

## ABSTRACT

The Citarum River is the most polluted river in the world. Citarum River contamination caused by human activities such as domestic activities, agriculture, livestock, fisheries, and industrial activities that dump waste directly into the air body. In order to support Citarum River pollution control, a hexacopter plant that can land and float on the river surface will be designed to monitor air quality in real time. In this study, the hexacopter plant was chosen as the sensor carrier because in previous studies the use of kayaks (boats) was deemed inefficient, still requiring a lot of energy.

In this final project, testing the performance of the second Ziegler-Nichols PI and PID controllers on the control of the hexacopter plant. The parameter being tested is the application that follows the reference and time to reach the state. In addition, the waypoint method will also be implemented so that hexacopter plants can fly automatically from home to several designated air quality sampling points on the Citarum River.

The test results show that the application of the second Ziegler-Nichols PID method controller on the hexacopter has a faster function in achieving a steady state and is better at following the PI controller reference, with a settling time of 0.4 seconds for roll angle, 0.35 seconds for pitch angle and the maximum overshoot of 13.9% for roll angle, 3.5% for pitch angle. In addition, the hexacopter plant has also been able to fly automatically to the coordinate points that have been determined by the waypoint method. Also, the hexacopter plant has limitations in power consumption, the maximum performance of the hexacopter plant can only last 10 minutes in the air, because it is necessary for an optimal route when the hexacopter plant is conducting air sampling missions of the Citarum River.

**Keywords** — Ziegler Nichols (Second Method), PID, PI, Waypoint, Plant Hexacopter