

## Abstract

Portable electronic devices such as cell phones, tablets, speakers and music players are convenient, entertaining, and have become a significant part of everyday life. For these devices to remain useful they must remain charged; which is the motivation for this project. The CVAWT is capable of charging 2 USB powered devices in an outdoor setting such as the beach, camp sites, etc. The CVAWT is a convenient, low-maintenance, easily transportable way for individuals to keep electronics charged outdoors.

## Goals

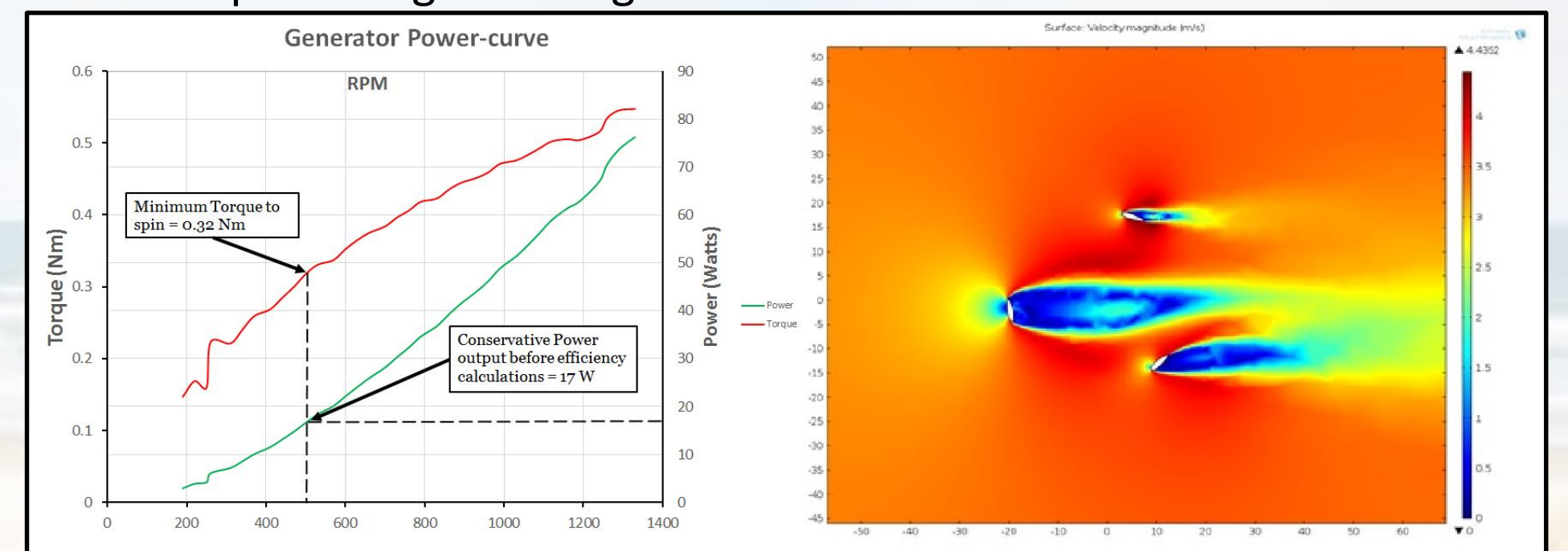
- Design a vertical axis wind turbine that is collapsible and transportable
- Charge USB powered electronic devices
- Optimize performance
- Store energy
- Adhere to weight limit of 40lbs

