

Call for Papers

Edge Intelligence and In-Network Computing for Connected Autonomous Underwater Vehicles

Autonomous underwater vehicles (AUVs), unmanned underwater vehicles (UUVs), unmanned surface vehicles (USVs), underwater sensors, relay nodes, surface buoys, and gateway devices are becoming essential components of future ocean observation, environmental monitoring, offshore inspection, maritime security, disaster prevention, and autonomous maritime missions.

Unlike terrestrial and aerial vehicular networks, underwater vehicular communication systems operate under severe constraints, including extremely limited bandwidth, long and distance-dependent propagation delays, severe Doppler effects, intermittent connectivity, high channel variability, and stringent energy limitations. These constraints make centralised data collection and cloud-centric processing impractical, requiring that communication, computation, mobility, energy management, and mission execution be jointly designed.

Edge intelligence and in-network computing therefore emerge as fundamental enablers for scalable, autonomous, and resilient underwater vehicular systems. By moving data processing, inference, aggregation, task execution, and decision-making closer to underwater vehicles, relay nodes, surface buoys, and gateways, these paradigms can reduce communication overhead, improve response latency, enhance robustness under intermittent connectivity, and support mission-aware autonomous operation.

This special issue aims to bring together recent advances in architectures, methodologies, protocols, and enabling technologies for edge intelligence and in-network computing tailored to connected autonomous underwater vehicles and underwater vehicular communication networks. It seeks high-quality contributions addressing theoretical foundations, algorithm design, cross-layer optimisation, system architectures, experimental platforms, and real-world deployments.

Topics of Interest

Topics of interest include, but are not limited to:

- Edge intelligence architectures for autonomous underwater vehicular networks
- In-network computing, data aggregation, fusion, and distributed inference in underwater networks
- Communication-computation co-design for AUVs, UUVs, USVs, underwater sensors, and relay nodes
- Task offloading, computation scheduling, and resource allocation under constrained underwater links
- Cross-layer optimisation of communication, computation, mobility, energy, and mission objectives
- Delay-tolerant, asynchronous, and event-driven computing for intermittent underwater connectivity
- Distributed learning, federated learning, and reinforcement learning for underwater vehicular systems
- Semantic communication and information freshness for underwater sensing and decision-making
- Collaborative perception, cooperative sensing, and multi-vehicle coordination

- Mission-aware networking and autonomous decision-making for underwater vehicular systems
- Energy-efficient edge computing and on-board intelligence for underwater vehicles
- Acoustic, optical, magnetic induction, and hybrid communication support for computing-aware underwater networks
- Programmable underwater propagation environments and acoustic reconfigurable intelligent surfaces
- Digital twins, simulation platforms, and testbeds for underwater edge and in-network computing
- Security, privacy, trust, and quantum resilience in intelligent underwater vehicular networks
- Full-duplex, low-latency feedback, and adaptive control mechanisms for underwater systems
- Internet of Underwater Things architectures supporting edge intelligence
- Field trials, prototype systems, and real-world deployments

Submission Guidelines

Authors are invited to submit original, unpublished research papers that are not currently under review elsewhere. Submissions should follow the manuscript format and submission requirements of IEEE Transactions on Vehicular Technology. [<https://mc.manuscriptcentral.com/tvt-ieee>]. When submitting, please select "Special Section" as the Article Type and clearly indicate that the submission is intended for the Special Issue on "Edge Intelligence and In-Network Computing for Connected Autonomous Underwater Vehicles" in the **cover letter**.

Submitted manuscripts must clearly indicate their relevance to the special issue and should present significant technical contributions, rigorous evaluation, and clear advances beyond existing work.

Important Dates

- **Manuscript submission deadline:** December 15, 2026
- **First review notification:** March 31, 2027
- **Revised manuscript due:** April 31, 2027
- **Final decision notification:** May 30, 2027
- **Publication date:** August 2027

Guest Editors

- Shahid Mumtaz (Lead), Nottingham Trent University, UK
- Chi Lin, Dalian University of Technology, China
- Costas Pelekanakis, Northeastern University, USA
- Lutz Lampe, University of British Columbia, Canada