



SENIOR DESIGN PROJECT SYNOPSIS – SPRING 2014

POWER-GENERATING WIND MITIGATION DEVICE

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Hurricane season represents a very important occurrence for several regions worldwide, in particular to South Florida and its neighboring areas. Hurricanes come accompanied by severe rain as well as very strong winds, which can cause severe damages to houses. Therefore, there is a need for innovative engineering solutions to mitigate the wind accompanied by these natural disasters. In addition, power generation is extinguishing the planet's limited resources. Issues like CO₂ emissions and global warming need to be addressed. For that reason, the development of new technologies to generate clean electricity is extremely important. This proposed project is aimed at creating an innovative device that mitigates the uplift effect of high winds and is able to harvest the kinetic energy to generate clean electricity.

The design phase of the present project started by considering very simple wind turbine shapes, and moving into more complex ones. Thus, the study started by analyzing the behavior of a straight blade turbine in terms of wind mitigation and power generation. From there, other more complex shapes like a Savonius turbine were considered.

A total of 5 different models were studied using two methods. First, these models were studied in a wind tunnel; then all the results obtained were correlated with simulations using ANSYS Fluent. At the end of the study, conclusions were drawn, and the best device among those considered was selected. The decision was based on an assessment that involved wind mitigation, power generation, manufacturability, and cost. Finally, several recommendations were presented for future studies to further develop this revolutionary concept.