

RESEARCH INTERESTS

- **Computer Vision** - Crowd behavior generation, Vision-language models, Video diffusions
- **Robotics** - Trajectory prediction, Crowd dynamics modeling, Autonomous vehicle
- **Machine Learning** - Graph neural network, ML for computer vision, Deep learning

RESEARCH EXPERIENCE

Korea Culture Technology Institute

Postdoctoral Researcher (Military Obligation), Advisor: Prof. Jung Won Yoon
– Conversational Immersive Crowd Behavior Generation Using Large Language Models

Gwangju, S. Korea
Mar 2025 – Present

Carnegie Mellon University

Visiting Researcher, Advisor: Prof. Jean Oh
– Trajectory prediction based on pedestrian walking patterns, Bot Intelligence Group, The Robotics Institute

Pittsburgh PA, USA
Sep 2022 – Dec 2022

Daedong Industrial Co., Ltd.

Sponsored Researcher, Advisor: Dr. Jeong-hwa Yu
– Consignment research for autonomous driving rice transplanter and tractor using stereo camera, LiDAR and GPS

Daegu, S. Korea
Jan 2019 – Dec 2019

SONNET.ai

Software Engineer, Advisor: Dr. Joonwoo Son
– Autonomous cooperative driving team, focused on SLAM and 3D urban mapping with ROS and Autoware

Daegu, S. Korea
May 2019 – Sep 2019

Daegu Gyeongbuk Institute of Science and Technology

Full-time Intern, Advisor: Prof. Sunghyun Cho
– Image super-resolution, Visual Computing Lab, Departments of Information and Communication Engineering

Daegu, S. Korea
Summer 2018

Convergence Research Institute

Research Intern, Advisor: Dr. Soon Kwon
– Self-driving car technologies, Research Departments of Division of Automotive Technology, DGIST

Daegu, S. Korea
Winter 2017

PUBLICATIONS

- [1] C. Jeong, **I. Bae**, J.-H. Park, and H.-G. Jeon, “Test-time prompt tuning for zero-shot depth completion”, in *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, [Highlight], Oct. 2025.
- [2] **I. Bae**, J. Lee, and H.-G. Jeon, “Social reasoning-aware trajectory prediction via multimodal language model”, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, [IF=20.8], accepted, Jun. 2025.
- [3] **I. Bae**, J. Lee, and H.-G. Jeon, “Continuous locomotive crowd behavior generation”, in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2025.
- [4] J. Lee, C.-Y. Won, H. Jung, **I. Bae**, and H.-G. Jeon, “Fully explicit dynamic gaussian splatting”, in *The Thirty-Eighth Annual Conference on Neural Information Processing Systems (NeurIPS)*, Dec. 2024.
- [5] S. Park, **I. Bae**, S. Shin, and H.-G. Jeon, “Kinetic typography diffusion model”, in *Proceedings of the European Conference on Computer Vision (ECCV)*, Sep. 2024.
- [6] **I. Bae**, J. Lee, and H.-G. Jeon, “Can language beat numerical regression? language-based multimodal trajectory prediction”, in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2024.
- [7] **I. Bae**, Y.-J. Park, and H.-G. Jeon, “Singulartrajectory: Universal trajectory predictor using diffusion model”, in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2024.
- [8] J. Lee, H. Jung, J.-H. Park, **I. Bae**, and H.-G. Jeon, “Geometry-aware projective mapping for unbounded neural radiance fields”, in *Proceedings of the International Conference on Learning Representations (ICLR)*, May 2024.
- [9] **I. Bae**, J. Oh, and H.-G. Jeon, “Eigentrajjectory: Low-rank descriptors for multi-modal trajectory forecasting”, in *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, Oct. 2023.
- [10] J.-H. Park, J. Choe, **I. Bae**, and H.-G. Jeon, “Learning affinity with hyperbolic representation for spatial propagation”, in *Proceedings of the Fortieth International Conference on Machine Learning (ICML)*, Jul. 2023.
- [11] **I. Bae** and H.-G. Jeon, “A set of control points conditioned pedestrian trajectory prediction”, *Thirty-Seventh AAAI Conference on Artificial Intelligence (AAAI)*, [Oral presentation], Feb. 2023.
- [12] **I. Bae**, J.-H. Park, and H.-G. Jeon, “Learning pedestrian group representations for multi-modal trajectory prediction”, in *Proceedings of the European Conference on Computer Vision (ECCV)*, Oct. 2022.
- [13] **I. Bae**, J.-H. Park, and H.-G. Jeon, “Non-probability sampling network for stochastic human trajectory prediction”, in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2022.