## Design Features

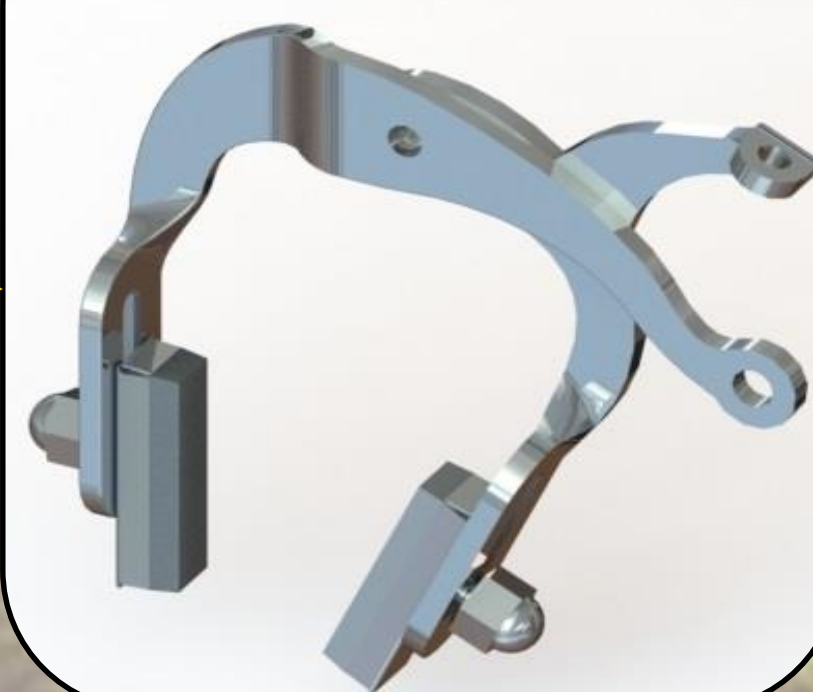
- Total operating height 6 feet
- Rotor diameter 36 inches when operating, collapsible to 20 inches
- Charges devices in low wind conditions using reserve charge of a 5 Ampere hour lead-acid battery
- Prevent overcharging of lead acid battery
- Ideal operating wind speed between 10 – 30 mph
- Braking system for fast and safe stopping
- Timing Belt Pulleys with 4 to 1 ratio
- Fiberglass coated foam for lightweight and durable blades
- Prevents damage to user's device by limiting charging current to 2 Amperes

