

## Wind Turbine Research Plan

4.11.2019

**Team Name:** NeuralPrism2 Wind Energy

**Purpose:** To design and build a wind turbine that generates the most energy.

**Hypothesis:** We think a geared drivetrain with a rectangular-shaped blade made of aluminum foil and balsa wood with a pitch of \_\_\_\_\_ degrees will generate the most energy.

### **Materials:**

- Vernier Kid Wind Turbine Kit
- Fan/Wind Tunnel
- Multimeter—to measure volts.
- Hot Glue
- Wooden Dowels—to attach to the gears
- Aluminum
- Balsa Wood **Procedure:**
- Build the Vernier wind turbine structure including the gear.
- Design and build blades.
- Test the design shape, number and pitch angle using a multimeter compare the energy output of each design.

### **Data Table:**

<b>Trial</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Blade Design</b>	Small flag	Small flag	Small flag	Foam core	Foam core	Foam core	Foam core	Foam core	Foam core
<b>No. of Blade</b>	3	3	3	3	3	6	6	6	6
<b>Blade Pitch</b>	20°	20°	10°	20°	15°	20°	35°	15°	5°
<b>Turbine Voltage</b>	0.00	0.98	0.93	1.57	1.11	3.18	1.55	3.34	3.19

**Conclusion:** We decided at first to use an aluminum flag with a balsa wood frame. Turns out that it was a bad call on KM2's part. First off, the balsa frame for the flag itself wasn't attached at all. When we tried to glue it together and shorten the blade radius, we barely got any leverage to

fixing it. We had to change the material that we made from balsa wood and aluminum to cardboard, and that vastly improved the initial build. The blade shape was an irregular hexagon (a rectangle with the corners cut off on one side). We also learned that the optimal pitch range is smaller than you may expect.