Hyeongju Lee

zoocasso1590@gmail.com
zoocasso.github.io

Data & Backend Engineer — 29 months building production data pipelines and backend systems, plus 3D computer-vision research. Master's completion Mar. 2027. Military service completed.

Education

Kyushu Institute of Technology — Fukuoka, Japan
Master's, Computer Science & Systems Eng. (Creative Informatics), GPA 3.625/4.0 — *Apr. 2025 – Mar. 2027 (exp.)*

Hankyong National University — Anseong, South Korea
B.S. in Electrical, Electronic & Control Engineering, GPA 4.00/4.50 — *Mar. 2018 – Feb. 2025*

Industry Experience

Vision Inside — Seoul, South Korea
Data & Backend Engineer (Industrial Technical Personnel, Jul. 2022 – Jul. 2024) — *Jul. 2022 – Nov. 2024 (29 months)*

- **KISTI-commissioned public R&D value-creation platform (later SMART K2C), Aug. 2022 – Jun. 2024 — data engineer on Vision Inside's side, owning collection, loading and serving.** Built the collection layer: Selenium crawlers for Amazon and Danawa plus public-data-portal APIs for the Public Procurement Service, run on a distributed crawling farm of laptops feeding a central MySQL. Collected Amazon and Danawa category by category, de-duplicating products by ID (ASIN), into one comparable dataset with the procurement data. In the Java Spring KISTI prototype web app, owned the DB schema, backend integration and frontend wiring (with the in-house Java team); moved it in-house on Docker.
- Built models 3–5 myself (project–company keyword matching, price-band K-means clustering with Dunn-index k, a daily KeyBERT review-keyword batch) and served them as FastAPI services with Jinja2/Tabulator admin dashboards. Wrote the audit deliverables (operator manual, data-build report) and presented results in technical meetings with KISTI researchers; the project later led to a follow-on main contract.
  Details: zoocasso.github.io/en/work/kisti
- **Genomic variant annotation & risk-report system (Kyung Hee Univ. College of Korean Medicine × a Canadian bio lab), Aug. 2022 – Sep. 2023 — backend and pipeline developer (algorithm designed with the team lead).** Implemented a FASTQ → BWA → samtools → Picard → GATK variant-calling pipeline and a 4-stage SQL annotation join (dbSNP, GWAS Catalog, 1000 Genomes, UniProt) over public reference data, loaded via chromosome-wise splitting and chunked pandas/SQLAlchemy ingestion. Served rule-based GWAS risk scores, 26-population allele-frequency comparisons, and drug/herbal-medicine lookups through a FastAPI JSON API; deployed it with Docker through a Harbor registry I set up on a Korea IDC Ubuntu server (DNS/HTTPS), internal access only. Served as the **technical bridge between the Korean and Canadian teams**, working with the lab's designer. **Improved:** web screens rendered inside the server → a separate JSON API for the frontend.
  Details: zoocasso.github.io/en/work/genomics
- **Life-insurance disclosure tool (team of three):** loaded insurance disclosure workbooks into MySQL and served them through a FastAPI web viewer.

Research Experience

Kyushu Institute of Technology — Fukuoka, Japan
Graduate Researcher, 3D imaging (advisor: Prof. Min-Chul Lee) — *Apr. 2025 – Present*

- **Four first-author papers** (ICMV 2026, ICCAS 2026, ITC-CSCC 2026 & 2025) on training-free light-field / integral-imaging reconstruction. Ray-based inverse mapping (RIM) redistributes angular to spatial samples with zero quantization error under orthographic conditions: **+2.39 dB PSNR** and +0.14 SSIM on 7 Stanford Lytro scenes, and **+0.11 mAP50** for a downstream YOLO detector. Details: zoocasso.github.io/en/research/rim
- Replaced iterative origin-point search with direct camera-parameter computation: **81 reconstructions → 1** (0.31 s on CPU measured in the paper; the iterative 25.45 s is an estimate; 0.0057 s on GPU with CuPy).
  Details: zoocasso.github.io/en/research/origin-point
- Master's thesis (in preparation): real-time GPU pipeline that detects once on a lens-array image and refocuses only inside each box — **16.4 ms per real Lytro frame (61 fps)**. Image enhancement for low-light and hazy scenes (patent application in preparation).
- **ICMV 2026 Best Poster Award** (Oct. 2026); **Rotary Yoneyama Memorial Foundation Scholar** (2026), selected through a Japanese-language interview.

