

# CHAE-YEON HEO



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The primary goal of my research focuses on developing computer vision and generative models that can intelligently understand, edit, and create visual content. I aim to build methods that connect high-level semantic interpretation with practical, controllable image manipulation—covering tasks such as image restoration, inpainting, and generative editing. I am also interested in 3D vision, including reconstruction and neural rendering, with the broader goal of improving the reliability and flexibility of visual AI systems used in real-world applications.

## Research Interests

Computer Vision , Image Editing & Restoration , Generative Models , 3D Vision

## Education

### Chonnam National Univeristy

M.S in Aritifical Intelligence Convergence

*Sep. 2024 – Aug.2026*

Advisor: Prof. Yeong-Jun Cho

GPA: 4.31/4.5

### Chonnam National Univeristy

B.S. in Artificial Intelligence

*Mar.2021– Aug.2024*

GPA: 3.57/4.5

# TECHNICAL SKILLS

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- **Languages :** Python
- **Libraries & Frameworks :** PyTorch, OpenCV, NumPy, Pandas, Matplotlib, HuggingFace
- **Research Areas :** Image Inpainting, 3D Vision (Gaussian Splatting), Object Detection & Tracking
- **DevOps & Tools :** Git, Linux environment, LaTeX, Docker

## Publications

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### [CSF-Net: Context-Semantic Fusion Network for Large Mask Inpainting.](#)

- **Authors :** Heo, C. Y., & Cho, Y. J.
- **Published in :** WACV (2026) - Winter Conference on Applications of Computer Vision [h5-index 131]
- **Contribution:** Presents the *first* inpainting framework that leverages **amodal completion** as semantic guidance for large-mask image restoration. CSF-Net introduces a transformer-based fusion strategy that unifies amodal priors with contextual cues, substantially reducing object hallucination and improving structural accuracy across diverse masking conditions.

### [Flatfish Lesion Detection Based on Part Segmentation Approach and Lesion Image Generation.](#)

- **Authors:** Hwang, S. B., Kim, H. Y., **Heo, C. Y.**, Jeong, H. Y., Jung, S. J., & Cho, Y. J.
- **Published in :** Journal of the World Aquaculture Society (2025) [SCIE Q1]
- **Contribution:** Introduces the *first high-resolution, expert-annotated flatfish lesion dataset* and a part-wise lesion detection framework that reflects the anatomical characteristics of flatfish. The work also proposes a GAN-based lesion synthesis + harmonization pipeline that generates realistic lesion variations, improving detection accuracy by up to 12% and generalizing to other species.

### [Missing Person Recognition Algorithms Based on Image Captioning and Visual Grounding.](#)

- **Authors :** Jeong, A., Woo, Y., Kim, H. Y., Suh, G., **Heo, C. Y.**, Cho, Y. J., & Jeong, H.
- **Publised in :** ICPR (2024) - International Conference on Pattern Recognition [h5-index 68]
- **Contribution:** Proposes a multimodal missing-person recognition pipeline that jointly uses image captioning and visual grounding—enabling fine-grained attribute reasoning even under incomplete or ambiguous visual evidence. By fine-tuning on the large-scale synthetic MALS dataset, the model demonstrates robustness across diverse environments and occlusion-heavy conditions.

### [Real-3DGS: Sensor Fusion-based Realistic Scale Environmental Modeling for Simulation of Autonomous Driving.](#)

- **Authors:** Seo, Y. R., **Heo, C. Y.**, & Kim, C. S.
- **Published in:** Journal of Digital Contents Society (2024) [KCI]
- **Contribution:** Introduces the first sensor-fusion 3D Gaussian Splatting pipeline that integrates LiDAR-SLAM pose alignment and LiDAR depth supervision to overcome scale ambiguity in vanilla 3DGS. Real-3DGS enables physically accurate real-scale scene reconstruction and significantly improves depth rendering quality—making 3DGS suitable for autonomous-driving simulation.

