



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Bella Ganocy; Ella Ganocy	Project Number J1009
Project Title Construction of a Modular Vertical Axis Wind Turbine and Study of the Performance of MagLev vs. Conventional Bearings	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of the science project was to build and then study the performance of a magnetically levitated vertical axis wind turbine (VAWT) compared to a vertical axis wind turbine using conventional bearings. The hypothesis is that the performance of a wind turbine can be improved by using frictionless magnetic bearings rather than conventional bearings at the base of a vertical axis wind turbine. This may allow for improved efficiency and, as a result, greater clean electricity production which our world so desperately needs.</p> <p>Methods/Materials A modular wind turbine model with interchangeable magnetic bearings, conventional ball bearings, and wheel bearings was built and subsequently, the performance of the turbine was studied at wind speeds of 5 mph and 10 mph.</p> <p>Results Our model using magnetic bearings reached steady velocity of 192 and 310 rpm (revolutions per minute) at wind speeds of 5 and 10 mph, respectively. However, when testing the model using wheel bearings and conventional ball bearings at the same wind speeds, the forces of friction were so high that the turbine did not turn at all.</p> <p>Conclusions/Discussion Our model using magnetic bearings was far superior in terms of performance when compared to using conventional ball bearings and wheel bearings at the wind speeds studied. A vertical axis wind turbine (VAWT) with magnetic bearings may be a useful platform for producing more green energy in the future. Our model may serve as a basis for future study.</p>	
Summary Statement After building our modular vertical axis wind turbine, we studied its performance and found that the model using magnetically levitated bearings was far superior to the one using conventional bearings.	
Help Received My twin sister (also my team mate) and I developed the idea, performed the experiments and completed the project. Our dad (T. Kent Ganocy MD MBA) helped us build the windmill, and used all the dangerous power tools needed.	