



# In-Chang Yeo

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Ph.D. Candidate, Department of Naval Architecture and Ocean Engineering, Seoul National University, Republic of Korea

Mobile: +82-10-5755-3046

Email: iys02191@snu.ac.kr

## Education

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- 2014.03~2020.02, B.S. Student, Department of Naval Architecture and Ocean Engineering, Seoul National University, Republic of Korea
- 2020.03~2026.08, Ph.D., Department of Naval Architecture and Ocean Engineering, Seoul National University, Republic of Korea

## Research Projects

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**Researcher/Project Manager** (03/2020 – 12/2023; 02/2023 – Present) with Korea Research Institute of Ships and Ocean Engineering (KRISO)

**Project:** Development of the Situation Awareness and Autonomous Navigation Technology of Unmanned Surface Vehicles Based on Artificial Intelligence

**Project:** Development of Obstacle Detection and Tracking Program for Unmanned Surface Vehicles

- Designed and implemented a real-time maritime obstacle detection and tracking system deployed on KRISO's unmanned ships
- Led the development and validation of a YOLO-based detection model for AI-driven situation awareness, which included collecting optical/thermal camera data and building a large-scale training database
- Successfully demonstrated system-wide integration and operation in autonomous navigation scenarios by fusing (correlating) detection/tracking information with other sensor data and establishing communication with the control center

**Researcher** (04/2020 – 06/2021) with Hanwha Ocean Co Ltd

**Project:** Determination of Modules Applying Machine Learning Techniques to Optimize Hull Form

- Analyzed and identified key modules within the hull form design process suitable for machine learning-based optimization
- Developed a software tool that recommends an improved hull form by leveraging machine learning techniques to analyze and interpolate between two given reference hull designs

**Researcher** (12/2020 – 03/2021; 04/2021 – 02/2022) with Hanwha Ocean Co Ltd

**Project:** Development of an Automated Stress Analysis Method for Ship Piping Systems

**Project:** Development of a Method for Optimizing Ship Piping Systems Considering Stress Analysis

- Investigated and developed methodologies for the automation and optimization of complex ship piping systems, focusing on structural integrity
- Developed a comprehensive software solution that automates the end-to-end stress analysis process for various piping networks

- Implemented optimization algorithms within the software to automatically generate efficient piping system designs that adhere to critical stress analysis constraints.

**Researcher** (03/2021 – 02/2024) with National Research Foundation

**Project:** Deep Learning for Optimal Hull Form Based on Multi-channel Performance Analysis Data

- Led research into applying deep learning methodologies for hull form optimization, leveraging complex, multi-channel performance analysis data
- Developed and implemented a predictive model based on a Multi-Layer Perceptron (MLP) to efficiently analyze performance data and derive optimal hull form parameters

**Researcher/Project Manager** (05/2021 – 05/2022; 07/2022 – 07/2023; 09/2023 – 08/2024) with Avikus Co Ltd

**Project:** Development of the Path Planning Scenario/Algorithm for Small Ships and Its Validation Study

**Project:** Development of the Path Planning Algorithm for Berthing and Narrow Waterways of Small Ships

**Project:** Development of Technologies for the Noise Modeling of Sensor Data and the Graph Reconstruction Based on GPS Log

- Led research and development of advanced path planning algorithms tailored for small ships, specifically addressing complex scenarios such as berthing and narrow waterway navigation
- Developed and validated a comprehensive path planning software that ensures safe and conventional navigation by integrating and processing S-57 digital charts and real-time AIS (Automatic Identification System) data
- Engineered foundational technologies for robust navigation, including sensor data noise modeling and the graph-based reconstruction of navigable routes from GPS log data

**Researcher** (08/2021 – 02/2022) with HD Hyundai Heavy Industries Co Ltd

**Project:** Development of an Optimization Program for LNG Cargo Tank Marking and Flatness

- Conducted research on optimizing the placement of LNG cargo tank insulation panels, balancing critical safety constraints and economic (cost-saving) factors
- Developed a comprehensive software program to automate and optimize the arrangement (marking and flatness) of insulation panels attached to the LNG cargo tank

