



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Nikita Patel	Project Number J0125
Project Title Gone with the Wind	
Objectives/Goals My project will analyze which blade angle is the most efficient for generating electrical power using wind turbines. The blade angles I am testing are 15, 30, 45, 60, and 75 degrees. I will have three different wind speeds, 5, 10, and 15 mph, blowing at the wind turbine.	
Abstract	
Methods/Materials Materials: Anemometer, Ammeter measuring mA, Wind turbine kit with six blades that can change angles, Multimeter measuring mV and mA, Motor for load	
<ol style="list-style-type: none">1. Build the wind turbine from the kit2. Connect Ammeter in series to the turbine and motor and Voltmeter across motor3. Set the blade angles of all blades at a right angle to the wind and then set the blades to 15 degrees. Repeat for 30, 45, 60, 75 degrees4. Turn the fan on and use the anemometer moving forward or away from the fan until the speed is reached 5 mi/hr. Repeat for 10 and 15 mi/hr5. Turn fan on and measure the voltage from the Voltmeter and the current from the ammeter6. Record the voltage and the current, wind speed and blade angle	
Results I predicted that 45 degrees would generate the most energy but it generated only a few mW. The angle of the blade that generated the most energy varied depending on the wind speed. At 10 and 15 m/hr wind, the maximum power was generated at 15 degrees blade angle. However at 5 m/hr wind, 30 degrees blade angle obtained the most power. This may be because the angle of the turbine blades is inversely proportional to the wind speed for maximum power. Even at very slow speeds, you could set the angle high enough to generate any energy.	
Conclusions/Discussion My conclusion is that the optimum turbine angle for maximum power depends on the wind speed. Currently wind turbines have fixed blade angles meaning that at very low speeds, the turbine either shuts off or generates a few MW of power. I am proposing wind turbines to have actively variable blade angles that constantly change according to the speed of winds.	
Summary Statement Which blade angle is the most efficient for generating electrical power using wind turbines?	
Help Received Dad helped in assembling the wind turbine and in purchasing the materials.	