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

Chonnam National Univeristy

B.S. in Artificial Intelligence — *Mar.2021– Aug.2024*

GPA: 3.57/4.5

Publications

CSF-Net: Context-Semantic Fusion Network for Large Mask Inpainting.

- **Authors : Heo, C. Y.**, & Cho, Y. J.
- **Published in : WACV (2026) -** IEEE/CVF Winter Conference on Applications of Computer Vision
- **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
- **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)
- **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

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 인페인팅 기반 이미지 복원 시스템) — *Patent Application in Progress*

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 Registration in Progress
- **Image Restoration System Based on a Context-Semantic Fusion Network for Large-Scale Mask Inpainting**
  (대규모 마스크 인페인팅 기반 이미지 복원 시스템) — Software Registration in Progress

Awards

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

- **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:** 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

- **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.