

In-Chang Baek

A Game Artificial Intelligence Researcher
+82)10-9367-4907 | inchang.baek@gm.gist.ac.kr
scholar.inchang.dev | [github.inchang.dev](https://github.com/inchangdev)

SUMMARY

Passionate about pushing the boundaries of artificial intelligence (AI) within the gaming industry, I am actively immersed in the study of procedural content generation (PCG) technology. My primary objective is to leverage decision-making algorithms, particularly reinforcement learning, to enhance human creativity and optimize development workflows in creative activities. Beyond academia, I am driven by the prospect of translating theoretical research into tangible solutions for industry. Through collaborative efforts with industry partners and basic research initiatives, I endeavor to bridge the gap between theoretical exploration and real-world implementation in the gaming sector. Currently pursuing integrated M.S. and Ph.D. degrees at the AI Graduate School of Gwangju Institute of Science and Technology (GIST), my research interests span a broad spectrum of AI, encompassing reinforcement learning, procedural content generation, and general game AI.

Keyword: reinforcement learning, large language model, procedural content generation

EDUCATION

M.S.-Ph.D. in Gwangju Institution of Science and Technology (GIST) Artificial Intelligence Graduate School (Supervisor: Kyung-Joong Kim)	Gwangju, South Korea 2021 - Current
B.S. in Sejong University Computer Engineering (<i>Cum Laude</i>)	Seoul, South Korea 2017 - 2021

PUBLICATION

International

- [I12] S. Ahn, **I.-C. Baek**, K.-J. Kim, K. N. Truong, and J.-H. Hong, “ μ Cap: Instrumental Music Captions for Deaf and Hard-of-Hearing Individuals,” *ACM CHI Conference on Human Factors in Computing Systems (CHI '26)*, 2026 (Best Paper Award)
- [I11] I.-T. Jung, C.-H. Lee, **I.-C. Baek**, D.-I. Oh, Y.-J. Choi, K.-J. Kim, D.-J. Kong, and J.-H. Hong, “GPTalk: LLM-Based Virtual Companions for Metacognitive Growth in Self-Directed E-Learning Environments,” *International Journal of Human-Computer Studies*, p. 103754, 2026.
- [I10] **I.-C. Baek**, T.-H. Park, K.-J. Kim, “Seamless Tutorial: Contextual State Transition Generation Based on Player Internal Knowledge,” *IEEE Transactions on Games*, 2025
- [I9] E.-J. Kwon, S.-W. Oh, **I.-C. Baek**, Y.-C. Park, G.-B. Kim, J.-Y. Moon, Y.-H. Choi, and K.-J. Kim, “A Humanoid Visual-Tactile-Action Dataset for Contact-Rich Manipulation,” *IROS 2025 Workshop on Robotic Fine Manipulation: Integrating Tactile, Visual, and Intelligent Control*, 2025
- [I8] **I.-C. Baek***, S.-H. Kim*, Seo-Young Lee, Dong-Hyeun Lee, and K.-J. Kim, “IPCGR: Language-Instructed Reinforcement Learning for Procedural Level Generation,” *arXiv preprint arXiv:2503.12358*, 2025 (* Equal contribution, Under review at *IEEE Conference on Games (CoG)*)
- [I7] **I.-C. Baek**, T.-H. Park, J.-H. Noh, C.-M. Bae, and K.-J. Kim, “ChatPCG: Large Language Model-Driven Reward Design for Procedural Content Generation,” *2024 IEEE Conference on Games (CoG)*, 2024
- [I6] H.-C. Jeon*, **I.-C. Baek***, C.-M. Bae, T. Park, W. You, T. Ha, H. Jung, J. Noh, S. Oh, and K.-J. Kim, “RaidEnv: Exploring New Challenges in Automated Content Balancing for Boss Raid Games,” *IEEE Transactions on Games*, 2023 (* Equal contribution)
- [I5] **I.-C. Baek**, T.-G. Ha, T.-H. Park, and K.-J. Kim, “Toward Cooperative Level Generation in Multiplayer Games: A User Study in Overcooked!” *2022 IEEE Conference on Games (CoG)*, 2022
- [I4] **I.-C. Baek**, T.-H. Park, T.-G. Ha, and K.-J. Kim, “Turing Test Framework for Cooperative Games,” *2022 IEEE Conference on Games (CoG)*, 2022

