Design, Fabrication, and Test of a Single Rotor Modular Unmanned Aerial Vehicle for Algae Bloom Monitoring of Lake Erie

Marco Veliz Castro
University of Windsor, velizca@uwindsor.ca

Afshin Rahimi
University of Windsor, Afshin.Rahimi@uwindsor.ca

Design, Fabrication, and Test of a Single Rotor Modular Unmanned Aerial Vehicle for Algae Bloom Monitoring of Lake Erie

Afshin Rahimi[1]

University of Windsor, Windsor, ON, Canada

Marco Veliz Castro[2]

University of Windsor, Windsor, ON, Canada

Every summer, runoff pollution is causing algae in Lake Erie to grow out of control, impacting the health of the lake, suffocating fish, making water unsafe for swimming, deterring tourists, and damaging local economies. Given these facts, the current study proposed a swarm of single rotor unmanned aerial vehicles (SRUAV) for health monitoring of Lake Erie. Traditionally, for such a task, a single drone is designed with complicated structure and control modules resulting in high costs of design, construction and maintenance. A single unit design can be very vulnerable and costly to maintain. Robotic swarms can achieve the same ability through cooperation and have the advantage of reusability of the simple agents and the low cost of construction and maintenance. Robotic swarms also have the advantage of high parallelism, which is especially suitable for large scale tasks. In the present work, as the first phase of the overall project, design, fabrication and test of a single agent from the envisioned swarm is detailed. The simple agent will be equipped with a modular payload fitted with either a camera or sampling/dispenser device and will be responsible for the aerial photography and sampling of algae blooms in Lake Erie. The current practice for the research data collection is either relying on the US-based research centers data or conducting manual field investigations. The long-term goal of the proposed research is to provide an alternative low-cost solution for the health monitoring of Lake Erie, with other potential use cases, which could benefit local Canadian researchers including UWindsor's Great Lakes Institute for Environmental Research and enhance the productivity and efficiency of the monitoring practices.

[1] Afshin Rahimi is an assistant professor with the department of Mechanical, Automotive and Materials Engineering at the University of Windsor, arahimi@uwindsor.ca

[2] Marco Veliz Castro is an undergraduate student with the department of Mechanical, Automotive and Materials Engineering at the University of Windsor, velizca@uwindsor.ca