



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Aadit Golwala	Project Number J0312
Project Title Offshore Floating Wind Turbines: Reducing Complexity and Cost by Turning the Entire Structure into the Wind	
<p style="text-align: center;">Abstract</p> <p>Objectives Design and build a prototype offshore floating wind turbine that turns the whole structure into the wind using only the power of the wind.</p> <p>Methods Built an inverted 3-sided pyramid out of PVC pipe as the base of the structure. Another pyramid made of carbon fiber rods attached on top of the PVC pipe pyramid. A DC motor with a propeller was attached to the top. Pipe insulation served as floatation. Chain with a weight attached served as an anchor. Fin made of foam fixed to the back of the prototype. Turned on a fan at 3 different speeds to test whether the turbine could turn into the wind. Created 2 centimeter high waves to test if the prototype stayed afloat.</p> <p>Results Tested 2 prototypes for stability and the ability to turn into the wind. The first was highly unstable and sunk all 5 times in the stability test. It failed the direction test and sank 3 out of 5 times. The second prototype had many improvements. It successfully passed the stability test for all 5 trials. The entire structure turned directly into the wind all 5 times for the direction test. The structure was also able to turn at all 3 tested speeds.</p> <p>Conclusions I built a prototype offshore floating wind turbine that floated and stayed stable, while successfully turning into the wind. The entire structure was able to turn into the wind at three wind speeds and was able to stay stable during the wave test. Most wind turbines turn the nacelle, a housing for the turbine, into the wind to get more energy. My design turns the whole structure, not only the nacelle. This moves the turning point to a lower plane, the sea. This also increases the durability and strength of the overall structure which reduces the complexity and therefore the maintenance cost.</p>	
Summary Statement I built a working prototype of a simpler and cheaper offshore floating wind turbine that turns the whole structure into the wind using only the power of the wind.	
Help Received None. I designed, built, and tested the idea on my own.	