# Patents and Software

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## Patents

- **3D Drone Position Estimation Using a Single Camera**  
(단일 카메라 기반 드론 3차원 위치 추정 방법) — KR Patent Registered (10-2025-0089527)
- **Flatfish Lesion Image Generation Method**  
(넙치 병변 이미지 생성 방법) — *Patent Application in Progress*
- **Flatfish Disease Detection System Based on Part Segmentation Approach**  
(부분 분할 접근법 기반 넙치 질병 검출 시스템) — *Patent Application in Progress*
- **Image Restoration System Based on a Context-Semantic Fusion Network for Large-Scale Mask Inpainting**  
(대규모 마스크 인페인팅을 위한 문맥-의미 융합 네트워크 기반 이미지 복원 시스템) — KR Patent Registered (10-2026-0020469)

## Software

- **Camera-LiDAR Sensor Fusion-based Real-Scale Environment Rendering**  
(카메라-라이다 센서 융합 기반 현실 규모의 환경 렌더링) — Software Registered (C-2025-027288), Jul 18, 2025
- **3D Drone Trajectory Estimation in Monocular Camera Environments**  
(단안 카메라 환경 드론 3차원 궤적 추정) — Software Registered (C-2025-017676), May 2025
- **Flatfish Lesion Detection System Based on Three-Region Fish Segmentation**  
(물고기 세 영역 분할 기반 넙치 병변 탐지 시스템) — Software Registered (C-2025-060751), Dec 2025
- **Image Restoration System Based on a Context-Semantic Fusion Network for Large-Scale Mask Inpainting**  
(대규모 마스크 인페인팅 기반 이미지 복원 시스템) — Software Registered (C-2025-060749), Dec 2025

## Awards

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- **Silver Prize, 2025 Industry-Academia AI Hackathon Competition (CNU)** Jul. 2025  
Topic: VLM-based Wildfire Risk Detection System
- **Grand Prize, 2024 Capstone Design Excellence Competition (CNU)** Aug. 2024  
Topic: Sensor Fusion-based Static Environment Modeling
- **Gold Prize, 2024 AICOSS Winter Industry-Academia AI Hackathon** Jan. 2024  
Topic: Missing Person Recognition algorithms based on Image Captioning
- **Gold Prize, 2023 AICOSS Winter Industry-Academia AI Hackathon** Jan. 2023  
Topic: Privacy-Preserving Service Using Object Detection
- **Excellence Award, 2022 Winter Energy+AI Micro Capstone Competition (CNU)** Nov. 2022  
Topic: YOLOv7-based Automated PET Bottle Sorting System
- **Grand Prize, 2022 Summer Energy+AI Micro Capstone Competition (CNU)** Aug. 2022  
Topic: Real-Time Detection of Illegal Filming Drones Using Deep Learning
- **Encouragement Award, 2022 Gwangju AI Problem-Solving Idea Contest** Jul. 2022  
Topic: AI-Based Health Exercise Assistant "A-Gym"

