



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Nicholas M. Willy	Project Number J0132
Project Title Which Pitch to Ditch? How Propeller Pitch Affects the Thrust and Speed of an Underwater Motor	
Objectives/Goals The purpose of this project is to determine how propeller pitch affects the thrust and speed of an underwater motor. The blade angle, defined by pitch, of an underwater propeller is one important design variable affecting the propeller's performance. Each year M.A.T.E. holds an Underwater Robotics contest with remotely operated vehicles (ROVs). These ROVs are maneuvered using thrusters constructed of propellers attached to underwater motors. Next year I will compete in the MATE contest and I want to ensure my ROV will have the best thrust and speed combination providing an enormous advantage in the competition.	
Abstract In doing this project learned how to measure propeller performance and select the most effective ROV propellers. To conduct the experiment, I designed and constructed two devices: one to measure thrust and the other to measure speed across an above ground pool. I also modified a motor so that I could easily interchange propellers during testing without compromising the design of the testing devices or motor performance. I tested three propellers each having a different pitch: 2.50 inch pitch, 2.75 inch pitch, 3.0 inch pitch.	
Methods/Materials Multiple runs for each test were performed and I was able to observe different performance with the pitch variations. Speed and thrust were measured in both forward and reverse directions. After testing, the results did not match my hypothesis directly.	
Results In a future experiment I would like to conduct experiments related to the other parts of propeller design such as diameter and blade area. This experiment was fun and I know it will help me next year on the ROV team.	
Conclusions/Discussion	
Summary Statement I tested how the pitch of a propeller affects the thrust and speed of an underwater Remotely Operated Vehicle (ROV) motor.	
Help Received My dad helped me construct measuring devices, and helped me collect data, and taught me Microsoft Excel. My mom helped me design and assemble my poster board. My teacher Mr. Alexandrov supported and guided me.	