The Development of a Mobile, Arduino-Based Water Quality Testing Apparatus

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Water quality describes the condition of water based on its chemical, physical, and biological state. Poor water quality poses health risks to humans and the environment, causing disease, an imbalance in the ecosystem, and even death. Water sources across the globe have been negatively impacted by pollution, climate change, and human tampering. Water quality meters need to be more accessible and easy to use in order to monitor water quality globally. A prototype buoy with sensors to measure pH, turbidity, and conductivity was designed using a 3d printer. After the prototype was constructed, multiple redesigns were constructed to improve upon the design's efficiency. The initial torus shape was replaced with a polygon. Once the container and floatation device passed the test for water tightness and floating capabilities, it was assembled and placed in water. The water quality sensors tested the quality of two different ponds and tap water. Multiple readings confirmed the ability of the sensors to take consistent readings for pH, turbidity, and conductivity in all three water types. Aside from the initial cost of $399 for the 3d Printer, the cost of printing the container and flotation device was under $5, and the cost of all sensors and electronic parts was $126, making this a low-cost water quality testing device that is easy to construct and use. Future design adaptations and testing is needed to include sensors to collect additional water quality data. In addition, adding a GPS component would increase understanding of a large body of water being tested.

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