

# Hanbyel Cho

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## Research Focus

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- I am an AI Robotics Research Scientist at Samsung Electronics, working on AI-driven humanoid whole-body control and interaction. My research builds upon my background in computer vision and human motion understanding, extending it toward learning-based humanoid whole-body control and interaction. I am broadly interested in reinforcement learning, generative AI, and robotics, with a focus on:
  - Humanoid whole-body motion generation and control
  - Vision-based imitation learning for humanoid behaviors
  - Humanoid-object interaction and manipulation
  - Sim-to-real transfer for humanoid systems

My long-term goal is to build generalizable humanoid agents capable of perceiving human environments and performing complex physical interactions in the real world.

## Work Experience

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- **Samsung Electronics, Future Robot AI Group** **Seoul, South Korea**  
*Research Scientist* (Manager: Donghan Koo) Aug 2025 - Present
  - Developed a real-time text-driven humanoid whole-body control framework (SafeFlow) combining physics-guided rectified flow matching with a 3-Stage Safety Gate, deployed on Unitree G1 for robust execution under open-ended and out-of-distribution text commands
  - Developed a vision-based pipeline for learning agile humanoid whole-body behaviors from human videos, including object interaction and manipulation, to acquire diverse motor skills from in-the-wild demonstrations
  - Developed a general-purpose RL-based motion tracking controller for whole-body teleoperation and downstream policy execution on real humanoid hardware
- **Meta Reality Labs, XR Input Perception** **Redmond, WA, USA**  
*Research Scientist Intern* (Manager: Cem Keskin) Jun 2024 - Dec 2024
  - Developed a cross-device generalization method for multi-view egocentric (inside-out) body tracking, enabling robust performance across varying camera extrinsics without device-specific calibration
- **Meta Reality Labs, Codec Avatars Lab** **Pittsburgh, PA, USA**  
*Research Scientist Intern* (Manager: Wei Pu) Dec 2023 - Feb 2024
  - Developed a custom detector for temporal alignment in a high-density multi-camera capture system, enabling frame-accurate synchronization for photorealistic neural avatar and 3D human reconstruction

## Education

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- **Korea Advanced Institute of Science and Technology (KAIST)** **Daejeon, Korea**  
*PhD in Electrical Engineering* (Advisor: Prof. Junmo Kim) Mar 2020 - Feb 2025  
Dissertation: High-Fidelity Human Body Model Reconstruction in Unconstrained Situations
- **Korea Advanced Institute of Science and Technology (KAIST)** **Daejeon, Korea**  
*MS in Electrical Engineering* (Advisor: Prof. Junmo Kim) Mar 2018 - Feb 2020  
Thesis: Improving Performance of Face Super-Resolution with Stochastic Attributes Modeling
- **Korea Advanced Institute of Science and Technology (KAIST)** **Daejeon, Korea**  
*BS in Electrical Engineering* Mar 2013 - Feb 2018

