

Epsilon One

A network of low-cost smart buoys, processed as one system by graph neural networks: continuous environmental monitoring for estuaries, ports and offshore sites.

Top-rated · SaferSEA Call for Pilots

Pilot partner · APDL

Presented at OMAE 2026 · Tokyo

Backed by MAR 2030 + EU

NODE SPECIFICATION

Hull	Ø 0.43 m dome, two-part sealed hull, ~0.64 m total height
Mass	~6 kg, self-righting (low-mounted battery ballast)
Power	12 V LiFePO4, 48 h autonomy per charge (first-run spec)
Payload	Down-facing camera · sonar · thermometer · optional hydrophone
Extensible	Salinity, dissolved oxygen, pH, chlorophyll, turbidity, IMU, GPS
Materials	316 stainless hardware, EPDM seals, marine-grade windows
Deployment	Compact moored clusters, sized to the water body

WHAT THE NETWORK DELIVERS

Water quality	Continuous temperature, turbidity, suspended sediment
Hydromorphology	Bathymetry and bed change, water level and tide
Pollution	Sediment plumes, litter detection, underwater noise
Biodiversity	Fish presence, habitat mapping, acoustic biodiversity
Human pressure	Vessel traffic and noise, dredging and construction impact

THE METHOD

Nodes are one graph: what one buoy senses is interpreted in the context of its neighbours, so events are detected between the instruments, not only at them. In simulation, the graph models hold above 95% detection AUC where independent per-node tracking degrades to 69%. The science is public and citable:

Aquascan: Graph-Based Learning for Distributed Marine Sensing, OMAE 2026, Tokyo · DOI 10.5281/zenodo.15691882 · github.com/ctvc-pt/aquascan-gnns.

PILOT DEPLOYMENTS

We run a small number of pilot deployments per season: a compact cluster of nodes in your estuary or port, days to weeks in the water, delivered as a continuous monitoring record with analysis. Write to info@ctvc.pt.