



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Kyle Tianshi	Project Number J0923
Project Title Detecting Invisible Particles in Water Using Laser Microscopy and Image Processing	
<p style="text-align: center;">Abstract</p> <p>Objectives Microplastic particles in drinking water pose health concerns since they are invisible to drinkers and are difficult to filter. My goal is to create a simple and efficient method to detect microscopic particles such as microplastics in the water. When shining a powerful laser into the air, the dust particles floating in the air within the beam of light can be seen clearly. Taking this principle, I hypothesized that a strong laser beam projects into the water would allow me to see the micro-particles inside on the water. Using image processing, the particle size distribution can be calculated.</p> <p>Methods Different light sources including a green laser, 800x zoom microscope, Costco drinking water, tap water, and seawater (water samples), square cups, Python software to calculate the particle size distribution.</p> <p>Results A simple laser and microscope detecting method was developed and utilized to test with three different types of water- drinking water, tap water, and seawater. The micrometer-sized particles can be detected using a laser, and the particle size distribution can be calculated using both image and video processing. According to the results, the drinking water is clean, the tap water has ~20 particles between 1 and 700 micrometers, and the seawater contains over 500 particles of various sizes.</p> <p>Conclusions In conclusion, the size distribution of particles in the water can be calculated quickly and efficiently using laser microscopy and image processing. This was confirmed by measuring three different water samples. This method can detect as small as 0.5 micrometers. To make image processing more efficient, videos were used instead of a single image to improve detection accuracy.</p>	
Summary Statement I created a quick and efficient method to detect microscopic particles in water.	
Help Received My science teacher provided materials for me to complete the experiments, and my dad helped me record the videos.	