

Maritime human factors for tomorrow



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The role of Shared Mental Models for autonomous shipping

Background and motivation

I have a professional background as navigational officer in merchant shipping with 7 years of seafaring experience onboard product tankers. I have a Bachelor's degree in Nautical Sciences from Indira Gandhi National Open University and a Master's degree in Maritime Management from University of South-Eastern Norway. My PhD degree is in Nautical operations, a joint program of four leading maritime universities in Norway (UiT, USN, NTNU, HVL), which I defended in August 2023. My primary motivation to join the SEAS programme was to further deepen my expertise in Maritime Human Factors while also being part of the diverse and inter-disciplinary environment at University of Bergen. My aim is to have a unique contribution to the existing knowledge on maritime safety and working conditions of the seafarers in the era of automation and digitalization and create value in this area for the benefit of marine sustainability.

Project description

The postdoctoral project will advance knowledge in the field of maritime human factors for safety in remote operation of autonomous ships. As autonomous ships are being developed for maritime transportation, the role of human operators in the remote-control center (RCC) and the onboard navigators will play a crucial role in ensuring safe outcomes of remote operations. The ships will be remotely operated by a distributed team of navigators and RCC operators who will coordinate, monitor and exchange navigational information. The marked difference between this mode of navigation has from traditional maritime operations where the navigation team is co-located represents a knowledge gap.

Main questions

- What is the current state of the art in applied cognitive and team factors for maritime navigation?
- What are the information requirements for the Remote-Control Centre (RCC) operators for supervising and coordinating autonomous ships?
- What is the impact of Shared Mental Models (SMMs) in situational awareness and performance of the RCC operators?

Marine sustainability

By promoting safety at sea through improving understanding of human factors, the project will inform the best practices in the design of workspaces and operational procedures for maritime navigation. Specifically, it can contribute towards the SDG 8 (Decent work and economic growth and SDG 9 (Industry, innovation and infrastructure)

Highlighted activities (Planned)

- 18 months research exchange in Chalmers University of Technology at Gothenburg, Sweden (January 2024 – July 2025)
- Collaboration with VTT, Finland
- Participation in workshops and conferences related to maritime human factors

Aims / Milestones

- Conduct a systematic literature review of applied cognitive and team factors for maritime navigation
- Conduct interviews and observation of experienced RCC operators
- Design and conduct experiment for evaluating impact of Shared Mental Models (SMMs) on situational awareness and performance
- Use Psychophysiological measures for cognitive state estimation of RCC operators

Supervisory team

Main supervisor – Prof. Bjørn Sætrevik, Department of Psychosocial Sciences, University of Bergen

Co-supervisor – Prof. Morten Fjeld, Department of Information Sciences and Media Studies, University of Bergen

External supervisor – Prof. Scott Mackinnon, Department of Mechanics and Maritime Sciences, Chalmers University of Technology

Industry Mentor – Kristian Gould, PhD, Equinor

Figure-1: An example of Remote-Control Centre



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