Title: Development of Reversible USV platform for Bathymetric Survey of Public Water Resources

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Abstract:

This study is to develop a new reversible Unmanned Surface Vessels (USV) platform capable of measuring water quality and bathymetry in real-time. Currently, human operators manually measure water quality and depth by getting on boats. The human operators are exposed to dangers and also consume time and labor, making the water monitoring system impossible to measure in real-time. According to the advanced robotics technology, the water monitoring system is currently being developed into a system that measures water quality and depth through robotics boats and/or drones, but there are still many cases where robot systems cannot be directly deployed depending on the speed of the wind and water, and the height of the waves due to rollover risk.

We, therefore, propose a new USV platform to overcome those limitations of current robot systems. This USV can be put into the real world at any time without being affected by weather and waves since the USV is designed with a vertical symmetry structure to enable the mission to be continuously carried out when USV is capsized. The USV system automatically checks if the robot is capsized via GPS and IMU sensors mounted on the USV. Depending on the USV status, the system controls three waterproofing servo motors to rotate two main thrusters and a sensor module equipped with water quality and depth sensors, performing the mission regardless of the overturn. It also measures water quality and water depth in real-time through a Total Dissolved Solids (TDS) sensor that measures water quality, a temperature sensor that measures water temperature, and a Ping sensor that measures water depth. All data is transmitted to the user interface or main system in real-time using the latest robot middleware, Robot Operating System 2 (ROS2), that supports real-time control.

In the future, we will develop an integrated monitoring system that measures water quality and water depth with a multi-USV system. And we will launch a website that provides real-time data information so that the public can easily understand water depth and water quality of public water resources.