- [14] **I. Bae** and H.-G. Jeon, “Disentangled multi-relational graph convolutional network for pedestrian trajectory prediction”, *Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI)*, Feb. 2021.
- [15] M. Oh, B. Cha, **I. Bae**, G. Choi, and Y. Lim, “An urban autodiving algorithm based on a sensor-weighted integration field with deep learning”, *Electronics*, vol. 9, no. 1, 2020.
- [16] **I. Bae**, M. Oh, B. Cha, Y. Lim, and G. Choi, “Deep learning based steering angle correction system using vanishing point for autonomous vehicle”, in *SOITmc*, Nagoya, Japan, 2019.
- [17] M. Oh, B. Cha, **I. Bae**, H. Choi, J. Cho, J. Jeong, K. Park, G. Koo, D. Choi, T. Kim, G. Shin, Y. Kim, J. Hwan, Y. Kim, G. Choi, and Y. Lim, “Adaptive urban auto-driving algorithm based on sensor weighted integration field”, in *The Fall Conference of Korea Automotive Safety Association*, Jeju, Korea, 2019.
- [18] **I. Bae**, B. Cha, M. Oh, H. Choi, J. Cho, J. Jeong, K. Park, G. Koo, D. Choi, T. Kim, G. Shin, Y. Kim, J. Hwang, Y. Kim, G. Choi, and Y. Lim, “Sparse spatial cnn for traffic lane recognition on urban road environments”, in *The Fall Conference of Korea Automotive Safety Association*, Jeju, Korea, 2019.
- [19] K. Park, G. Ko, Y. Kim, Y. Kim, T. Kim, **I. Bae**, G. Shin, M. Oh, J. Jeong, J. Cho, B. Cha, D. Choi, H. Choi, J. Hwang, G. Choi, and Y. Lim, “Development of collision-free path planning algorithm considering moving path of dynamic obstacles in artificial potential field for autonomous vehicles”, in *The Fall Conference of Korea Automotive Safety Association*, Jeju, Korea, 2019.
- [20] **I. Bae**, Y. Kim, T. Kim, M. Oh, H. Ju, S. Kim, G. Shin, S. Yoon, C. Lee, Y. Lim, and G. Choi, “Improved environment recognition algorithms for autonomous vehicle control”, *Journal of Auto-Vehicle Safety Association*, vol. 11, no. 1, pp. 35–43, 2019.
- [21] **I. Bae**, T. Kim, M. Oh, H. Ju, Y. Kim, Y. Lim, and G. Choi, “Improved environment recognition and integrated control algorithms for autonomous vehicle”, in *The Fall Conference of Korea Automotive Safety Association*, Wonju, Korea, 2018.

EDUCATION

Gwangju Institute of Science and Technology

Ph.D. in AI Graduate School, GPA: 4.5/4.5 (100/100), Advisor: Prof. Hae-Gon Jeon

– Dissertation: “Modeling Crowd Behaviors: From Representation to Understanding and Generation”

Gwangju, S. Korea

Sep 2021 – Feb 2025

Gwangju Institute of Science and Technology

M.S. in Electrical Engineering and Computer Science, GPA: 4.2/4.5 (96/100), Advisor: Prof. Hae-Gon Jeon

– Thesis: “Disentangled Multi-Relational Graph Convolutional Network for Pedestrian Trajectory Prediction”

Gwangju, S. Korea

Mar 2020 – Aug 2021

Daegu Gyeongbuk Institute of Science and Technology

B.E. in Convergence Engineering, GPA: 3.9/4.3 (95/100), Advisor: Prof. Gyeungho Choi and Prof. Yongseob Lim

– Thesis: “An Urban Autodiving Algorithm Based on a Sensor-Weighted Integration Field with Deep Learning”

Daegu, S. Korea

Mar 2016 – Feb 2020

Korea Advanced Institute of Science and Technology

Winter Sessions

Daejeon, S. Korea

Dec 2018 – Jan 2019

University of California, Berkeley

Summer Sessions

Berkeley CA, USA

Jul 2017 – Aug 2017

RESEARCH PROJECTS

Trajectory Prediction

Forecasting the spatial coordinates of agents exhibiting diverse dynamic behaviors

– (Computer vision, Robotics) Related publications: CVPR [1,3–4,10], ICCV [6], ECCV [9], AAAI [8,11]