**Researcher/Project Manager** (02/2022 – 02/2025) with Hanwha Ocean Co Ltd

**Project:** Development of Foundational Technologies for Autonomous Navigation

- Engineered and delivered a 3D Surround View Monitoring (SVM) software to provide comprehensive 360-degree situational awareness for ship navigation
- Developed and validated an automated berthing algorithm for autonomous ships, integrating camera and LiDAR sensor fusion to ensure high-precision maneuvering during docking

**Researcher/Project Manager** (10/2022 – 09/2023) with HD Korea Shipbuilding & Offshore Engineering Co Ltd

**Project:** Development of an AI-based Ship Design Support Solution

- Developed and trained a YOLO-based detection model to automatically identify and extract key symbols and components from P&ID (Piping and Instrumentation Diagram) drawings
- Engineered a data conversion method to transform the extracted piping system information from drawings into an integrated graph (network) structure, facilitating automated analysis and digital twin integration

**Researcher/Project Manager** (04/2024 – 09/2025) with HD Hyundai Heavy Industries Co Ltd

**Project:** Development of a Pump Tower Optimization Program (HD Hyundai Heavy Industries Co Ltd)

- Developed a surrogate model for the pump tower's structural analysis and applied it to the design optimization process

## Publications

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- Jin-Hyeok Kim, Myung-Il Roh, Ki-Su Kim, **In-Chang Yeo**, Min-Jae Oh, Jung-Woo Nam, Sahng-Hyon Lee, Yong-Hun Jang, "Prediction of the Superiority of the Hydrodynamic Performance of Hull Forms Using Deep Learning", International Journal of Naval Architecture and Ocean Engineering (SCIE indexed), Vol. 14, pp. 100490.1-15, 2022.11.01
- **In-Chang Yeo**, Myung-Il Roh, Do-Hyun Chun, Seok Ho Jang, Jae Won Heo, "Optimal Arrangement Design of Pipeline Support by Considering Safety and Production Cost", International Journal of Naval Architecture and Ocean Engineering (SCIE indexed), Vol. 15, pp. 100531, 2023.05.10
- Do-Hyun Chun, Myung-Il Roh, **In-Chang Yeo**, Hye-Won Lee, "Proposed method for design optimization of LNG tanks based on the arrangement of thermal insulation panels", Ocean Engineering (SCIE indexed), Vol. 288, Part 2, 116063, 2023
- Jin-Hyeok Kim, Myung-Il Roh, **In-Chang Yeo**, "Hull Form Optimization of Fully Parameterized Small Ships Using Characteristic Curves and Deep Neural Networks", International Journal of Naval Architecture and Ocean Engineering (SCIE indexed), Vol. 16, pp.100596.1-12, 2024.05.08
- Ha-Yun Kim, Myung-Il Roh, Hye-Won Lee, **In-Chang Yeo**, Yeong-Min Jo, Jisang Ha, Nam-Sun Son, "A Hybrid Tracking Method for Maritime Obstacles Using Sensor Data", Ocean Engineering (SCIE indexed), Vol. 312, Part 2, 2024.09.16
- Dong-Guen Jeong, Myung-Il Roh, **In-Chang Yeo**, Ki-Su Kim, Jun-Sik Lee, "A Route Planning Method for Small Ships in Coastal Areas Based on Quadtree", International Journal of Naval Architecture and Ocean Engineering (SCIE indexed), Vol. 17, pp. 100647.1-17, 2025.02.03
- Jin-Hyeok Kim, Myung-Il Roh, **In-Chang Yeo**, "A Method for Generating Multiple Hull Forms at Once Using MLP (Multi-Layer Perceptron)", Ocean Engineering (SCIE indexed), Vol. 324, pp. 120659.1-20, 2025.04.30
- Yun-Sik Kim, Myung-Il Roh, Ha-Yun Kim, **In-Chang Yeo**, "An Improved Method of Detecting the Horizon for Tracking Maritime Obstacles", Ocean Systems Engineering, Vol. 15, No. 2, pp. 219-239, 2025.06.30
- Jin-Hyeok Kim, Myung-Il Roh, **In-Chang Yeo**, "An MLP (Multi-Layer Perceptron)-Based Method for Optimizing Multiple Hull Forms at Once Using Surrogate Modeling with Geometric Moments", Ocean Engineering (SCIE indexed), Vol. 339, Part 1, 2025.11.15
- **In-Chang Yeo**, Myung-Il Roh, Dong-Guen Jeong, Jun-Sik Lee, "A Route Planning Method for Small Ships Inside the Marina", International Journal of Naval Architecture and Ocean Engineering (SCIE indexed), Vol. 17, pp. 100684.1-16, 2025.08.13
- **In-Chang Yeo**, Myung-Il Roh, Yun-Sik Kim, Ha-Yun Kim, Do-Hyeok Ahn, Nam-Sun Son, "A Localization Method of Nearby Ships Based on 3D Object Detection Using a Camera", International Journal of Naval Architecture and Ocean Engineering (SCIE indexed), **Under review**
- Seong-Won Choi, Myung-Il Roh, **In-Chang Yeo**, Won-Chul Yoo, Seon-Do Han, "A Route Planning Method for Small Ships Based on Historical AIS Data", Ocean Engineering (SCIE indexed), **Accepted**
- Ha-Yun Kim, Myung-Il Roh, Yeong-Min Jo, Hye-Won Lee, Yun-Sik Kim, **In-Chang Yeo**, "A Sensor-level Fusion Method for Tracking Maritime Obstacles", Ocean Engineering (SCIE indexed), **Under review**

