

Constructing a Novel Multi-rotor Compatible Water Sampling Apparatus, Associated Water Quality Analysis System and Specialized Hexacopter

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Water sampling is crucial for water quality management and analysis. However, conventional methods of sampling water can be expensive, dangerous, and inefficient. Areas such as pit mines, flooded plains, and elevated water bodies may be difficult and impractical to reach. This project focused on creating a water sampling apparatus and hexacopter that could effectively and efficiently take remote samples when compared to the current method. Success in our trials was defined as a full sample of approximately 200 mL being collected and returned to the launch site. The apparatus was composed of two separate parts that worked together. The first part was the housing unit for the Raspberry Pi, Arduino, BNC shield, and servo motors. The second part was the sampler itself, which collected the water samples in a bale-system fashion. The water sampler can collect samples at various depths, depending on the dimensions required. The housing unit was attached to the bottom of a custom hexacopter built for water sampling via industrial hooks and nylon cables. This project further built upon the concept of autonomous water sampling via UAVs and implemented water quality analysis mechanisms to the system as well. As of March 2020, when tested at a point of the Boise River, the average pH values using the attached probe was 7.233. The Boise River pH that was last recorded was around 7.4 as of April 2019, however did not specify the location where that value was found. This hexacopter sampling apparatus system can be used in the field by other researchers who are in need of a faster, more efficient, process of sampling water.