ABSTRACT

Water surface vehicles are increasingly being used so that their development is so rapid. The development of water vehicles is not only limited to manned vessels, but also unmanned vessels. Unmanned vessels can be used for various purposes such as fishing, harvesting seaweed, cleaning up oil spills, and for other purposes.

Several studies show that the existing control system on unmanned vessels is very complicated. This is because the unmanned surface vessel (USV) has a very complicated non-linear model. In addition, surface vessels generally have the shape of a boat, which is less efficient in making turns and turning directions because it requires a trajectory in the form of a portion of the circumference of the circle that can be called as *the turning circle*.

For this reason, a Omnidirectional USV design is made that is easier to control and can move more freely. The Omnidirectional USV is designed to have 4 actuators in the form of a motor that leads to the 4 cardinal sides. In addition, each motor is added with a rudder for heading direction controller. The system utilizes GPS localization to obtain position data, and the compass module to obtain heading direction data. In this research, a control system for controlling the Omnidirectional USV heading direction will be made. The control method that will be applied in this research is the Proportional Integrative Derivative or PID control method by using Ziegler Nichols tuning method. For increasing system responsiveness, the PID control system in this study is equipped with anti-windup. It is hoped that the Omnidirectional USV system and design in this study can be more efficient in carrying out movements.

Keyword: *Omnidirectional Unmanned Surface Vessel, heading direction, PID, Ziegler Nichols, GPS Localization, Anti-Windup*