# SeongHyun Kristine Seo

Data Scientist / AI/ML Researcher

seonghyunseo.kr@gmail.com | +82-10-9893-9275 | linkedin.com/in/seonghyun-seo-ms

Aspiring to become a proficient AI/ML researcher dedicated to using scientific and statistical expertise to analyze data and uncover insights. Focused on creating innovative, data-driven solutions for industrial applications to promote sustainable and autonomous AI. Currently serving as an AI/ML researcher intern at Boeing AI (BKETC, Seoul, Korea).

## Educations

**MS in Industrial Engineering - Specialization in Autonomous AI/ML Operations**, Aug 2025
Sungkyunkwan University (SKKU)
*Thesis: Autonomous online learning with feature store and data store updates: A case study on virtual metrology in steel manufacturing (Advisor: Prof. D.-J. Lim)*

**B.S. in Data Science and Systems Management Engineering (Double Major)**, Sungkyunkwan University(SKKU) Feb 2024

## Experiences

**AI/ML Researcher Intern**, Boeing – Seoul, Korea Aug 2025 – Present

- Contributed to the Early Warning Reporting and System Development project by building time series forecasting and causal inference models to predict future quality risks and identify the root causes of early warning signals in aircraft manufacturing.
- Collaborated with global teammates, participating in the development and prototype deployment of an automated reporting system and actively integrating stakeholder feedback into iterative improvements.

**Graduate Research Student**, Technometrics Lab – Suwon-si, Korea Sept 2022 – Aug 2025

- Researched and developed strategies for improving and optimizing MLOps by detecting and addressing concept drift, focusing on AI model retraining methods that account for changes in data patterns. Presented findings at multiple international conferences, submitted journal papers, and filed a patent on adaptive AI retraining systems.
- While primarily working with manufacturing data, also gained broad exposure to diverse domains by taking courses in AdTech, Prognostic Health Management (PHM), and Quality Management, fostering a strong interest in applying AI/ML methods across different industries.

**Research Assistant**, Hyundai Research Institute – Seoul, Korea Sept 2022 – Feb 2023

- Contributed to a report analyzing and forecasting the social and economic impacts of the Korean art fair market.
- Utilized big data collected from Google Trends and Naver Data Lab services to generate word clouds and conducted network analysis focused on key topics. Responsible for comprehensively summarizing and organizing the analysis results.

## Projects

**Early Warning Reporting**, Boeing AI in BKETC Aug 2025 – Present

- Developed an automated time series forecasting pipeline using Prophet to detect and predict quality risks in aircraft manufacturing, enabling early identification of delays and defects.
- Developed a causal inference model using PCMCI and Transfer Entropy to quantify directional dependencies among process variables and pinpoint the root causes of early warning signals.
- Designed LLM-based reporting workflows with multi agents that generated and distributed warning-level reports, streamlining AI-driven decision-making processes.

**Modeling for BPED Process**, Technometrics, POSCO Holdings Winter 2024 - Summer 2025

- Developed AI-based modeling frameworks for BPED process optimization in LiOH production, integrating machine learning with time series-based techniques to enhance decision-making under complex manufacturing conditions and improve both operational efficiency and product quality.
- Built real-time anomaly detection models and contributed to a customized platform that supports end-to-end modeling, visualization, and recommendation for practical deployment within smart factory environments.
- Led the project as a data scientist and PM, coordinating cross-functional efforts, producing evidence-based documentation, and translating model insights into actionable field-ready solutions through close collaboration with engineers.

**Development of a Predictive Model for Enhancing Productivity**, Technometrics, POSCO, POSCO DX — Summer 2024

- Developed versatile ensemble models by combining algorithms such as Huber, XGBoost, and Extra Trees, using expertise in algorithm implementation, customization, and parameter optimization to enhance factory productivity through collaboration with industry professionals.
- Successfully built prediction models for five distinct targets, achieving a project outcome of accuracy 84.7, surpassing the initial KPI of accuracy 80.8.
- Recognized for their strengths in organizing and summarizing work outcomes, fostering teamwork, solving problems effectively, and providing clear and logical communication during reviews. Demonstrates a comprehensive understanding of task flows and the ability to independently manage responsibilities.

**Developing Model Update Strategy in Steel Industry**, Technometrics, POSCO DX — Summer 2023

- Led a Proof-of-Concept (PoC) with POSCO DX, validating an AI-driven model update strategy to detect and adapt to Concept Drift in real-world steel manufacturing processes.
- Implemented and tested an adaptive AI framework, improving predictive accuracy from 15 to 85, exceeding baseline 60-70, and demonstrating feasibility for full-scale deployment.
- Presented PoC findings to stakeholders, securing executive approval for further implementation and integration into the production system.

**Smart Factory Capstone Project: Anomaly Detection with Injection Data**, On-Campus Project — Spring 2023

- Developed anomaly detection algorithms and a quality evaluation framework, enabling real-time identification of defects and improving production accuracy.
- Led an industry-academia collaboration to automate data labeling using injection molding data, focusing on enhancing process efficiency and quality control.

## Publication and Patent

**Seo, S.**, & Lim, D.-J. (2025). *Sustainable maintenance of virtual engineering assets: A Case Study on Virtual Metrology in Steel Manufacturing*, **under review** at *Reliability Engineering & System Safety* (IF 11.0, JCR 2024) — 2025

Lim, D.-J., & **Seo, S.-H.** (2025). *System and Method for AI Model Retraining through Feature Store and Data Store Updates*, KR Patent No. 10-2025-0049679, filed April 2025. Patent Pending. — 2025

## Honors and Awards

**Hyundai Motors CMK Foundation Scholarship**, Scholarship Student / Current Alumni — 2024 – 2025

**Lotte Scholarship**, Scholarship Student — 2021 – 2023

**3rd Prize, SKKU Comprehensive Engineering Design Contest**, Team Member — 2023

**3rd Prize, SKKU (DNA-Hero) Capstone Design Contest**, Team Lead — 2023

**2nd Prize, KB Financial Group Solveathon**, Team Lead — 2022

## Academic Talks and Presentations

**Autonomous Online Learning with Feature Store and Data Store Updates: A Case Study on Virtual Metrology in Steel Manufacturing**, UKC 2025 - Atlanta, GA — 2025

**Automating ML Workflow Orchestration: Strategies for Autonomous Post-Deployment Model Updates**, 2024 INFORMS Annual Meeting - Seattle, WA — 2024

**Steeling Against Time: A Case Study of the Korean Steel Industry**, 2024 INFORMS Annual Meeting - Seattle, WA — 2024

**Is All Well with Your Models? Strategies to Deal with Concept Drift**, 2023 INFORMS Annual Meeting - Phoenix, AZ — 2023

## Skills

**Professional Certifications:**

- **Big Data Analysis Engineer** Certificate No. BAE-011003141
- **ADsP (Advanced Data Scientist Professional)** Certificate No. ADsP-044013036

**Programming Languages: Python**, SQL, R

**Language:** Korean (Native), English (TOEIC 950, OPIc IH, Advanced), Chinese/Mandarin (HSK Level 2, Beginner)

## Extracurricular Activities

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| **TnT**, On-Campus AI (ML/DL) Study Group, Group Member | 2023 |
| **DSCover**, On-Campus Data Science Study Group, Group Member | 2021 |
| **Student Council**, Chief Director, 53rd and 54th Student Council of SKKU | 2020 – 2022 |