- [I3] H.-T. Joo, **I.-C. Baek**, and K.-J. Kim, “A Swapping Target Q-value Technique for Data Augmentation in Offline Reinforcement Learning,” *IEEE Access*, vol. 10, 2022
- [I2] **I.-C. Baek** and K.-J. Kim, “Efficient Multi-Agent Reinforcement Learning Using Clustering for Many Agents,” *AIIDE-19 Workshop on Artificial Intelligence for Strategy Games*, 2019
- [I1] **I.-C. Baek** and K.-J. Kim, “Web-Based Interface for Data Labeling in StarCraft,” *IEEE Conference on Computational Intelligence and Games (CIG)*, 2018

Domestic

- [D5] J.-H. Noh, **I.-C. Baek**, S.-W. Oh, J.-Y. Moon, S.-M. Oh, and K.-J. Kim, “Object Characteristics Classification-Based State Representation Method for Match-3 Game playtesting,” *Korea Software Congress*, 2022
- [D4] B.-H. You, T.-G. Ha, T.-H. Park, **I.-C. Baek**, and K.-J. Kim, “Automatic Build of Large Game Maps from Small Concept Maps using Wave Function Collapse Algorithm,” *KIISE Transactions on Computing Practices*, 2022
- [D3] B.-H. You, T.-G. Ha, T.-H. Park, **I.-C. Baek**, and K.-J. Kim, “Automatic Build of Large Game Maps from Small Concept Maps using Wave Function Collapse Algorithm,” *Korea Software Congress*, 2022
- [D2] **I.-C. Baek**, T.-G. Ha, K. J. Kim, “An Evolutionary Approach for Procedural Content Generation in Cooperative Game Overcooked,” *Korea Software Congress*, 2021
- [D1] H. Park, Isaac Han, **I.-C. Baek**, and K.-J. Kim, “Physics-Based 3D Maze Game Environment for the Generalization of Deep Reinforcement Learning,” *Korea Software Congress*, 2021

Preprint

- [PP4] **I.-C. Baek***, J. Jung*, S.-H. Kim, G.-H. Hwang, and K.-J. Kim, “Multiverse: Language-Conditioned Multi-Game Level Blending via Shared Representation,” 2026 (Under review at *IEEE Conference on Games*) (* Equal contribution)
- [PP3] S.-H. Kim, G.-H. Hwang, **I.-C. Baek**, S.-Y. Lee, and K.-J. Kim, “Multi-Objective Instruction-Aware Representation Learning in Procedural Content Generation Reinforcement Learning,” 2026 (Under review at *IEEE Conference on Games*)
- [PP2] **I.-C. Baek**, S. Lee, S.-H. Kim, G. Hwang, and K.-J. Kim, “Human-Aligned Procedural Level Generation Reinforcement Learning via Text-Level-Sketch Shared Representation,” *arXiv preprint arXiv:2508.09860*, 2025 (Under review at *IEEE Transactions on Games*) (* Equal contribution)
- [PP1] **I.-C. Baek**, S.-H. Kim, S. Earle, Z. Jiang, J.-H. Noh, J. Togelius, and K.-J. Kim, “PCGRLLM: Large Language Model-Driven Reward Design for Procedural Content Generation Reinforcement Learning,” *arXiv preprint arXiv:2502.10906*, 2025 (Under revision at *IEEE Transactions on Games*)

Patent

- [PT1] K.-H. Kim, K.-J. Kim, D.-H. Park, T.-H. Park, **I.-C. Baek**, and W. S. You, “Apparatus and Method for Transforming Style of Sketch Image,” 2023