# Projects

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- **Mar 2025 – Dec 2025 | Sleep Video-based Airway Obstruction Analysis Model (Individual Project):** Developed an AI system for analyzing Drug-Induced Sleep Endoscopy (DISE) videos using ResNet50 for anatomical classification and VQA. Engineered a labeling-free automated data generation pipeline that labels and extracts frames via rule-based logic and metadata without manual medical intervention to track airway areas and provide clinical insights.
- **Nov 2025 – Present | AiMemory: AI-based Parenting Record Automation Service:** Designed and prototyped a multimodal AI system that automates baby diaries, generates one-click photobooks, and ensures on-device privacy to reduce parents' record-keeping burden.  
Role: Team Lead, AI model design & prototyping.
- **Sep 2024 – Jan 2025 | Single Image Reflection Removal (Samsung Electronics Joint Project):** Developed a cross-attention-based reflection removal model to fix reflection-induced anomaly detection failures inside washing-machine monitoring systems.  
Role: Development & Reporting
- **Mar 2024 – Jun 2024 | Jejueo–Standard Translator:** Created a bidirectional translation app between Jejueo dialect and Standard Korean to support tourism and dialect preservation.  
Role: Translation model development & experiments
- **Apr 2024 – Jun 2024 | Pokémon VGC 2024 Championship Simulation Engine:** Implemented a battle simulation engine following official Pokémon VGC 2024 double-battle rules; designed team-building logic and rule-based strategy evaluation.
- **Mar 2024 – Jun 2024 | Static Environment Modeling using Camera–LiDAR Sensor Fusion:** Developed a sensor-fusion pipeline to reconstruct static 3D environments by integrating camera and LiDAR data.  
Role: Development & Experiments
- **Mar 2024 – Jun 2024 | Nighttime Object Detection using Sensor Fusion:** Performed camera–LiDAR data acquisition using mobile robots, performed calibration, and developed a nighttime object detection pipeline.  
Role: Camera–LiDAR calibration & data acquisition
- **Oct 2023 – Dec 2023 | Missing Person Recognition:** Built a recognition pipeline that searches for missing persons using only textual appearance descriptions, combining image captioning and visual grounding.  
Role: Team Lead, Development & Experiments
- **Nov 2023 – Dec 2023 | Zero-shot Labeling Tool using Grounded-SAM (Individual Project) :** Created a zero-shot labeling tool leveraging Grounded-SAM to automate dataset annotation for downstream tasks.

- **May 2023 – Jul 2023 | Building Coverage Ratio Measurement via Aerial Image Segmentation:** Implemented segmentation-based measurement of building coverage ratio using aerial imagery.  
Role: Development & Experiments
- **Feb 2023 | CloseCV: Privacy-Preserving Video De-Identification Solution:** Developed a selective de-identification system using YOLO, ByteTrack, and Track ID-based identity removal; deployed prototype for competition use.  
Role: Development & Experiments

## Experience

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- **Sep 2025 – Dec 2025 | Teaching Assistant** — Industry–Academia Capstone Design (Prof. Young-Jun Cho) : Guided student capstone projects, assisted evaluation, and supported course operations.
- **Mar 2025 – Aug 2025 | Teaching Assistant** — AI/Software Capstone Design (Prof. Young-Jun Cho) : Assisted project evaluation, student guidance, and class management for capstone design teams.
- **Dec 2024 | Instruction Support** — Gwangju High School : Conducted project-based AI education for high school students, focusing on problem solving using AI tools.
- **Jun 2024 – Dec 2024 | Mentor** — Gwangju High School AI Project Program : Led projects on Object Detection + Multi-Object Tracking and integrated KakaoTalk OPEN API for automated cafeteria notifications.
- **Sep 2024 – Jan 2025 | Mentor** — Undergraduate–Graduate Joint Program : Mentored students in Computer Architecture, Artificial Intelligence (MLP, Backpropagation), and Image Processing.
- **Mar 2024 – Jul 2024 | Teaching Assistant** — Computer Vision (Prof. Young-Jun Cho) : Assisted lectures and practice sessions on feature extraction, dimensionality reduction, and image classification.
- **Mar 2024 – Jul 2024 | Mentor** — SW Teaching Excellence Program (CNU Software-Centered University) : Mentored students in Computer Architecture, Python OOP, and Git fundamentals.
- **Sep 2023 – Dec 2023 | Teaching Assistant** — Object-Oriented Design Project (Prof. Young-Jun Cho) : Supported instruction on search algorithms, linear regression, linear classifiers, and genetic algorithms.
- **Mar 2023 – Aug 2023 | Teaching Assistant** — SW/AI Gifted Education Program (CNU Gifted Center) : Taught Python programming fundamentals and libraries.