Design of a Navigation, Obstacle Avoidance, and Control System for an Unmanned Surface Vehicle for Water Quality Monitoring

**FYT Project LZ2-11**

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**Introduction**

In recent years, serious water polluting accidents have happened more and more frequently. The current monitoring method can only provide isolated water data from single and fixed locations using buoys or manual sampling, which is quite inconvenient and inefficient. There is an urgent demand for a mobile, flexible, and efficient water monitoring method that can cover a large area.

In this project, we developed a battery powered USV, named Robotic Water Inspector (RWI), which can perform real-time water quality monitoring by adapting autonomous navigation and control technologies.

**System Specification**

- **Positioning Accuracy**

  The left figure shows the movement path of RWI during one test process while the right figure shows average locations of ten repeated tests. It shows that RWI can achieve about 3.5m positioning accuracy.

**Field Experiments**

- **Detailed RWI structure and components**

**Fixed Point Monitoring**

- Temporal distribution of temperature (left) and chloride (right) in a rainy day from 12:00 to 18:00

**Spatial Distribution Monitoring**

- Spatial distribution of temperature (left) and chloride (right) in Zhuhai Zhengkeng Reservoir

**Conclusion**

RWI is capable of acquiring real-time water quality data at any location, and obtaining the temporal and spatial distribution of water quality parameters. This approach shows great potential in pollution source tracking and eutrophication monitoring.