

Postdoctoral Fellow in Digital Twin for Ocean Industries

With the uncertain prospects of climate change, improving the understanding of related geophysical, chemical, and biological implications for ocean spaces and ecosystems is essential. Simultaneously, to attain the UN sustainable development goals (SDGs), in particular SGD11, SDG13, and SDG14, ocean industries are increasingly engaged in activities such as renewable energy generation and sustainable aquaculture and fisheries. Furthermore, climate-change related impacts of oceans to coastal zones, such as coastal erosion and flooding, need to be better understood and monitoring systems developed to support mitigation measures.

Various ocean sensors, platforms, and communication systems have been developed, and are being further improved, to facilitate understanding ocean and ecosystem processes and the impacts that ocean industries have on these. To advance monitoring and decision-support, a large-scale project under the Transforming Climate Action program (<https://www.ofi.ca/programs/transform-climate-action>) is currently underway. This project aims to develop a framework and models for a Digital Twin for Ocean Industries, for optimal deployment to support strategic and operations decisions for selected ocean industries, such as aquaculture.

POSITION

Our Industrial Engineering Department is seeking a Postdoctoral Fellow (PDF) in Digital Twin technologies for Ocean Sensor Systems to play a pivotal role in research implementation, coordination, and management of a project focusing on these topics. The postdoc will join a dynamic, dedicated group working with Prof. Ronald Pelot, Prof. Floris Goerlandt and Prof. Hamid Afshari in the Maritime Risk and Safety (MARS) Research Group at Dalhousie University, in further collaboration with professors from Dalhousie's Faculties of Engineering, Computer Science, and Science.

The PDF will perform cutting-edge research to develop advanced Decision Support Systems (DSS) to support sustainable human uses of ocean spaces. This will require new conceptual and technical research, advancing the state of the art in Digital Twin Engineering by applying operations research, systems engineering and simulation to offshore technologies, including those which help mitigate climate change such as offshore wind farms. Applying and advancing techniques such as Deep Learning (ANN), Reinforcement Learning (RL), and Deep Reinforcement Learning (ANN+RL) would be beneficial. Based on ocean sensor networks' inputs, the developed DSSs will support the monitoring, prediction, environmental impacts and technical engineering management of ocean industry designs and operations (ex. offshore wind, aquaculture, tidal energy, etc.).

The successful candidate will work closely with the project team to: (i) plan the research and refine research questions in a coherent framework; (ii) collect, integrate, and manage data, models and knowledge to answer the research questions; (iii) develop frameworks, modeling approaches, and the technical implementation thereof through coding and programming work; (iv) support and provide scientific and technical advice to graduate students working in the project; (v) write journal articles, conference articles, and book chapters to disseminate the research findings; (vi) support the development of specific models for the selected case studies; and (vii) perform project management tasks such as coordinating stakeholder engagement activities, preparing reports, and disseminating the results to diverse audiences.

The PDF will be employed by Dalhousie University (www.dal.ca) and must be physically based in Halifax, Nova Scotia. The PDF will have opportunities to develop his or her own research agenda associated with the Transforming Climate Action program, and have the opportunity for extending his or her professional network through various relevant research and stakeholder networks. Participation in academic career development programs offered by Dalhousie University is encouraged. Remuneration will be in line with competences and experience, with a starting salary of \$65,000 (CAD) annually, with additional benefits including pension and health and dental insurance be available according to Dalhousie University's benefits package for grant-based employees.

FUNDING

The position is available from September 1, 2024, through August 31, 2026 (24 months), with a 6-month probation period. This position is funded by the Transforming Climate Action program, through a grant by the Canada First Research Excellence Fund.

QUALIFICATIONS

The ideal candidate will be someone who:

- holds a Ph.D. in a relevant field (e.g., industrial engineering, systems engineering, operations research, computer science, engineering management, or a related field);
- has relevant research experience in systems engineering and design, simulation modeling, data analytics, and operations research;
- has a strong interest in interdisciplinary research, to advance fundamental and applied knowledge;
- has the ability and willingness to absorb new knowledge and learn new research methods as needed for attaining the research objectives;
- has knowledge of, or strong interest in, some of the following areas (particularly in a Canadian context): ocean sensors and marine technology, ocean processes, ocean industries, maritime transportation, marine-related environmental, social and economic activities, and risk analysis and modeling;
- has relevant technical and software skills in modeling, coding, and programming, in languages such as Python, MatLab, or similar;
- has experience in using other relevant research and research management software (e.g., qualitative data analysis, statistical analysis, project management, citation management, office software,...);
- has demonstrated high productivity in producing peer-reviewed publications;
- has strong time management, organizational, and project management skills;
- has experience conducting interviews and focus group research in engineering design contexts, and in organizing expert and/or end-user events to define design requirements and specify case studies;
- works well both independently and as part of an interdisciplinary team;
- has experience guiding research assistants at undergraduate and graduate levels;
- can communicate effectively with researchers in various disciplines and with non-academic members of governments, communities, and the private sector.

Given the wide range of qualifications, prospective applicants with strengths in only a subset of the above knowledge domains, but with a strong willingness to learn and widen their understanding of relevant concepts, frameworks, and methods to successfully implement the project, are encouraged to apply.

APPLICATION

Applicants should submit a cover letter, a detailed curriculum vitae including a list of publications, two to three representative publications, and the names of three referees by email to Prof. Ronald Pelot (ronald.pelot@dal.ca) with "TCA-1.3 PDF" as the subject line. Your cover letter should highlight what particular aspects of the advertised position spark your interest, give a description of your research interests, and include a self-assessment of your main strengths and areas for improvement, addressing both your academic knowledge, and your technical and project management skills. Applications will be considered from March 18, 2024, until the position is filled. Please address any inquiries to Prof. Pelot.

Dalhousie University commits to achieving inclusive excellence through continually championing equity, diversity, inclusion, and accessibility (EDIA). Our university encourages applications from Indigenous persons (especially Mi'kmaq), persons of Black/African descent (especially African Nova Scotians) and members of other racialized groups, persons with disabilities, women, and persons identifying as members of 2SLGBTQ+ communities, and all candidates who would contribute to the diversity of our community. If you require more information, please visit Fair Hiring Practices.

If you require any support for the purpose of accommodation, such as technical aids or alternative arrangements, please let us know of these needs and how we can be of assistance. Dalhousie University is committed to ensuring all candidates have full, fair, and equitable participation in the hiring process. Our complete Accommodation Policy can be viewed [here](#).