Jan 2020 – Present

Vision and Language

Combining visual information with natural language processing

– (Computer vision) Related publications: ECCV'24 [3], CVPR'24 [4], Under-Review

May 2023 – Present

Machine Learning for CV

Leveraging ML techniques in computer vision applications

– (Machine learning) Related publications: CVPR'24 [5], ICML'23 [8], CVPR'22 [11]

May 2023 – Present

Geometric Cues

Hyperbolic geometry and stereographic projection for low-level vision and view synthesis

– (Computer vision) Related publications: NeurIPS'24 [2], ICLR'24 [6], ICML'23 [8], Under-Review

May 2021 – Present

Autonomous Driving

Hardware & software for autonomous vehicles in urban environments

– (Robotics) Related publications: Electronics [13], SOITmc [14], KASA [15–19]

Dec 2017 – Dec 2020

HONORS AND AWARDS

Awards

- Minister's award, Outstanding PhD Thesis Award at GIST (Top 1), Ministry of Science and ICT, Korea. Feb 2025
- Winner, 2024 Qualcomm Innovation Fellowship Korea, Qualcomm Technologies, Inc. Dec 2024
- Excellent Paper Award, International Workshop on Frontiers of Computer Vision (IW-FCV 2023), Yeosu Korea. Feb 2023
- Finalist, 2022 Qualcomm Innovation Fellowship Korea, Qualcomm Technologies, Inc. Nov 2022
- Bronze Prize, 27th HumanTech Paper Award, Samsung Electronics Co., Ltd. Feb 2021
- Excellence Prize, Oral Presentation Session, 1st Convergence University Academic Symposium, DGIST. Sep 2019
- Bronze Prize, International Autonomous Driving Competition, Competition on Korea Autonomous Driving Experiment City (K-City), Korea Transportation Safety Authority. Sep 2019
- First Prize, Best Bachelor Thesis Award, Part of Undergraduate Group Research Curriculum, DGIST. Jan 2019
- First Prize, International Student Green Car Competition, Autonomous Vehicle Technical Report, Korea Transportation Safety Authority & Korea Auto-Vehicle Safety Association. May 2018
- Bronze Prize, International Autonomous Driving Competition, Competition on Korea Autonomous Driving Experiment City (K-City), Korea Transportation Safety Authority. May 2018

Honors

- Outstanding Reviewer (Top 3%), International Conference on Computer Vision, Honolulu HI, USA. Oct 2025
- 2nd Place, RA Student Research Achievement Scholarship, AI Graduate School, GIST. Dec 2024
- Doctoral Colloquium, Korean Conference on Computer Vision (KCCV 2024), Busan Korea. Aug 2024
- Outstanding Reviewer (Top 2%), Conference on Computer Vision and Pattern Recognition, Seattle WA, USA. Jun 2024
- CVPR 2024 Doctoral Consortium, Supported by the U.S. National Science Foundation (NSF), Seattle WA, USA. Mar 2024
- 1st Place, RA Student Research Achievement Scholarship, AI Graduate School, GIST. Dec 2023
- 10th Sunseom Scholarship, Development Foundation, GIST. Nov 2023
- Outstanding Reviewer (Top 1.86%), International Conference on Computer Vision, Paris, France. Oct 2023
- Travel Scholarship Funding, AAAI-23 student scholarship and volunteer program, Association for the Advancement of Artificial Intelligence, Washington, DC, USA. Dec 2022
- 2nd Place, RA Student Research Achievement Scholarship, AI Graduate School, GIST. Dec 2022
- Overseas Internship Program Scholarship Funding, AI Graduate School, GIST. Sep 2022
- International Computer Vision Summer School (ICVSS 2022), Sicily, Italy. Jul 2022
- RA Student Academic Grade Scholarship, School of Electrical Engineering and Computer Science, GIST. Nov 2020
- World Friends ICT Volunteer, Education service of programming language (Python), Photoshop, and Video Editing, Volunteered in Can Tho University (CTU), Vietnam. Jul 2016 – Aug 2016

