DOOYOUNG KIM Senior Researcher (PhD)

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SUMMARY

- A Senior Researcher (PhD) with a vision to connect people beyond space and time through the development of next-generation immersive platforms. Key qualifications include:
  - **Research Excellence:** Demonstrated a strong research record with over **25 publications** in top-tier journals and conferences, in addition to **7 patents**. This work is highlighted by receiving the **Two Best Paper Awards (Top 1%)** at IEEE ISMAR 2025 and the **Best Conference Paper Award (1st Prize)** at IEEE ISMAR 2024.
  - **Proven Leadership:** Serving as **Co-PI** on a Meta-Object project (**$3M national R&D grant, IITP)** and as the **System Integration Manager** for a OpenXR platform (**$6M national R&D grant, NST**).
  - **Global Collaboration & Service:** Pioneering the "**XRMemory**" concept (currently serving as **Lead Guest Editor** for its special issue in Springer VR journal), leading international collaborations (**KAIST-NYU Meta-Museum**), and serving as **chair/organizer** for premier conferences like IEEE ISMAR/VR.
  - **Technical Expertise:** Highly skilled in **Spatial AI, HCI, 3D Interaction, XR prototyping** (HoloLens2, Quest3, etc.), with a focus on spatial computing, visual perception, spatio-temporal experience, and human-subject experiments.

EDUCATION

PhD in Culture Technology (AR/VR)

KAIST 03/2021 – 02/2024

- Thesis: Space-Adaptive Mutual Space Generation for Mixed Reality Remote Collaboration
- Research Topics: AR, VR, HCI, computer graphics, remote collaboration, spatial AI, visual perception, and VR locomotion
- UVR Lab. | Advisor: Prof. Woontack Woo

Master in Culture Technology (AR/VR)

KAIST 03/2019 – 02/2021

- Thesis: Adjusting Relative Translation Gains According to Space Size in Redirected Walking for Mixed Reality Mutual Space Generation
- Research Topics: AR, VR, HCI, remote collaboration, visual perception, and VR locomotion.
- UVR Lab. | Advisor: Prof. Woontack Woo
- Visiting Research (2020) : Imagine Lab, Ecole des Ponts ParisTech, Paris, France | Advisor: Prof. Vincent Lepetit

Bachelor in Mechanical Engineering

KAIST 03/2014 – 02/2019

- Exchange Student: Tsinghua University, Beijing, China
- Lab Intern: @Hubo Lab – Humanoid Robot (2017), @UVR Lab – AR/VR (2018)

RESEARCH PROJECTS

Meta-Museum

NYU-KAIST Collaborative Research Grant 01/2025 – Present

- Topic: Tele-experience system for meta-museum between Daejeon (Korea) and New York (US) | Spatial AI, XR Experience
- Role: Project Leader, KAIST-NYU Collaborative Research, Collaborating with NYU Future Reality Lab (Ken Perlin).

Meta-Object

Korea Government (IITP) Funded National Research Project 04/2024 – Present

- Topic: Real-time XR interface technology for environmental adaption | Object Modeling, Multimodal Feedback, Intelligent Platform
- Role: **Co-Principal Investigator (Co-PI)**. Led the successful grant proposal securing **$3M in funding**. Currently directing 40 researchers across 8 multi-disciplinary teams by defining the project's core vision and technical roadmap.

OpenXR: TranSpace 3.0

Korea Government (NST) Funded National Research Project 12/2021 – Present

- Topic: Development of untact realitic OpenXR remote collaboration platform technology | Spatial AI, Interaction, Avatar, Social Presence
- Role: System Integration Manager. Currently serving as the system implementation lead for the KAIST research team. $6M over 6 years

TranSpace 2.0

Korea Government (NRF) Funded National Research Project 09/2019 – 12/2020

- Topic: Development of user restoration technology for ultra-realistic remote virtual interaction | MR Telepresence, Avatar, Locomotion
- Role: Research Assistant - AR/VR remote collaboration system development, VR locomotion technology research

National R&D Real Challenge

Korea Government (KIRD) Funded National Research Project 04/2020 – 12/2020

- Topic: Reinforcement of visual cognitive abilities for AR-VR Mixed Reality remote collaboration | MR Telepresence, Perception
- Role: Research Assistant - Research on visual perception in VR remote collaboration scenario

EXPERIENCES

Senior Researcher

KAIST & New York University 2024 - Present

- Acting as a Co-PI on the $3M 'Meta-Object' national project and as the System Integration Manager for the $6M 'OpenXR' platform.
- Leading an international collaboration with NYU's Future Reality Lab (Ken Perlin) on the 'Meta-Museum' initiative as a visiting researcher.
- Supervising 7 graduate students, resulting in multiple publications at top-tier venues including IEEE TVCG and IEEE VR.

Global Shaper

World Economic Forum 01/2023 – Present

- Global Shapers Community is an initiative of the World Economic Forum, it is a network of hubs developed and led by young people who are exceptional in their potential, their achievements and their drive to make a difference in their communities.
- Founding Curator of Daejeon Hub, Vice Curator (2023-2024)

AR/VR Researcher

Korea Institue of Science and Technology Information (KISTI) 05/2022 – 03/2023

- As a dispatched researcher, I conducted joint research with KAIST and the Korea Institute of Science and Technology Information (KISTI) on the government-funded "OpenXR: Untact Realistic Platform Technology" project.

