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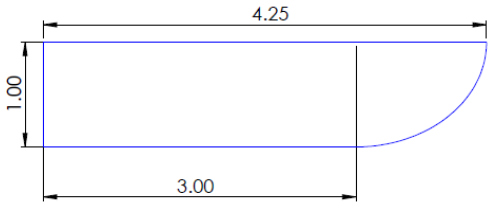
Just the Tip

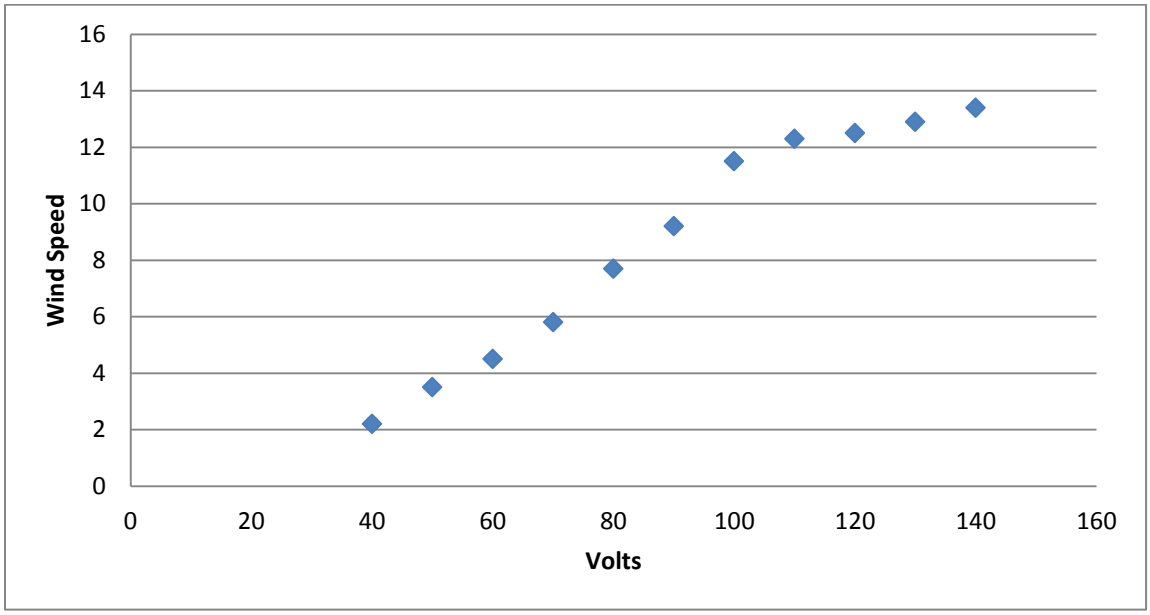
Parameters for the blades:

- Tip Testers
- Constant blade span (blade length)
- Varying chord (1 and 2 inches)
- Different tip shapes
  - Shark
    - 1 inch (thin)
    - 2 inch (fat)
  - House
    - 1 inch (thin)
    - 2 inch (fat)
  - Tent 1 inch (thin)
- Test different number of blades for each type



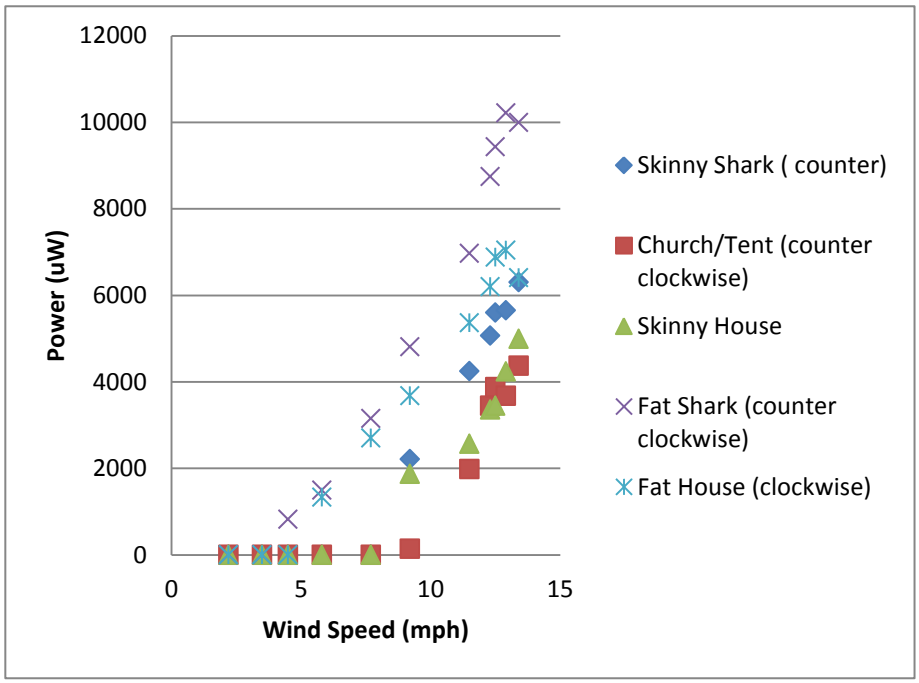
Calibration Curve

We used the curve to estimate different wind speed outputs of the fan given the voltage input.