## Publications

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- SplitAdapter: Load-Aware Humanoid Loco-Manipulation via Factorized Adaptation  
Jeonguk Kang, **Hanbyel Cho**, Sanghyun Kang, Donghan Koo  
*arXiv Preprint*, 2026
- SafeFlow: Real-Time Text-Driven Humanoid Whole-Body Control via Physics-Guided Rectified Flow and Selective Safety Gating  
**Hanbyel Cho**, Sang-Hun Kim, Jeonguk Kang, Donghan Koo  
*arXiv Preprint*, 2026
- Controllable Feature Whitening for Hyperparameter-Free Bias Mitigation  
Yooshin Cho, **Hanbyel Cho**, Janghyeon Lee, Hyeong Gwon Hong, Jaesung Ahn, Junmo Kim  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2025
- Efficient Dynamic Scene Editing via 4D Gaussian-based Static-Dynamic Separation  
Joohyun Kwon\*, **Hanbyel Cho**\*, Junmo Kim (\*Equal contribution)  
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025
- Foreseeing Reconstruction Quality of Gradient Inversion: An Optimization Perspective  
Hyeong Gwon Hong, Yooshin Cho, **Hanbyel Cho**, Jaesung Ahn, Junmo Kim  
*The 38th Annual AAAI Conference on Artificial Intelligence (AAAI)*, 2024
- Generative Approach for Probabilistic Human Mesh Recovery using Diffusion Models  
**Hanbyel Cho**, Junmo Kim  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2023, *CV4Metaverse Workshop*
- Implicit 3D Human Mesh Recovery using Consistency with Pose and Shape from Unseen-view  
**Hanbyel Cho**, Yooshin Cho, Jaesung Ahn, Junmo Kim  
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023
- Video Inference for Human Mesh Recovery with Vision Transformer  
**Hanbyel Cho**, Jaesung Ahn, Yooshin Cho, Junmo Kim  
*IEEE International Conference on Automatic Face and Gesture Recognition (IEEE FG)*, 2023
- Localization using Multi-Focal Spatial Attention for Masked Face Recognition  
Yooshin Cho, **Hanbyel Cho**, Hyeong Gwon Hong, Jaesung Ahn, Dongmin Cho, Junmo Kim  
*IEEE International Conference on Automatic Face and Gesture Recognition (IEEE FG)*, 2023
- Rethinking Efficacy of Softmax for Lightweight Non-Local Neural Networks  
Yooshin Cho, Youngsoo Kim, **Hanbyel Cho**, Jaesung Ahn, Hyeong Gwon Hong, Junmo Kim  
*IEEE International Conference in Image Processing (ICIP)*, 2022
- Camera Distortion-aware 3D Human Pose Estimation in Video with Optimization-based Meta-Learning  
**Hanbyel Cho**, Yooshin Cho, Jaemyung Yu, Junmo Kim  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2021
- Improving Generalization of Batch Whitening by Convolutional Unit Optimization  
Yooshin Cho, **Hanbyel Cho**, Youngsoo Kim, Junmo Kim  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2021
- Stochastic Attribute Modeling for Face Super-Resolution  
**Hanbyel Cho**, Yekang Lee, Jaemyung Yu, Junmo Kim  
*arXiv Preprint*, 2020

## Skills

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- **Robotics & Control:** Humanoid Whole-body Control; Deep RL (PPO); Imitation Learning; Sim-to-Real Transfer; Diffusion Policy; Motion Tracking
- **Generative Models:** Diffusion Models; Flow Matching; Gaussian Splatting; NeRF
- **Computer Vision:** 3D Human Pose Estimation; 3D Human Mesh Reconstruction; Transformers; ConvNets; Egocentric Vision; LLMs; VLMs; PEFT
- **Programming:** Python, C++, PyTorch, ONNX, NumPy, MATLAB, LaTeX
- **Simulation & Hardware:** Isaac Gym; Isaac Sim/Lab; MuJoCo; OptiTrack MoCap; Unitree G1

## Academic Service

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- **Conference Reviewer:** CVPR, ICCV, ECCV, NeurIPS, BMVC, ACM-MM, ACCV
- **Journal Reviewer:** TIP, JVCI

## Awards & Scholarships

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- **Finalist, Qualcomm Innovation Fellowship Korea** Nov. 2023  
*Hosted by Qualcomm Korea, Inc.*  
Recognized for the first-authored paper titled: Implicit 3D Human Mesh Recovery using Consistency with Pose and Shape from Unseen-view (CVPR, 2023)
- **Excellent Presentation Award, CARAI Academic Workshop** Oct. 2023  
*Hosted by Center for Applied Research in Artificial Intelligence (CARAI)*
- **Finalist, Qualcomm Innovation Fellowship Korea** Nov. 2022  
*Hosted by Qualcomm Korea, Inc.*  
Recognized for the first-authored paper titled: Camera Distortion-aware 3D Human Pose Estimation in Video with Optimization-based Meta-Learning (ICCV, 2021)
- **Governmental Scholarship for KAIST Graduate Students** 2018 - 2024
- **Governmental Scholarship for KAIST Undergraduate Students** 2013 - 2017

## References

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- **Intern Manager:** Cem Keskin, Principal Research Scientist, Meta
- **Intern Manager:** Wei Pu, Engineering Manager, Meta
- **MS/PhD Advisor:** Junmo Kim, Professor, School of Electrical Engineering, KAIST