## Awards

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**Best Paper Award**, K-CDE 2021 Summer Conference (Aug 2021)

- The Society of CAD/CAM Engineers, Korea
- **Paper:** "Visualization of a Hull Performance Prediction Model Using Score-CAM"

**Best Paper Award (x2), K-CDE 2023 Winter Conference (Feb 2023)**

- The Society of CAD/CAM Engineers, Korea
- **Paper:** "An Automatic Generation Method for Ship Surround View Images"
- **Paper:** "A Hull Form Transformation Method for Merchant Ships Based on Local Deformation Considering Design Requirements"

**Best Paper Award (x2), K-CDE 2023 Summer Conference (Aug 2023)**

- The Society of CAD/CAM Engineers, Korea
- **Paper:** "Automated Data Generation and Deep Learning-Based Object Detection for Reviewing Ship Safety Plans"
- **Paper:** "Representation and Analysis of Equipment Connectivity in P&IDs Using Graphs"

**Best Paper Presentation Award (x2), SNAK 2023 Fall Conference (Nov 2023)**

- The Society of Naval Architects of Korea (SNAK)
- **Paper:** "A Study on the Application of GNN for Hull Form Design"
- **Paper:** "An Algorithm for Generating Automatic Berthing and Unberthing Paths for Ships Using LiDAR"

**Outstanding Graduate Student Award (Dec 2023)**

- BK21 Phase 4 University Innovation Project Group

**Student Best Paper Presentation Award (x2), SNAK 2025 Spring Conference (May 2025)**

- The Society of Naval Architects of Korea (SNAK)
- **Paper:** "An Automatic Berthing Method for USVs Using Multi-Sensor Fusion"
- **Paper:** "An Adaptive Control Method for Offshore Cranes Based on Deep Reinforcement Learning Considering Various Operating Conditions"

**Best Presentation Award (x2), K-CDE 2025 Summer Conference (Aug 2025)**

- The Society of CAD/CAM Engineers, Korea
- **Paper:** "A Learning-Based Tracking Method for Maritime Obstacles"
- **Paper:** "A Collision Avoidance Method for a 6-DOF USV Based on Deep Reinforcement Learning Considering Sea State"

## Research Area

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- Detection and Tracking of Maritime Obstacles
- Autonomous Ship
- Collision Avoidance
- Computational Ship Design
- Optimum Design

## Programming skills required for engineering

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- Simulation and program development skills and experience with C#, Python, and Unity
- Deep learning with Python and Unity
- MS Office

# Web Profiles

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- Google Scholar: <https://scholar.google.com/citations?user=k6h32HEAAAAJ&hl=en&authuser=1>
- LinkedIn: [www.linkedin.com/in/inchang-yeo](http://www.linkedin.com/in/inchang-yeo)
- Website: <https://inchangyeo.github.io/>
- Laboratory: <https://sydlab.snu.ac.kr/>