



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b>  <b>Nathan Smith</b>	<b>Project Number</b>  <b>S1122</b>
<b>Project Title</b>  <b>Aqua Drone: A Novel Approach to Water Testing. An Autonomous Drone Used to Measure the Quality of Water</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Currently, people see the practical use of drones in testing water with the scientists manning drones to collect water in dangerous situations such as that in Pit Lake. In Pit Lake, drones are used and the use of drones can be extended with the use of drones to avoid the trampling of virgin land in order to avoid disrupting the ecosystem. Engineering Goals: The goal of my project is to build a drone that has the ability to Test water autonomously, which will help relieve the problem of scientists getting hurt when testing for water quality. The drone will also have onboard testing which will make it more efficient than the current types of drones that take water to the lab to be tested.</p> <p><b>Methods</b> In my project I 3D printed a drone and the landing gear in order to make something completely new. The drone was a 3D scanned drone, but was significantly modified by me in order to get the landing gears to work. The landing gears were designed by me to work on the drone I 3D printed. Getting the drone up and running I used many forums on the internet as well as people from my local hobby shop for guidance. The electronics (water testing) are Arduino boards with DF Robot PH, EC, and temperature sensors. In order to get these sensors to work together I had to download code on the internet, however these were not compatible with using the LCD screens I planned on. As a result, I had to modify the code to work with these screens, so I could see the results in real time.</p> <p><b>Results</b> I based my results as a success or failure on whether or not I got an accurate reading from my drone. It did not matter whether the water was in good or bad condition, but rather I am basing it on a pass/fail basis. From the data collected I determined if there are algae blooms by analyzing the difference in PH from the morning and the evening. My results indicated that all the ponds tested had significant algae blooms, and thus the drone itself was a success. Of course improvements can be made, but the fact that it worked, makes this project a success.</p> <p><b>Conclusions</b> This drone has the capability to revolutionize water testing. We can see in this day and age how manual labor that is not cost effective is being replaced by machines. Water testing is no different. Not only is it not cost effective, but testing water manually is potentially dangerous to the environment and the scientist. In the future expeditions to test the quality of water will look much different. Instead of a large group of</p>	
<b>Summary Statement</b>  I built a drone with onboard water testing capabilities in order to test bodies of water in a much more cost and time affective way.	
<b>Help Received</b>  I recieved advice materials for the electronics for the drone such as the power distribution board from an employee at RC Country Hobbies. The rest of the information I gathered was from the internet.	