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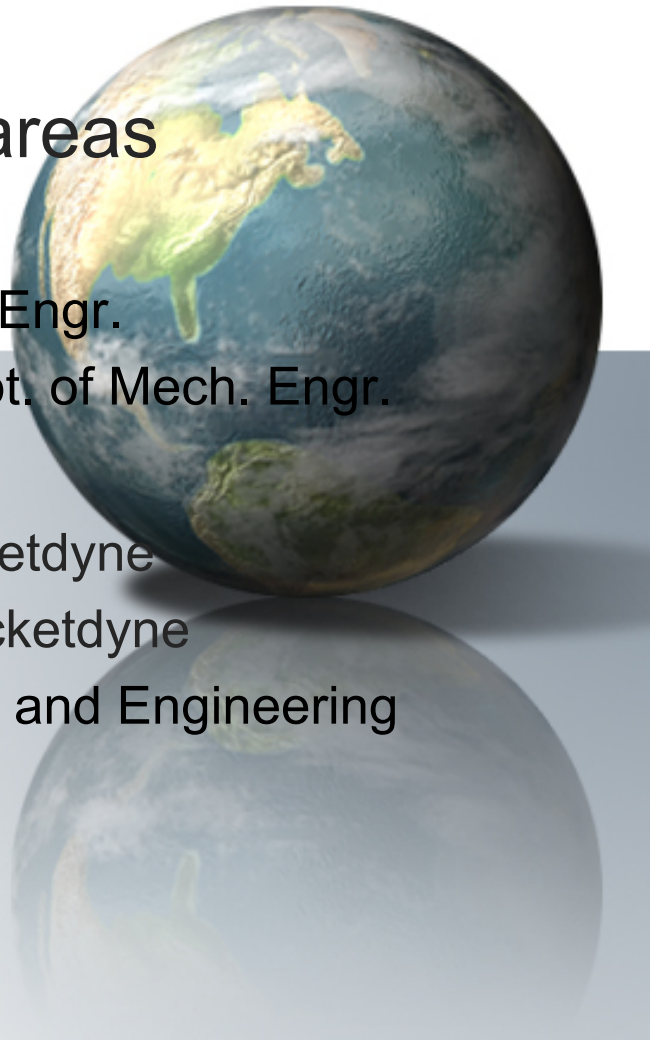
Wind Energy SubArea



Wind Energy: one of the three sub areas

- Researchers
  - Ziaul Huque, Professor, Dept. of Mech. Engr.
  - Donald Harby- Assistant Professor, Dept. of Mech. Engr.
- Collaborators
  - Dr. Munir Sindir – Pratt & Whitney Rocketdyne
  - Dr. Steve Barson – Pratt & Whitney Rocketdyne
  - Dr. Andy Swift – Director, Wind Science and Engineering Research Center, Texas Tech Univ.

Wind Energy SubArea

Major Objective

The major objective of this subproject is to determine the optimum design of wind turbine blades by applying multi-objective techniques with surrogate models.

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- There are three major sub tasks
  - Improve understanding of the complex flow field around wind turbine blades and determine the relevant aerodynamic loads on the blades.
  - Perform structural analysis of the turbine blades using Finite Element Method (FEM).
  - Perform multi-objective optimization of the rotor blades using surrogate models.
  - Added task will be to combine the first two tasks to study fluid -structure interaction

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- Tasks for Year 1
  - Aerodynamic simulations using BEM Theory
  - Structural analysis based on BEM theory aerodynamic loads.
  - Development of wind turbine laboratory

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- Work in Progress
  - 6 undergraduate students are working on a biomass project to produce bio oil.
  - 6 students working on designing wind turbine blades using BEM
  - 1 graduate student is working on developing surrogate model
  - 1 graduate student is working on optimizing blade shape.
  - 1 graduate student is working on CFD simulations