Concept Note
IEEE Government Engagement Program on Standards (GEPS)
Webinar for IEEE GEPS participants
Wednesday, 19 June 2024 | 13:00-14:15 UTC (75 mins)

IEEE Government Engagement Program on Standards (GEPS) Live Webinar -

Marine Automation and Autonomy

Oceanic Engineering is working towards a safe, healthy, and productive ocean. Many systems on board marine vessels are now automated, and some are working towards full automation. Automation and robotics have many potential benefits including reducing risk to human life, lower costs and emissions from more efficient operations, as well as enabling science and industry to measure and manage ocean resources in ways not possible with traditional vessels.

Many challenges remain, including developing confidence and assurance in autonomous or remote systems, understanding and minimizing risks of failures, and determining liability when accidents inevitably occur. Automation also brings new security risks such as cybersecurity, hijacking of the vessel, stowaways, and intentional collision. These new risks that the industry must resolve are issues for both private law and public law regulators and certainly a matter of debate. Marine robotics and automation will contribute significantly to addressing large-scale societal problems.

This webinar designed specifically for IEEE GEPS participants will address aspects of:

- Marine automation and the implications for standards and regulations
- What resources, best practices and standards need to be developed and the work already underway, as well as the gaps in individual and collective modalities to address the environment, sustainable development and climate change issues, and what is needed to close them.
- Considerations that need to be taken into account when developing practical best practices and standards, and what individuals can do in addition to or alongside corporations and organisations, and the impact this can have.

Speakers and Abstracts

- Nelson Coelho, Assistant Professor, Aalborg University, Denmark --- The introduction of fully autonomous and remote piloted vessels at sea raises legal challenges; aside from liability and insurance questions at the national level, there are hurdles to be resolved concerning the
requirements of manning that are established under the international law of the sea regime, in particular in the UNCLOS and IMO instruments. This presentation describes how those obstacles were identified when designing a new European waterborne transport system based on a combination of autonomous navigation in short-sea shipping routes and inland waterways with automated cargo handling terminal operations (EU Horizon 2020 AEGIS project). Some attention is given to international collaborations set in place to facilitate the introduction of these technologies and circumvent existing regulatory obstacles (namely the cooperation agreement between maritime authorities of Belgium, Denmark and the UK signed in 2023).

- **Joseph Morelos**, Lloyd's Register Foundation — A Maritime Autonomous Surface Ship (MASS) is a sophisticated, tightly integrated system of systems comprising numerous hardware and software elements, including artificial intelligence. The inherent complexity of developing MASS — due to the elaborate, interdisciplinary nature of systems engineering and machine learning DevOps increases its susceptibility to a wide range of errors, defects, and security vulnerabilities that can materialise as faults, failures, and accidents in the field. Establishing a robust assurance framework within the International Maritime Organization (IMO) MASS Code is critical to minimising latent engineering and development defects in MASS. This presents a significant challenge, requiring the maritime industry to collaborate closely with regulators to define and implement appropriate verification and validation methods and technologies.

- **Jin Wang**, Professor, Liverpool John Moores University, UK — Intelligent Ships Tomorrow - Many practical, regulatory and technological barriers remain in turning the world’s cargo ships into a fully autonomous fleet, and that could mean it is a long time before it is actually profitable to invest in the technology. The issues relating to the safety and economics of unmanned ships have barely started to be considered. A lot of work will need to be done before solutions are found in terms of regulating design and operation.

**Moderator**

- **Christopher Whitt**, Past President, IEEE Oceanic Engineering Society (OES)

**Agenda**

1. Opening - Karen Mulberry
2. Welcome and Introduction - Christopher Whitt
3. Safe by Design: Assuring the Correctness, Dependability and Safety of MASS - Joseph Morelos
4. Intelligent Ships Tomorrow - Jin Wang
5. A legal perspective on autonomous ships - Nelson Coelho
6. Panel discussion, Q&A - Christopher Whitt
7. Wrap-Up and Closing - Karen Mulberry