PATENTS

- [1] S. Park, H.-G. Jeon, **I. Bae**, and S. Shin, "Kinetic typography video generation system and control method thereof, and learning method of kinetic typography video generation system", *US Patent App. 19/366,853*, Oct. 2025.
- [2] H.-G. Jeon, J.-H. Park, and **I. Bae**, "Image convolutional method in hyperbolic space", *US Patent No. 12,417,613*, Sep. 2025.
- [3] H.-G. Jeon, J. Lee, H. Jung, J.-H. Park, and **I. Bae**, "Method and system for implementing radiance field using adaptive mapping function", *US Patent App. 19/002,445*, Dec. 2024.
- [4] H.-G. Jeon, **I. Bae**, and J. Lee, "Method and system for predicting trajectory using large language model", *US Patent App. 18/986,359*, Dec. 2024.
- [5] H.-G. Jeon, **I. Bae**, and Y.-J. Park, "Integrated trajectory estimation method and system based on generative model", *US Patent App. 18/982,956*, Dec. 2024.
- [6] S. Park, H.-G. Jeon, **I. Bae**, and S. Shin, "Kinetic typography video generation system and control method thereof, and learning method of kinetic typography video generation system", *KR Patent App. 10-2024-0149357*, Oct. 2024.
- [7] H.-G. Jeon, **I. Bae**, and J.-H. Park, "Pedestrian trajectory prediction method using grouping pedestrian", *KR Patent No. 10-2720638*, Oct. 2024.
- [8] H.-G. Jeon, J. Lee, H. Jung, J.-H. Park, and **I. Bae**, "Radiance field implementation method and system using adaptive mapping function", *KR Patent App. 10-2024-0044389*, Apr. 2024.
- [9] H.-G. Jeon, **I. Bae**, and Y.-J. Park, "Integrated trajectory estimation method and system based on generative model", *KR Patent App. 10-2024-0037757*, Mar. 2024.
- [10] H.-G. Jeon, **I. Bae**, and J. Lee, "Trajectory prediction method and system using a large language model", *KR Patent App. 10-2024-0037756*, Mar. 2024.
- [11] H.-G. Jeon and **I. Bae**, "Pedestrian trajectory prediction apparatus", *KR Patent No. 10-2591707*, Oct. 2023.
- [12] H.-G. Jeon and **I. Bae**, "Pedestrian trajectory prediction apparatus", *KR Patent No. 10-2537381*, May. 2023.
- [13] H.-G. Jeon, **I. Bae**, and J.-H. Park, "Pedestrian trajectory prediction method", *US Patent App. 18/174,716*, Feb. 2023.
- [14] H.-G. Jeon and **I. Bae**, "Pedestrian trajectory prediction method using trajectory descriptors representing actual walking patterns", *KR Patent App. 10-2023-0027247*, Feb. 2023.
- [15] H.-G. Jeon and **I. Bae**, "Pedestrian trajectory prediction apparatus", *US Patent App. 17/680,023*, Oct. 2022.
- [16] H.-G. Jeon, J.-H. Park, and **I. Bae**, "Image convolutional method in hyperbolic space", *KR Patent No. 10-2388760*, Apr. 2022.

- [17] H.-G. Jeon, **I. Bae**, and J.-H. Park, "Pedestrian trajectory prediction method using non-probability sampling", *KR Patent App. 10-2022-0032099*, Mar. 2022.

ACADEMIC SERVICES

Conference Reviewer

- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) - 2023, 2024 (**Outstanding Reviewer**), 2025
- IEEE/CVF International Conference on Computer Vision (ICCV) - 2023 (**Outstanding Reviewer**), 2025 (**Outstanding Reviewer**)
- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) - 2026
- IEEE International Conference on Robotics and Automation (ICRA) - 2024
- Conference on Neural Information Processing Systems (NeurIPS) - 2025
- Association for the Advancement of Artificial Intelligence (AAAI) - 2026
- European Conference on Computer Vision (ECCV) - 2024
- Asian Conference on Computer Vision (ACCV) - 2024

Journal Reviewer

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Intelligent Vehicles (T-IV)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
- IEEE Transactions on Intelligent Transportation Systems (T-ITS)
- IEEE Robotics and Automation Letters (RA-L)
- Pattern Recognition (PR)

Invited Talks

- Invited Talk, Chungnam National University Hospital, Dec 2025.
- Invited Seminar, DGIST, Nov 2025.
- Invited Talk, NAVER LABS Corp., Aug 2025.
- Invited Talk, GIST, July 2025.
- QIFK Winner Talk, Qualcomm Korea, Qualcomm Technologies, Inc., Jan 2025.
- Doctoral Colloquium, Korean Conference on Computer Vision (KCCV), Aug 2024.
- Review Seminar, Electronic & Information Research Information Center (EIRIC), May 2023.