

Ruixin Song

CONTACT INFORMATION	E-mail: ruixinsong21@gmail.com Phone: (709) 769-9936	[Google Scholar] [LinkedIn]	[GitHub]
RESEARCH INTERESTS	Representation Learning · Graph Learning · Physics AI		
PROFESSIONAL EXPERIENCE	GradientX Technology , FinTorch Product Engineer & Founding Team Member	Vancouver, BC 2026.04 – present	
	- Co-founded FinTorch, an AI-powered financial copilot exploring personalized financial guidance, recommendation systems, and decision-support agents for individual users. - Designed and implemented the core technical architecture, including a RAG- and LangChain-based multi-agent pipeline for conversational financial question answering, personalized recommendation, and context-aware decision support. - Collaborated on research problem formulation, technical roadmap planning, product validation, and iterative evaluation within a cross-functional founding team.		
	Dalhousie University , AISViz, MAPS Lab Research Assistant (contract full-time) PIs: Dr. Gabriel Spadon de Souza, Dr. Ronald Pelot	Halifax, NS 2024.07 – 2026.03	
	- Conduct spatiotemporal trajectory representation learning for similarity computation. - Build scalable ETL pipelines for 15 years of shipping data in PostgreSQL/TimescaleDB, cutting storage by 34% with advanced indexing and partitioning. - Refactor Rust modules in (AISdb), improving performance and correctness; maintain CI/CD workflows with GitHub Actions. - Support lab research and collaborate with government and academia to deliver high-resolution maritime datasets for regulatory and scientific use.		
EDUCATION	Memorial University of Newfoundland , M.Sc., Computer Science (thesis-based)	St. John's, NL 2021.01 – 2024.05	
	- GPA: 4.0/4.0 (93.2/100) - Thesis: “Temporal Analysis and Gravity-Informed Marine Traffic Forecasting for Non-Indigenous Species Risk Assessment Through Ballast Water” - Advisor: Dr. Amilcar Soares Junior - Coursework: Computer Graphics, Machine Learning, Research Methods		
	Concordia University , Graduate Diploma program, Computer Science (<i>transferred to Memorial University after the 1st semester</i>)	Montreal, QC 2020.09 – 2020.12	
	Coursework: Computer Architecture, Algorithms, Academic Writing		
	Shanghai Ocean University , B.Eng., Spatial Information and Digital Technology	Shanghai, China 2016.09 - 2020.06	
	- Thesis: “Privacy-Preserving Electronic Voting System Using Homomorphic Encryption” - Advisor: Dr. Lifei Wei		
HONORS AND AWARDS	Fellow of the School of Graduate Studies Memorial University of Newfoundland Graduate Fellowship, \$16,000/yr Memorial University of Newfoundland	2024 2021 – 2023	

Best Poster Award (1st place) in Computer Science
Scientific Endeavours in Academia Conference
People's Scholarship
Shanghai Ocean University

2022

2017 – 2019

PUBLICATIONS

Ruixin Song, Md Mahbub Alam, Zahra Sadeghi, Amilcar Soares, Jose F. Rodrigues-Jr, Gabriel Spadon, “MoCo-AIS: A Contrastive Learning Framework for Similarity Computation of Vessel Trajectory”. *Under review in SIGSPATIAL*, 2026.

Gabriel Spadon, **Ruixin Song**, Vaishnav Vaidheeswaran, Md Mahbub Alam, Floris Goerlandt, Ronald Pelot, “Modeling Maritime Transportation Behavior Using AIS Trajectories and Markovian Processes in the Gulf of St. Lawrence”. *IEEE Big Data*, 2025. [[Link](#)]

Ruixin Song, “Temporal analysis and gravity-informed marine traffic forecasting for non-indigenous species risk assessment through ballast water”. *Master Thesis*, 2024. [[Link](#)]

Ruixin Song*, Gabriel Spadon*, Ronald Pelot, Stan Matwin, Amilcar Soares, “Enhancing Global Maritime Traffic Network Forecasting with Gravity-Inspired Deep Learning Models”. *Scientific Reports*, 2024. [[Link](#)]

Ruixin Song, “Network Analysis and Vessel Flow Prediction for Risk Assessment of Biological Invasion of Non-indigenous Aquatic Species”. *36th Canadian Conference on Artificial Intelligence - Graduate Student Symposium*, 2023. [[Link](#)]

Ruixin Song, Yashar Tavakoli, Sarah A. Bailey, Amilcar Soares. “A Temporal Assessment of Risk of Non-indigenous Species Introduction by Ballast Water to Canadian Coastal Waters Based on Environmental Similarity” *Biological Invasions*, 2023. [[Link](#)]

(* denotes equal contribution)

RESEARCH PROJECTS

TransformerGravity: A gravity-informed deep learning framework with self-attention for global marine traffic forecasting
2022 – 2024
(Funded by NSERC and Memorial University)

- Designed and implemented a deep learning framework in PyTorch combining stacked Transformer architecture with graph-based representations to forecast global shipping traffic patterns.
- Improved prediction accuracy by 13% over deep-learning baselines and 50% over traditional machine-learning models; optimized training code to improve performance stability.
- Built a data preprocessing pipeline (NumPy, Pandas, SciPy) supporting analysis of over 3.8 million records, and trained comparison models using scikit-learn.
- Led project implementation and technical documentation; co-authored a [paper](#) on Scientific Reports and delivered a [spotlight talk](#) at the 36th Canadian Conference on Artificial Intelligence (2023).

BWRA for Bio-Invasions: Improved the ballast water risk assessment (BWRA) model used by Transport Canada
2021 – 2022
(Funded by Fisheries and Oceans Canada, Transport Canada, and Memorial University)

- Spatially analyzed multilayer sea surface environmental data and matched it to over 8,300 global ports.
- Refined Transport Canada’s BWRA model using fine-grained environmental data, demonstrating statistically significant improvement (Wilcoxon signed-rank test, effect size > 0.5).

- Reduced model runtime by over 80% through code optimization, improving feasibility for operational use.
- Collaborated on an interdisciplinary team combining technical and biological expertise, resulting in a [co-authored paper](#) in *Biological Invasions* (Springer Nature, 2023).

ACTIVITIES

- **Workshop Lecture with SuperNova**, Dalhousie University, 2025.07
- **Reviewer**, ISCRAM conference, 2025.02
- **Volunteer**, OCEANS conference, 2024.09
- **Spotlight Talk (Graduate Student Symposium)**, Canadian Conference of Artificial Intelligence, 2023.06

TEACHING EXPERIENCE

Graduate Teaching Assistant , COMP 6981 Data Preprocessing <i>Memorial University of Newfoundland</i>	2022.01 – 2022.04 St. John's, NL
Teaching Assistant , Advanced Calculus <i>Shanghai Ocean University</i>	2017.02 – 2017.06 Shanghai, China

RELEVANT SKILLS

- **Programming language**
Python, Rust, Julia, R, C++, JavaScript
- **Tools**
scikit-learn, PyTorch, SciPy, WebGL, D3.js, graph-tool, NetworkX, PostgreSQL
- **Language**
English: Professional working proficiency (C1)
French: Classroom study (A1-A2)
Mandarin: Native