KIRSTEN ODENDAAL

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Summary

Internationally experienced Engineer and ML researcher applying robust engineering foundations and specialized AI/ML expertise (MSc. CS-ML/AI in-progress, 4.0 GPA) to advance 3D generative modeling, graph neural networks, and reinforcement learning for spatial reasoning and control. Proven ability to bridge applied research and deployment, with publications in Tier I venues and hands-on experience developing generative models for 3D geometry, surrogate physical simulators, and AI-driven design tools. Seeking opportunities to contribute to cutting-edge research in computer vision, graphics, and spatial intelligence.

Education

Georgia Institute of Technology, Atlanta, USA — Expected: August 2026
MSc. in Computer Science (Machine Learning and Artificial Intelligence): Current GPA: 4.0
Completed: Artificial Intelligence, Machine Learning, Deep Learning, Reinforcement Learning, High-Dimensional Data Analysis, Big Data, Natural Language Process
Upcoming: Computer Vision, Robotics AI

Delft University of Technology, Delft, NL — July 2021
MSc. in Maritime Technology (Ship Design, Production, Operation): 4.0 GPA (Cum Laude)

University of Alberta, Edmonton, CA — September 2019
BSc. in Mechanical Engineering: 3.7 GPA (Distinction)

Awards

Maritime Talent Award, Netherlands Maritime Awards Gala — July 2022
- National Recognition of outstanding and innovative work in researching, developing, and reporting a novel grey-box modelling methodology to estimate total vessel energy consumption using operational data and advanced analytic techniques for improved early staged vessel design.

Capstone Design Award, Thorsten Watterodt Award for Excellence in Design — May 2019
- Recognition of outstanding and innovative work in design procedures, finite element analysis, topographical optimization, material property evaluation, 3D manufacture utilization, computer-aided design (SolidWorks) and detailed drawing development (GD&T) in the complete design of an Unmanned Aerial Manipulator (UAM)

Experience

Team Leader: Development and Implementation, MARIN – *Wageningen, NL* — February 2025 – Current
- Leading the formation of the company's first dedicated Development Team, tasked with evolving the existing tool-chain, bridging R&D with implementation, and identifying areas for technological improvement.
- Serving as the team's lead applied data scientist, identifying strategic opportunities to deploy practical ML/DS methods that add business value and directly support MARIN's goal of global leadership in maritime AI.
- Formed a CRS collaboration and built a GNN-based CFD surrogate for ship-hull geometries (ShipNet), delivering accurate pressure and free-surface wave predictions across varied hull forms and reducing runtime 30x.
- Partnered with control engineers to benchmark RL-based ship-stabilization against classical controls, designing rigorous experiments and metrics that produced a data-driven report shaping MARIN's AI control-system roadmap.
- Standardized AI-driven optimization and surrogate-model workflows across MARIN by publishing comprehensive internal guides and leading a company-wide workshop, closing knowledge gaps and unifying best practices.
- Driving change management and stakeholder engagement efforts to seamlessly integrate the new team's functions and processes across the organization.

Technical Project Manager: Powering and Concept, MARIN – *Wageningen, NL* — October 2021 – February 2025
- Managed end-to-end projects and directed tool development, generating approximately €375,000 in annual revenue while pursuing new business opportunities and professional collaborations
- Led FOIL JIP data science team to implement data-driven pipeline techniques and time-series models, creating an AWS cloud web application that improved dynamic performance predictions and accelerated simulation speed by over 98%
- Improved off-design performance prediction accuracy by 10% using a machine learning model that bridges CFD and full-scale data through active learning and belief-state quantification
- Re-designed the MARIN engine design tool (MEC) into an NSGA-based optimization framework, managing multi-objective constraints and creating a commercially viable service

Graduate Researcher, De Voogt Naval Architects, TU Delft – *Haarlem, NL* — November 2020 – June 2021
- Achieved national recognition for innovative research and development of a novel grey-box modeling methodology to estimate total vessel energy consumption using real-world operational data, enhancing early-stage vessel design
- Collaborated with a multidisciplinary team to integrate machine learning models into existing workflows, applying Python and TensorFlow, and implementing best practices such as exploratory data analysis and data cleaning to enhance performance and model generalization
- Published research findings in a peer-reviewed (Tier I) journal, contributing to the academic community (publicly *available*)

Marine Design Engineer (Internship), Damen Yachting – *Vlissingen, NL* — June 2020 – October 2020
- Developed a MATLAB framework to replicate and assess the sensitivity of a commercial engineering software, investigating the feasibility of longitudinal strength weight simplifications through a numerical model sensitivity study
- Realized time-savings of 25% to 30% during basic engineering phases while ensuring accuracy deviations within 10%, allowing for new metrics for earlier informed decision-making

Assistant Technical Project Manager (Internship), Silverseas – *Palermo, IT* — March 2018
- Gained engineering project management and technical experience assisting the lead technical project manager for the world's first-ever luxury cruise ship 50ft extension and complete rejuvenation (Silver Spirit)

Thermal Development Engineer (Co-op), Husky (Cenovus) – *Calgary, CA*   September 2017 – August 2018
- Assist development teams with information gathering, analysis, technical software aid, regulatory approval reports, timeline generation, and implementation to support key development objectives
- Utilized VBA scripting to systematically develop parametric type-curves using curve-fitting and decay analysis approaches for forecasting future well production, ensuring accuracy in long-term planning