The curve shows an upward trend that never tops off (flattens out) but does decrease in slope at the highest wind speeds.

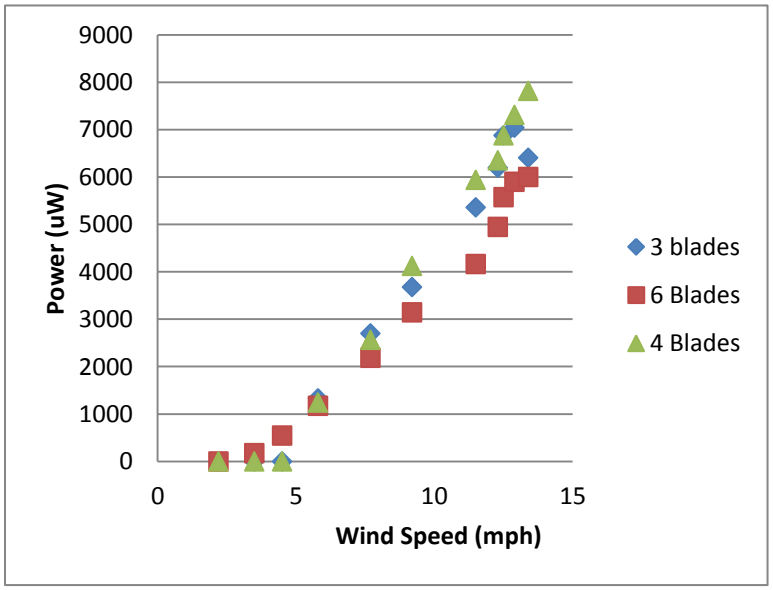
3 Blade Graph



All of the blade types followed the same general power curve (increasing positive slope). The best performer, by a large margin, is the Fat Shark tip type. It reached a power of over 10 mW, about 3 mW greater than its closest counterpart, the Fat House.

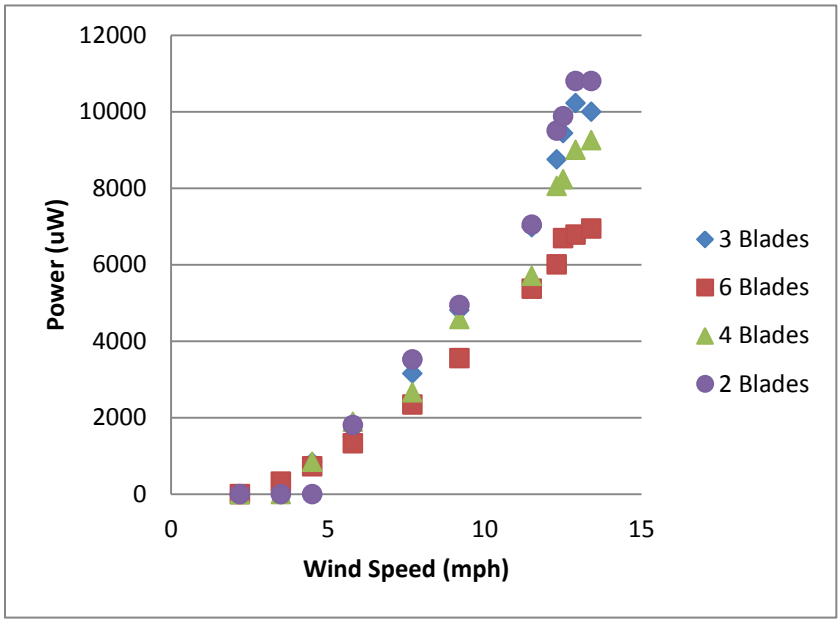
Clockwise vs Counterclockwise – the direction that the blades spun from our view, they were both upwind. This had no effect on the results because the motors efficiency was about the same in both directions.

Fat House



Upon analyzing the results of the Fat House blade, we found that 4 blades were most efficient, then 3 blades, and then finally 6 blades. It should be noted, however, that 3 blades and 4 blades are very close in efficiency. The difference in power amongst the three blade amounts is most notable at higher speeds, whereas at lower speeds the three categories remain rather consistent. Also, we observed that with 6 blades, speeds and therefore power was actually produced at the lowest speeds.

Fat Shark



Besides having the best name for a wind turbine blade, this design was also the most efficient during our testing. We found that the fewer blades we used, the more efficient the turbine became. Therefore, the turbine that used 2 Fat Shark blades was the best at catching wind and changing it into electrical energy. As for wind speed in relation to power output, the power curve was positively sloped, and maxed out at 12.9 mph. 6 Blades was least efficient, and produced little more than half of the turbine that used 2 blades.

Conclusion (lessons learned):

There are only a few solid conclusions that we can make. First, 6 blades is clearly worse than 4 and 3 and even 2. Second the shark shaped tip is more efficient than the pointed tip (round beats pointy). A generalization we can make is that, the wider the blade the higher the output.

Most (>99%) of energy was lost from the first fan creating the wind to our blades. This is partially our fault and partially the inefficient motor's fault. It is our fault because our blades were low quality due to the inexpensive nature of the project. It is partially the motor's fault because the motor was extremely inefficient.