



Design of a Morphing Wing Micro Vertical-Axis Wind Turbine for Optimum Performance

2 teams

Project Overview

Wind is an ideal alternative to fossil fuels as a renewable, non-polluting and local resource. Wind power produced by wind turbines today is more than ever before and is increasing every year. In this project, the surface of the wind turbine blades changes its geometry during rotation. Servo motors or smart materials will be used to perform the dynamic morphing behavior. Numerical work will be carried out to find out the optimum path and geometry change for maximum performing micro vertical-axis wind turbine (VAWT). The project will be capped by the construction and characterization of a prototype.

Project Areas

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| <ul style="list-style-type: none">• Fluids/CFD (1 MEE Student) | <ul style="list-style-type: none">• Instrumentation (1 MEE Student) |
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Project Deliverables

Project deliverables consist of the following numerical and experimental work:

- Numerical:
 - Investigate change in the camber of the wing as a function of the path
 - Investigate change in the angle of attack as a function of the path
 - Investigate change in the twist (3D) as a function of the path
- Construction and testing of the micro-wind turbine:
 - Select the morphing actuation device (Servo, Piezo, SMA, etc..)
 - Design the required sensors
 - Design the communication scheme with the morphing mechanism
 - Build and test the system in air tunnels or the water channel