to Standard Airfoil Models | |
| <p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to create a new design of wind turbine blade and test its efficiency at varying wind speeds against two previously designed blades, the standard airfoil and a design similar to the fin of a humpback whale (Whale Power Inc.).</p> <p>Methods/Materials My blade design, the Spoonfoil, is modeled after the standard airfoil but with an additional concave section engineered to capture more wind energy. The three dimensional blade designs were shaped from styrofoam blocks. Each set of three blades were attached to the rotor of a model wind turbine and tested ten times at three different wind speeds. Turbine output voltage was measured using a digital multimeter.</p> <p>Results For all blade designs, the voltage output increased significantly as the wind speed got higher. The Spoonfoil blade had the highest output at all wind speeds tested. At high wind speed the Spoonfoil blade had an 85% higher output than the standard airfoil, and a 54% higher output than the Whale Power blade.</p> <p>Conclusions/Discussion Overall the Spoonfoil blade was more efficient than the Whale Power and airfoil blades. The increase in the voltage output of the turbine at high fan speed was more pronounced in the Spoonfoil blade than in the other blade designs. The standard airfoil produced the lowest output of the three blade designs. Wind energy is the cleanest source of energy because it does not emit any kind of gas or use fossil fuels. As the planet is experiencing global warming, largely because of greenhouse gases, scientists are constantly looking for a way to enhance the clean sources of energy because one day we might be reliant on them. While doing my project I created a model for a new type of blade that generated a higher wind turbine output than the standard airfoil blade, the design that most wind turbines are using today.</p> | |
| Summary Statement I designed and built a model wind turbine blade that increased wind turbine output by 85%, when tested against a standard airfoil design model. | |
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