



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Alap A. Sahoo</b>	<b>Project Number</b> <b>J0129</b>
<b>Project Title</b> <b>Effect of Blade Type and Blade Angle on Power Generation in a Wind Turbine</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my project was to find out which combination of blade shape and blade angle would produce the most electricity on a model wind turbine.</p> <p><b>Methods/Materials</b> For my experiment, I used a model wind turbine, bass wood, a multimeter, sandpaper, a protractor, a fan, a hobby knife, glue, a wire cutter, a measuring tape, and a stopwatch. I tested four different blade shapes (leaf, box, jack knife, and arrowhead) at four different blade angles. Because preliminary research showed that low angles work the best, I decided to use 5, 10, 15, and 20 degree blade angles. My hypothesis was that the leaf blade would produce the most power at a 10 degree angle. I first built 3 blades of each type using bass wood, the hobby knife, and glue. I made sure that each blade was 6.5 inches long. I then placed my wind turbine 2 ft. away from the fan. I attached one set of blades to the turbine and took 7 readings (one reading every 10 seconds) at 3 different wind speeds, at 4 different angles. I repeated the experiment for each of the blade sets. After collecting all the data, I converted it into watts using the formula <math>Watts = Volts * Amps</math>. I assumed 0.5 for amps as amps are very difficult to measure.</p> <p><b>Results</b> The highest output for each blade was always at 15 degrees at the high wind speed. The box type blade's highest output was 5.21 watts, the leaf's was 5.62 watts, the arrowhead's was 5.26 watts, and the jack knife's was 5.35 watts.</p> <p><b>Conclusions/Discussion</b> The leaf blade type produced the most energy at a 15 degree angle. Therefore, my hypothesis, which predicted that the leaf blade at 10 degrees would produce the most energy, is partially correct. This information suggests that real wind turbine blades should be curved and be tilted at around 15 degrees.</p>	
<b>Summary Statement</b> My project is to find out which combination of blade shape and angle produces the most power in a wind turbine.	
<b>Help Received</b> My father ordered the model wind turbine from <a href="http://WWW.KIDWIND.ORG">WWW.KIDWIND.ORG</a> and bought the other equipments. My mother was supervising me while doing the experiment as sometimes blades were coming out of the turbine.	