AWARDS, HONORS, AND SCHOLARSHIPS

Award: Best Paper Award (Top 1%), ACM CHI Conference on Human Factors in Computing Systems (2026)
Scholarship: 5 years, (M.S./Ph.D.) full funding & stipend (Mar 2021 - Current)
Scholarship: GIST Graduate International Research Experience Fellowship (GIST-IREF) (Aug 2024, \$6,200)
Award: The 2nd ChatGPT4PCG Competition, IEEE Conference on Games (Aug 2024, \$300)
Fund: GIST Innapolis Campus Program (Aug 2021, \$10,000)
Fund: GIST Sprint for Startup (GSS) Program (Aug 2021, \$5,000)
Fund: GIST Entrepreneurship Club Program (April 2021, \$2,000)
Travel Grant: Received travel grant for IEEE Computational Intelligence in Games (Aug 2018)
Scholarship: Received scholarship for academic excellence (Aug 2017, Aug 2018)

EXPERIENCE

KRAFTON AI Research Intern (LLM-based Agent Generation)	Aug 2025 - Oct 2025 <i>Seoul, South Korea</i>
Game Innovation Lab, New York University Joint Research on Game+LLMs (Director: Julian Togelius) [PP1]	Aug 2024 - Nov 2024 <i>New York, United States</i>
Game Innovation Lab, New York University Research Intern (Director: Julian Togelius)	Feb 2023 - Mar 2023 <i>New York, United States</i>
YP Labs Research Intern (Data analysis using BigQuery)	Jul 2020 - Aug 2020 <i>Seoul, South Korea</i>
Cognition and Intelligence Lab, Sejong University Undergraduate Research Intern (StarCraft AI Project)	Jun 2017 - Oct 2019 <i>Seoul, South Korea</i>
Pinnacle Investment Full-stack Web Developer	Mar 2017 - Jul 2020 <i>Seoul, South Korea</i>

RESEARCH PROJECTS

Development of a Generative AI-Based Human-Robot Collaboration Platform for the Advancement of Home Humanoid and Demonstration/Commercialization of Home Services <i>Korea Institute for Advancement of Technology (KIAT)</i>	Mar. 2025 – Current
<ul style="list-style-type: none">• Research on language-instructed RL for tactile-sensored robot agents	
Development of Artificial Intelligence-based Game Simulation Technology to Support Online Game Content Production <i>Korea Creative Content Agency (KOCCA), Ministry of Culture, Sports and Tourism</i>	Apr. 2022 – Dec. 2024
<ul style="list-style-type: none">• Development of Unity-based multiplayer game gymnasium environment [I6]• Research on LLM-driven reward generation and feedback for RL agents [I7]	
Human-centered Game AI Basic Research Lab <i>National Research Foundation of Korea (NRF)</i>	Jun. 2021 – Feb. 2024
<ul style="list-style-type: none">• Research on multiplayer game level generation using genetic algorithms [I5]• Research on puzzle level generation for game tutoring, crowd-sourcing user study [PP1]	
Development of Artificial Intelligence Players for Puzzle Game Automated Testing <i>PuzzleOne Studio (Industry-academia Project, *In-charge-of)</i>	May. 2022 – Jan. 2023
<ul style="list-style-type: none">• Development of gymnasium-based game simulator for a commercial puzzle game [D5]• Research on RL agents with categorical state representations for game playtesting [D5]	
Development of Content Creation and Entertainment Technologies based on Intelligent Authoring Tool to Enhance Accessibility of Social Communication Disabilities <i>Korea Creative Content Agency (KOCCA), Ministry of Culture, Sports and Tourism</i>	Mar. 2021 – Dec. 2021
<ul style="list-style-type: none">• Generative model (GAN) deployment and authoring tool development for disabilities [PT1]	
A Study on the Latest Reinforcement Learning-Based Path Planning Techniques <i>Agency for Defense Development (ADD)</i>	Mar. 2021 – July. 2021
<ul style="list-style-type: none">• Development of RL-based driving agent and simulator development	

ACADEMIC SERVICES

Invited Participant: Dagstuhl Seminar 25292 — New Frontiers in AI for Game Design (Jul 13–18, 2025)
Reviewer: IEEE Conference on Games (CoG), IEEE Transactions on Games (ToG), AAAI Conference on Artificial Intelligence (AAAI)