



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> Muzammil A. Khan	<b>Project Number</b> <b>J0114</b>
<b>Project Title</b> <b>WHRRR! The Effect of the Angle of a Blade on the Voltage Output of a Wind Turbine</b>	
<b>Objectives/Goals</b> Today we are running out of Fossil Fuels. The environment is being harmed and we need another green source of energy. One of these sources of energy is a wind turbine. A wind turbine is a machine that converts the kinetic energy in wind into mechanical energy. This mechanical energy can be used to create electricity! The purpose of this project is to find out if changing the angle of blades of a wind turbine will change its voltage output. By finding the best angle we can increase the voltage produced by a wind turbine improving the wind turbine. Based on my research, the hypothesis I formed is that the 30° blade will produce the most voltage. The 30° blade has best angle of attack meaning, more lift will be produced compared to the angles of the other blades, producing more electricity.	
<b>Abstract</b>	
<b>Methods/Materials</b> First I constructed a wind turbine out of wood. Then I marked five different degrees on the wind turbine, 15°, 30°, 45°, 60°, and 75°. Then I placed the turbine 30.5cm away from a high velocity fan. Then I turned the fan on with the angle of the blades at 15° and left it on for 30 seconds. I observed the voltage the whole time and recorded the highest voltage produced. Then I changed the angle and repeated. I repeated the whole testing four times to make sure my results were accurate.	
<b>Results</b> The results were that the 15° blade produced an average of 2.75 mV. The 30° blade produced an average of 4.14 mV. The 45° blade produced an average of 2.68 mV. The 60° blade produced an average of 2.08 mV. The 75° blade produced an average of 2.01 mV.	
<b>Conclusions/Discussion</b> My hypothesis of the 30° blade producing the most voltage was supported. The reason for the 30° blade producing the most voltage was that its angle was the highest it could get before the amount of lift produced started to decline. In the other blades the lift produced was not as much as the angle of this blade meaning they rotated slower. This in turn had the magnet rotate slower, producing less electricity. Since there was more lift the 30° blade rotated faster the magnet rotated faster. Since the magnet rotated faster, more energy was produced. With this information wind turbines can be improved to produce more energy more energy more efficiently. At the same time, by doing this, we are a step closer to green energy and a step farther from fossil fuels!	
<b>Summary Statement</b> My project is about investigating the effect of the angle of a blade on the voltage output of a wind turbine.	
<b>Help Received</b> Grandfather helped me build the wind turbine.	