TECH OFFER

On-Device AI Marine Cleaning Robot

KEY INFORMATION

TECHNOLOGY CATEGORY:
Environment, Clean Air & Water - Mechanical Systems
Infocomm - Artificial Intelligence

TECHNOLOGY READINESS LEVEL (TRL): TRL7
COUNTRY: SOUTH KOREA
ID NUMBER: TO175413

OVERVIEW

Marine and river pollution, particularly during coastal disasters, threatens the biodiversity of affected areas due to the inflow of hazardous contaminants. In addition, with the increasing use of plastics, microplastic pollution in water bodies is also on the rise. To address such marine pollution, cleanup operations must be carried out promptly to reduce the negative impact on the environment. However, these operations are typically costly, require extensive coordination, and are cumbersome.

A Korean startup has designed and developed an autonomous ocean cleaning robot capable of accurately detecting and collecting marine debris in real time during coastal disasters. This ocean cleaning robot is built to remain durable and reliable even under harsh weather conditions. Equipped with proprietary AI algorithms as well as LiDAR and vision sensors, it enables intelligent perception and decision-making, adapting to changing marine environments such as obstacles, waves, and currents. With its on-device AI functionality, this marine robot can operate independently without relying on external communication networks. This provides a practical solution for faster and more cost-effective maritime emergency response, while delivering measurable ESG improvements.

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The technology owner is seeking marine environment service providers and government agencies that are open to conduct pilot trials, as well as partners to jointly develop complementary technologies to further enhance the robot's capabilities.

TECHNOLOGY FEATURES & SPECIFICATIONS

This compact modular autonomous surface drone, powered by on-device AI capabilities, can collect floating debris and oil spills while providing continuous service even in challenging coastal and marine environments—particularly during emergencies or in areas with limited connectivity—through smart navigation and stable operation.

The robot includes the following features and specifications:

- Pollutant collection system capable of efficiently recovering a wide range of complex marine pollutants, including high-viscosity low-sulfur fuel oil (LSFO), low-viscosity heavy fuel oil (HFO), diesel, and surface microplastics ranging from 0.001 mm to 5 mm
- Neural Processing Unit (NPU)-AI autonomous collection and navigation together with proprietary AI algorithms, enabling real-time pollutant recognition without reliance on cloud infrastructure
- Smart navigation and obstacle avoidance for dynamic marine environments
- Camera-sensor fusion technology for low-latency video streaming and 5G transmission
- IP-rated shock-resistant polyethylene chassis equipped with dual propulsion motors, ensuring stable performance even in rough seas and harsh weather conditions
- Swarm control and management platform enabling large-scale deployment and coordinated mission execution

POTENTIAL APPLICATIONS

This autonomous marine robot is designed and developed for efficient recovery of floating pollutants across a wide range of aquatic environments, including rivers, streams, reservoirs, ports, and open oceans. Due to this, there are a range of potential applications in which this solution can be deployed, such as:

- Remote environmental monitoring and cleanup for preservation of marine biodiversity
- Emergency response, such as oil spill containment, for immediate deployment especially in hard-to-reach marine zones with limited infrastructure or unstable communications
- Autonomous routine coastal clean-up campaigns, under ESG and smart city initiatives, for autonomous ocean conservancy and more resilient marine infrastructure

UNIQUE VALUE PROPOSITION

The robot solution offers the capability to collect and recover a variety of marine pollutants, such as oil spills and microplastics, while being robust and compact. The on-device AI capabilities ensure the solution is suitable for deployments in limited network coverage while providing remote, real-time autonomous operation for reliable detection and navigation in changing marine environment, such as waves, current and low visibility. The solution is modular and have multi-unit control feature to deliver cost-effectiveness and scalability for large-scale cleanup missions. With such benefits, it results in a nimble and less labour-intensive response to any marine operation while increasing productivity for a quicker and effective operational success.

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