

# Byeong Hoon Yoon

Data Scientist & AI Engineer | Industrial LLM / AI Agent | Reinforcement Learning Control | Computer Vision | MLOps  
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## PROFESSIONAL SUMMARY

Industrial AI engineer with full-stack software background and hands-on experience delivering AI solutions for POSCO Smart Help Center. Specialized in LLM/AI Agent solution planning, computer vision inspection, reinforcement learning based automatic control, optimization, anomaly detection, and production-grade MLOps. Led and supported high-impact manufacturing AI PoCs across quality, safety, energy, and process automation, including LLM/VLM PoCs, thermal-camera slab automatic rotation control, weld image analysis, safety PPE detection, SDD defect classification, and conveyor/belt abnormality detection.

## CORE COMPETENCIES

- **Industrial LLM / AI Agent:** LLM-based manufacturing knowledge assistant, AI Agent solution planning, VLM PoC using Qwen2-VL, MES/field operation automation concepts, RAG/ontology/agent workflow design.
- **Reinforcement Learning & Automatic Control:** Offline SAC, behavior cloning stabilization, world-model based simulation, reward shaping, safety constraints, policy drift mitigation, control pipeline diagnostics.
- **Computer Vision for Manufacturing:** YOLOv8/v9/v11, U-Net, segmentation, keypoint/angle extraction, image classification, object detection, CCTV/thermal-camera/video analytics.
- **MLOps & Data Pipelines:** PyTorch, TensorFlow, MLflow, Docker, Kubernetes, Airflow, PySpark, model monitoring, automated deployment, data quality diagnostics.
- **Industrial Optimization & ML:** XGBoost, TabNet, AutoML, cross-validation, time-series anomaly detection, rule-based hybrid modeling, OR-Tools, process scheduling and energy optimization.

## PROFESSIONAL EXPERIENCE

### Freelance Industrial AI Consultant / Data Scientist

Jun. 2026 – Present

Hubiz ICT

- Support Hubiz ICT's transition from traditional MES/POP development to AI-driven smart factory solutions as an external AI specialist.
- Translate manufacturing requirements into feasible AI tasks such as defect detection, quality classification, anomaly detection, and process automation.
- Provide AI project consulting across data requirements, labeling strategy, model selection, validation, and deployment planning, including MES/POP integration.

### External AI & Digital Transformation Expert Reviewer

Dec. 2025

Korea Iron & Steel Association

- Reviewed and provided expert feedback on a digital transformation education guideline report for steel industry employees.
- Advised on practical AI, data analytics, and digital transformation training directions, contributing field-based perspectives from POSCO Smart Help Center experience.

### Data Scientist & Engineer / Senior SHC Analyst

Mar. 2022 – Present

AMSquare / POSCO Smart Help Center

- Lead SHC technical execution as a senior company-side analyst, supporting POSCO field teams across computer vision, optimization, anomaly detection, automatic control, and LLM/AI Agent initiatives.
- Contributed to SHC growth as a trusted AI partner inside POSCO; 2025 records include 208 field visits, 47 PoCs, and 34 consulting cases, with an increased share of high-difficulty projects.
- Planned and executed LLM/AI Agent initiatives, including B.M 2.0 AI Agent solution planning/development and PoCs for manufacturing knowledge support, operator assistance, and multimodal safety inspection.

## SELECTED RECENT PROJECTS

### Industrial LLM / AI Agent & VLM PoC

- Led AI Agent solution planning/development for manufacturing operations — field knowledge search, work guidance, and operator support.
- Conducted a safety-monitoring PoC using Qwen2-VL for CDQ dust discharge work; identified limitations in high-place worker detection and real-time performance, then shifted to YOLOv11 detection for deployable PPE monitoring.

### Thermal-Camera Slab Automatic Rotation Control — Reinforcement Learning

- Developed and stabilized the learning pipeline for slab rotation control using thermal camera data, combining BC pretraining, offline SAC, and world-model based validation.
- Resolved SAC divergence and actor policy drift via conservative BC weighting, reward scale limits, target-Q/reward clipping, and safety-violation filtering.

### ERW Weld Metal Flow Angle Model

- Verified U-Net segmentation for metal flow detection and designed the Metal Flow Angle calculation logic using 25%/75% bondline points and horizontal reference lines.

### CGL Flow-Mark SDD Score Classification

- Expanded from 3-class to 5-class classification; trained on 403 images to 77.05% test accuracy under difficult label-boundary conditions, with split augmentation and multi-view preprocessing.

### BC Belt Conveyor Deviation and Edge Abnormality Detection

- Designed ROI, polygon, edge-detection, and line-connection logic for belt deviation detection; for the tail section, applied perspective warp and trained a segmentation model on ~300 labeled images.

### LDG Holder Level Optimization / Energy Loss Reduction

- Tested multiple ML approaches for holder level optimization and venting minimization; evaluated 12 models with 5-fold CV under limited segment-level data while balancing performance against compute constraints.

### Earlier Industrial AI Contributions

- Time-series anomaly detection for industrial equipment using AutoML, extended toward data observability and drift-resilient classification; real-time YOLO detection for worker safety and quality control; segmentation/detection pipelines (Saliency-DETR, Detectron2); RL/optimization for roll-combination, scheduling, and material handling; scalable pipelines with PySpark, Airflow, Docker, Kubernetes, and MLflow.

### Hubiz ICT — Deputy Manager, Full-Stack Developer / Division Head (Dec. 2018 – Feb. 2022)

- Led Smart Factory MES/POP development for manufacturing clients; built enterprise web systems with Java, Spring Boot, JavaScript/React, and relational databases.

## EDUCATION & CERTIFICATIONS

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**Illinois Institute of Technology** — M.S. Program in Data Science

Practical Data Science on the AWS Cloud (AutoML) — AWS, 2023

**Chungnam National University** — B.S. in Information & Communication Engineering

Machine Learning Engineering for Production (MLOps) — DeepLearning.AI, 2023

Deep Learning Specialization — DeepLearning.AI, 2022

AWS Certified Cloud Practitioner — AWS, 2020

## PUBLICATIONS & AWARDS

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- "Self-supervised Drift-Resilient Classification for Time Series Industrial Anomaly Detection" — Co-authored, IEEE Access, Accepted for Publication, Apr. 2025.
- "Wireless Stereo Transmitter and Receiver System" — Gold Prize, Feb. 2004.

## TECHNICAL SKILLS

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- **Programming:** Python, Java, JavaScript, PHP, C++
- **AI/ML:** PyTorch, TensorFlow, scikit-learn, XGBoost, TabNet, AutoML, RL, U-Net, YOLO, VLM/LLM workflows
- **MLOps/Data:** MLflow, Docker, Kubernetes, Airflow, PySpark, Hadoop, Kafka, data observability
- **Cloud/DB:** AWS, GCP, Azure, MySQL, PostgreSQL, MongoDB, DynamoDB, InfluxDB