Kyushu Institute of Technology Lab Fukuoka, Japan / Netherlands

Research Assistant (part-time), image-data pipeline for joint research with Hitachi *Apr. 2025 – Present*

- Rewrote an unmaintainable inherited codebase into an end-to-end Python pipeline — machine-vision camera control and capture, preprocessing into model-ready datasets — with a PyQt GUI that non-developer researchers run themselves.
- **Improved:** only the first frame of dark, low-light video, with a home-made C++ camera layer → single high-quality still captures at the right brightness, through the recommended SDK (PySpin).
- **Deployed in a lab in the Netherlands**, used hands-on by Hitachi staff and demonstrated to the Dutch researchers; design handed over to two junior researchers. Japanese and English.
  Details: zoocasso.github.io/en/work/hitachi

Hankyong National University, 3D Image Processing Systems Lab Anseong, South Korea

Undergraduate Researcher (advisor: Prof. Myungjin Cho) *Aug. 2024 – Mar. 2025*

- First-author poster on origin-point optimization for volumetric computational reconstruction at Photonics Conference 2024 (Optical Society of Korea) — the precursor of the ITC-CSCC 2025 paper.

Starting point in vision and ML 2022

- Depth estimation with a correlation filter and VCR (course project, MATLAB) became the starting point of the master's research. The same year: an MNIST CNN in MATLAB with backpropagation and momentum gradient descent written by hand, no deep-learning framework. Interest in vision started with the Smart Mirror graduation project (two-person team: Raspberry Pi, OpenCV LBPH face recognition, Kakao speech API).

Selected Projects

3DOS: Vision Enhancement on an XR Headset | *C++, OpenCV, Unity* Nov. 2024

- XR Device Content Makerthon finals (team 3DOS, five lab members registered): **owned all development and the live demo**. Fog/smoke removal and low-light recovery methods from Prof. Myungjin Cho's research, written in C++/OpenCV as an Android native plugin (arm64) for a Unity app on the Metalens 2 headset.

WJMax Game Server (side project, team of two) | *FastAPI, Docker, AWS* Aug. 2023 – Feb. 2024

- Owned the server, database and security for a community rhythm game: FastAPI on Docker (EC2) with RDS MySQL behind a Cloudflare proxy/WAF, and a play-log ingestion API serving ∼300 average and ∼2,000 peak concurrent players during updates. Details: zoocasso.github.io/en/work/wjmax

Publications (first author)

[1] **Hyeongju Lee**, Myungjin Cho, Min-Chul Lee, "Angular-to-Spatial Information Redistribution via Ray-based Inverse Mapping," *19th Int. Conf. on Machine Vision (ICMV 2026)*, Budapest. (Poster; Best Poster Award)

[2] **Hyeongju Lee**, Myungjin Cho, Min-Chul Lee, "Virtual Lens Array Synthesis from Multi-View Images via iRIM," *Int. Conf. on Control, Automation and Systems (ICCAS 2026)*, Sapporo. (Poster)

[3] **Hyeongju Lee**, Myungjin Cho, Min-Chul Lee, "Accelerated Origin Point Optimization for Volumetric Computational Reconstruction," *ITC-CSCC 2026*, Bangkok. (Oral) Code

[4] **Hyeongju Lee**, Gilsu Yeo, Myungjin Cho, Min-Chul Lee, "Image Enhancement of Volumetric Computational Reconstruction Using Origin Point Optimization," *ITC-CSCC 2025*, Seoul. (Poster) Code

[D1] **Hyeongju Lee** et al., "Image Enhancement of Volumetric Computational Reconstruction Using Origin Point Optimization" (in Korean), *Photonics Conference 2024*, Optical Society of Korea. (Poster)

Skills & Additional

Languages: Python, SQL (primary); C++ (XR makerthon, coursework, part of a company project), Java, JavaScript, C#, MATLAB (basic–intermediate)
Data & Backend: FastAPI, SQLAlchemy, pandas, MySQL, Selenium, BeautifulSoup, Java/Spring, openpyxl/xlwings, PyQt
ML & Vision: PyTorch, scikit-learn, OpenCV, NumPy, CuPy, Sentence-Transformers, YOLO-based evaluation, Blender
Bioinformatics: BWA, samtools, Picard, PyVCF; dbSNP, GWAS Catalog, 1000 Genomes, UniProt
Infrastructure: Docker, Harbor, Linux (Ubuntu/WSL), DNS, AWS (EC2, RDS), Cloudflare, Git
Certification: SQLD — SQL Developer, Korea Data Agency (Oct. 2023)
Spoken: Korean (native), Japanese (business conversational), English (conversational)
Military: Completed as Industrial Technical Personnel at Vision Inside (Jul. 2022 – Jul. 2024, 23 months)