## Results

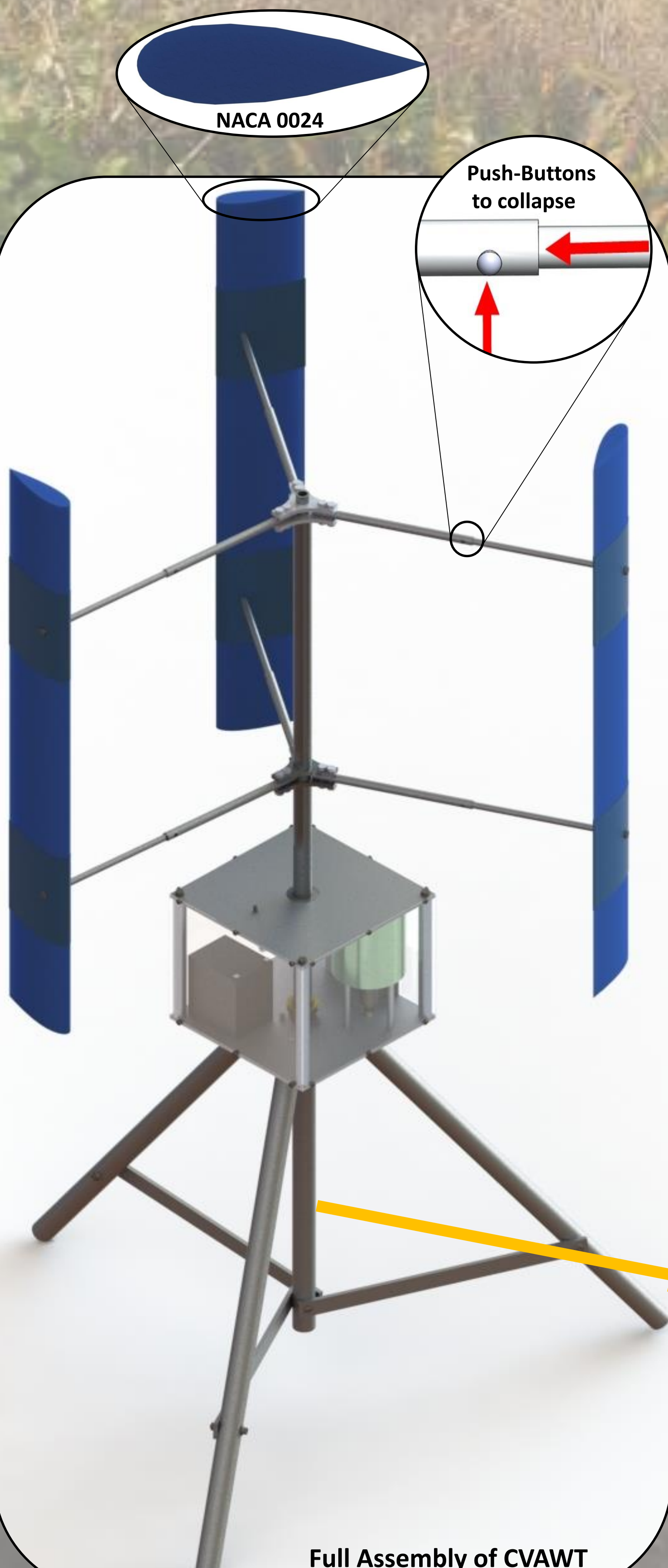
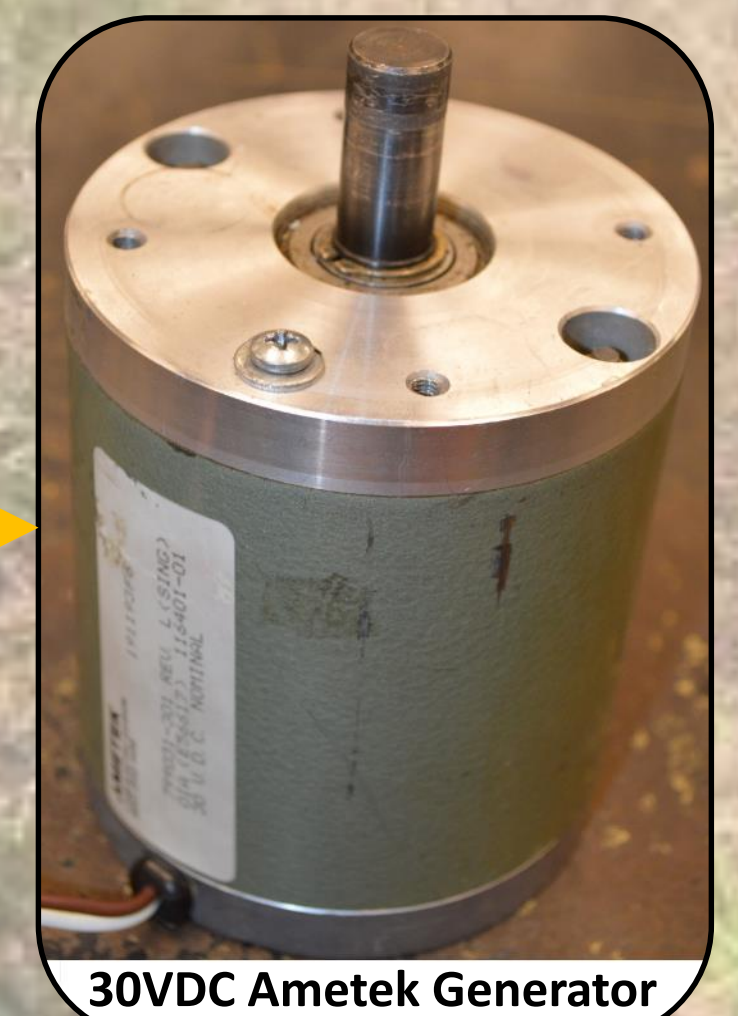
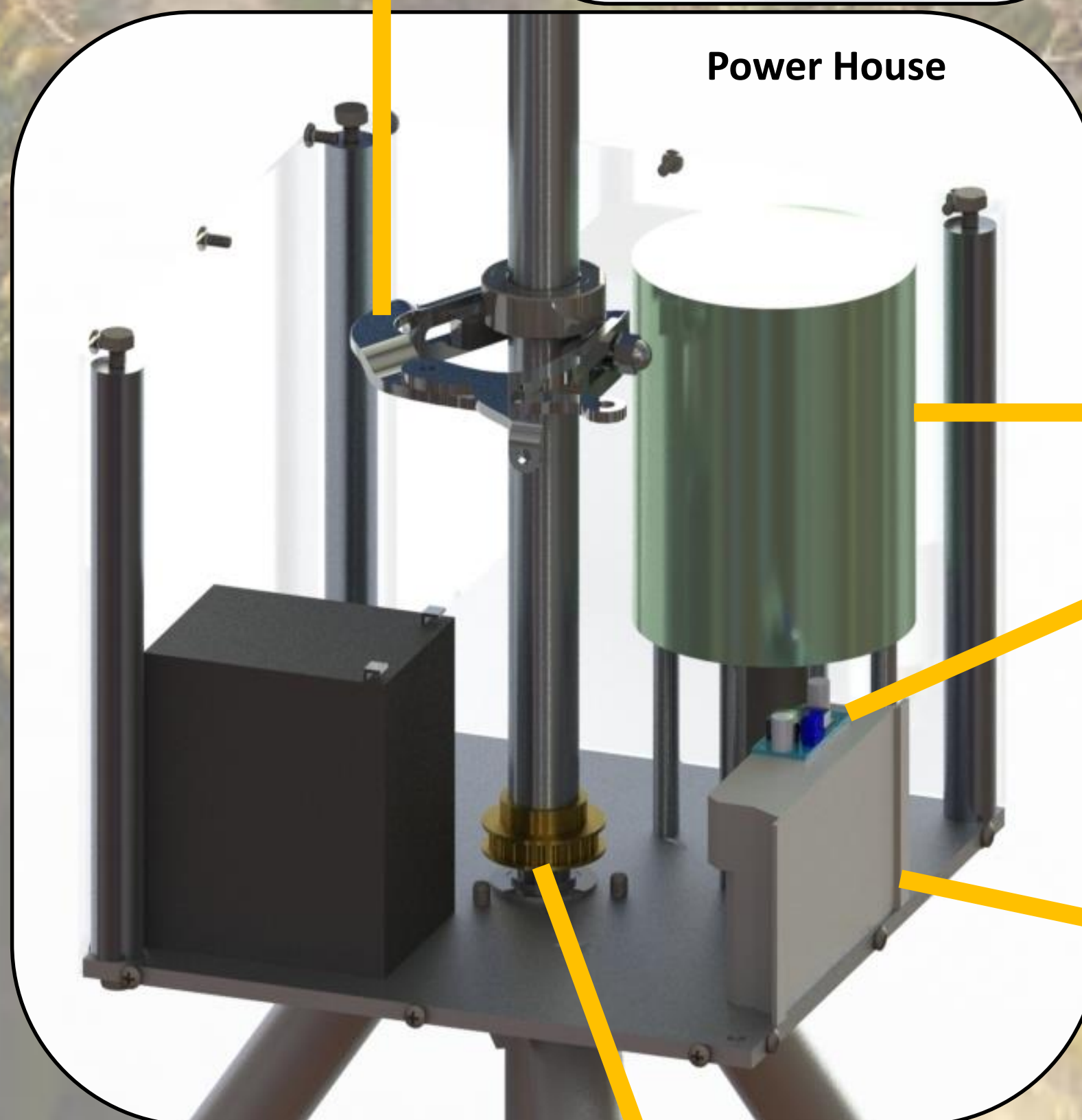
The aerodynamic analysis was performed to illustrate how the 3-blade design does not show significant interference between lifting surfaces, making it an efficient design. The power curve of the generator testing verifies that the CVAWT is capable of generating 5 Watts.



### Braking Mechanism



### Power House



## Future Work

- Variable pitch blades
- Collapsible blades
- Wind speed display
- Electronic braking system
- Channeling walls to increase power output

## Conclusion

There is very plausible evidence that the system will produce the anticipated results. The system will be capable of charging user's USB devices in a time frame equal to or faster than a standard wall outlet while outdoors. The CVAWT will provide users with an outdoor experience even a dead battery can't ruin.