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# Simulation-Based Unmanned Surface Vehicle Design Using PX4 and Robot Operating System With Kubernetes and Cloud-Native Tooling

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**Abstract :** This paper presents an approach for simulating and testing robotic systems based on PX4, using a local Kubernetes cluster. The approach leverages modern cloud-native tools and runs on single-board computers. Additionally, this solution enables the creation of datasets for computer vision and the evaluation of control system algorithms in an end-to-end manner. This paper compares this approach to method commonly used Docker based approach. This approach was used to develop simulation environment for an unmanned surface vehicle (USV) for RoboBoat 2023 by running a containerized configuration of the PX4 Open-source Autopilot connected to ROS and the Gazebo simulation environment.

**Keywords :** cloud computing, Kubernetes, single board computers, simulation, ROS
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