

ABSTRACT

Unmanned Surface Vehicle (USV) is an unmanned surface vessel that operates on water either remotely controlled or autonomously using navigation systems and artificial intelligence. This technology has rapidly advanced and is widely applied in military, industrial, and research fields. Before the development of USVs, maritime technologies included manned vessels, Remotely Operated Vehicles (ROVs), and Autonomous Underwater Vehicles (AUVs). The use of USVs offers advantages in operational efficiency, safety, and the ability to explore high-risk aquatic environments. However, challenges in communication and coordination between USVs in swarm systems remain obstacles to fully optimizing this technology. USVs utilize advanced technologies such as autonomous navigation systems, artificial intelligence, wireless communication, as well as sensors and cameras to enhance operational effectiveness. Their applications span across various sectors, including maritime security, ocean exploration, oil and gas industries, and transportation and logistics. USVs serve as an innovative solution that improves efficiency and reduces risks to human operators in various maritime operations. As technology continues to evolve, USVs are expected to play a greater role in global ocean exploration and maritime security.

Keywords: Unmanned Surface Vehicle, Remotely Operated Vehicle, Autonomous Navigation, Wireless Communication, Ocean Exploration, Gateway