Mechanical Systems Design Engineer (Co-op), STANTEC – *Red Deer, CA*   August 2016 - May 2017
- Applied mechanical engineering principles to efficiently design mechanical systems within commercial buildings and facilities using 2D/3D CAD software
- Ensured compliance with applicable codes, standards, and regulations in the real-world integration of mechanical structures
- Analyzed the energy and economic impact of HVAC systems using TRACE 700 energy modeling software
- Coordinated mechanical system design with other professional disciplines, including architecture, structural engineering, electrical engineering, civil engineering, and construction

Selected Projects

Generative AI for 3D Shape Design - Blog Link   github.com/kodendaal/hull_geometry_generation
- Developed and implemented a Deep Convolutional Generative Adversarial Network (DCGAN) framework in collaboration with the University of Strathclyde to generate novel 3D ship hull geometries successfully demonstrating the potential for AI-driven design automation in engineering.
- Engineered the GAN training process incorporating specialized loss functions (BCE, space-filling, Laplace) and post-processing techniques (smoothing, symmetry) to improve geometry realism, diversity, and smoothness using a self-generated/collected dataset of 24,000 examples.

Latent Space Manipulation for GAN-driven Design Exploration - Blog Link   github.com/kodendaal/gan_manipulations_project
- Authored the paper *"DragGANSpace"*, investigating latent space structure and control in GANs to enable interpretable manipulation of generated 2D images and design parameters.
- Demonstrated that lower-dimensional, semantically aligned latent subspaces can significantly accelerate the DragGAN optimization process while maintaining coherent geometry and stylistic fidelity.

MNet++: An Extension of 2D/3D Networks for Anisotropic Medical Image Segmentation   github.com/kodendaal/bd4h_mnet
- Reproduced the original MNet architecture from scratch using PyTorch, achieving parity with published benchmarks on biomedical segmentation datasets; *PROMISE* and *LiTS*.
- Designed and implemented novel spatial and channel fusion gates alongside bottleneck VMamba blocks to enhance multi-scale context integration and feature selectivity across 2D/3D feature representations.
- Performed extensive ablation and validation studies demonstrating consistent improvements in segmentation accuracy, stability, and computational efficiency.

LLM Based PDF Summarizer - Blog Here   github.com/kodendaal/rag_pdf_visualizer
- Developed a Retrieval-Augmented Generation (RAG) based Language Model (LLM) to interact with and summarize general PDF's (marketing material), enhancing personalized client experiences and direct knowledge transfer
- Utilized a novel open-source LangChain framework and integrated local conversational LLM and vector database tools to reduce the risk of hallucinations and privacy leaks.
- Created a Gradio UI for an interactive presentation, demonstrating the approach to upper management and securing further R&D investment for future integration within external and internal applications

Skills

Languages: Python, MATLAB, R, VBA, LaTeX
Frameworks/Technologies: Git, SVN, Langchain, Hugging Face, CUDA, Git, Docker, Microsoft Suite
Packages: Gradio, SkLearn, Pytorch, Tensorflow, Pandas, Scipy, Numpy, Stable Baselines, Optuna
Design/CAD: SolidWorks, Rhino3D, AutoCAD, MAXSURF, REVIT MEP, STAR-CCM+ (CFD), ANSYS APDL/Workbench (FEA)
O&G: PVR, GFR, OFM, Mosaic, DB Reporter, Spotfire, IHS Accumap, SAP, Palantir CASH, FDC, SCADA
Certificates/Training: Statistics & Data Science (MITx), Intro to Python Programming (GTx), Statistical Learning (Stanford|O)
Other: Canadian Citizen, Netherlands Work Visa, and authorized to work for any US employer (TN status)

Publications

Journal
1. **Enhancing early-stage energy consumption predictions using dynamic operational voyage data: A grey-box modelling investigation**, K. Odendaal, A. Alkemade, A. A. Kana, *International Journal of Naval Architecture and Ocean Engineering, (https://doi.org/10.1016/j.ijnaoe.2022.100484), 2022*

Pre-print
1. **Development of a data-driven hydrofoil design tool including unsteady hydrodynamics**, T. P. Scholcz, K. Odendaal, G. Marelli, L. Minerva, O. V. Schnitzeler, F. van Walree, *Applied Ocean Research, (Pre-print), 2025.*
2. **DragGANSpace: Latent Space Exploration and Control for GANs.**, K. Odendaal, N. Kaushik, and S. Halverson. *arXiv, (https://doi.org/10.48550/arXiv.2509.22169), 2025.*

Conference

1. **Power, propulsion and energy system co-design optimisation framework for future vessels**, A. Balaji, T. Köhler, K. Odendaal, U. Shipurkar, A. Dadikozyan, *5th Modelling and Optimisation of Ship Energy Systems (MOSES Conference), 2025.*

2. **Early design of hydrofoils; Foil Design JIP and methodologies**, L. Minerva, K. Odendaal, T. Scholcz and G. Marelli, *28th HISWA Symposium, 2024.*

3. **Design for operation: A data-driven framework for hull form optimization using surrogate models**, K. Odendaal, L. F. Minerva, G. Loeff, *27th HISWA Symposium, 2022.*

4. **Hydro-system evaluation for hull form optimization: A MEC approach**, K. Odendaal, U. Shipurkar, *27th HISWA Symposium, 2022.*

Article

1. **A bird's eye view of machine learning in the yachting industry**, K. Odendaal, *SWZ|Maritime Article, 2023*

2. **Integrating hydrodynamics with power poses a challenge**, K. Odendaal, U. Shipurkar, *SWZ|Maritime Article, 2023*