ZER10NE Creator & Alumni

Hyundai Motors Group (HMG) 04/2021 – 11/2022

- ZER01NE is a creator-supporting program funded by the HMG and I was selected as AR/VR researcher.
  - [1] Automatic SONATA: Scenery Style-Transfer System for Autonomous Vehicle (2021).
  - [2] Holo-bot: XR Social Interface Robot with Holographic Avatar (2022).

REFEREED PUBLICATIONS

🏆 Viewpoint-Tolerant Depth Perception for Shared Extended Space Experience on Wall-Sized Display

2025 IEEE Transactions on Visualization and Computer Graphics - Best Paper Award @ISMAR2025 (Top 1%)

****Dooyoung Kim****, Jinseok Hong, Heejeong Ko, and Woontack Woo

🏆 Visuo-Tactile Feedback with Hand Outline Styles for Modulating Affective Roughness Perception

2025 IEEE Transactions on Visualization and Computer Graphics - Best Paper Award @ISMAR2025 (Top 1%)

Minju Baeck, Yoonseok Shin, ****Dooyoung Kim****, Hyunjin Lee, Sang Ho Yoon, and Woontack Woo (Co-advised student first author)

Spatio-Temporal Mixed and Augmented Reality Experience Description for Interactive Playback

2025 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)

****Dooyoung Kim**** and Woontack Woo

RealityCrafter: User-guided Editable 3D Scene Generation from a Single Image in Mixed Reality

2025 ACM Symposium on User Interface Software and Technology Adjunct (UIST-Adjunct)

Seokyoung Kim, ****Dooyoung Kim****, Taejun Son, and Woontack Woo (Co-advised student first author)

Meta-Objects: Interactive and Multisensory Virtual Objects Learned From the Real World for Use in Augmented Reality

2025 IEEE Computer Graphics and Applications

****Dooyoung Kim****, Taewook Ha, Jinseok Hong, Seonji Kim, Selin Choi, Heejeong Ko, and Woontack Woo

An Overview of the 1st International Workshop on Spatial Memory in XR: The Future of Memory Capture and Replay Through XR and AI (XRMemory)

2025 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)

****Dooyoung Kim****, Kangsoo Kim, Claudio T Silva, Qi Sun, Dishita Turakhia, Zhu Wang, Keru Wang, Ken Perlin, Steven Feiner, Woontack Woo

Human-Scene Interaction Data Generation with Virtual Environment using User-Centric Scene Graph

2025 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)

Taewook Ha, Selin Choi, Seonji Kim, ****Dooyoung Kim****, and Woontack Woo (Co-advised student first author)

🏆 Spatial Affordance-aware Interactable Subspace Allocation for Mixed Reality Telepresence

2024 IEEE International Symposium on Mixed and Augmented Reality (ISMAR) - Best Conference Paper Award @ISMAR2024 (1st Prize)

****Dooyoung Kim****, Seonji Kim, Selin Choi, and Woontack Woo

Object cluster registration of dissimilar rooms using geometric spatial affordance graph to generate shared virtual spaces

2024 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)

Seonji Kim, ****Dooyoung Kim****, Jae-eun Shin, and Woontack Woo (Co-advised student first author)

Edge-Centric Space Rescaling with Redirected Walking for Dissimilar Physical-Virtual Space Registration

2023 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)

****Dooyoung Kim**** and Woontack Woo

Exploration of the virtual reality teleportation methods using hand-tracking, eye-tracking, and EEG

2023 International Journal of Human-Computer Interaction

Jinwook Kim, Hyunyoung Jang, ****Dooyoung Kim****, and Jeongmi Lee

🥇 **The effects of spatial configuration on relative translation gain thresholds in redirected walking**
2023 Springer Virtual Reality - Best Presentation Award @APMAR2022

****Dooyoung Kim****, Seonji Kim, Jae-eun Shin, Boram Yoon, Jinwook Kim, Jeongmi Lee, and Woontack Woo

Effects of avatar transparency on social presence in task-centric mixed reality remote collaboration
2023 IEEE Transactions on Visualization and Computer Graphics

Boram Yoon, Jae-eun Shin, Hyung-il Kim, Seoyoung Oh, ****Dooyoung Kim****, and Woontack Woo

Mutual space generation with redirected walking for asymmetric remote collaboration
2023 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)

****Dooyoung Kim****

Holobot: Hologram based extended reality telepresence robot
Companion of the 2023 ACM/IEEE International Conference on Human-Robot Interaction

Jinwook Kim, ****Dooyoung Kim****, Bowon Kim, Hyunchul Kim, and Jeongmi Lee

The effects of device and spatial layout on social presence during a dynamic remote collaboration task in mixed reality
2022 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)

Jae-eun Shin, Boram Yoon, ****Dooyoung Kim****, Hyung-il Kim, and Woontack Woo

Mutual space generation with relative translation gains in redirected walking for asymmetric remote collaboration
2022 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)

****Dooyoung Kim****, Hyung-il Kim, and Woontack Woo

The effects of spatial complexity on narrative experience in space-adaptive ar storytelling
2022 IEEE Transactions on Visualization and Computer Graphics

Jae-eun Shin, Boram Yoon, ****Dooyoung Kim****, and Woontack Woo

Effects of Virtual Room Size and Objects on Relative Translation Gain Thresholds in Redirected Walking
2022 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)

****Dooyoung Kim****, Jinwook Kim, Jae-eun Shin, Boram Yoon, Jeongmi Lee, and Woontack Woo

Art Rich: Place Your AR Artwork
2022 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)

Jieon Du, Sohyun Park, Joosun Yum, Zeynep Özge Özdemir, ****Dooyoung Kim****, Seo Young Oh, Sang Ho Yoon

Bring store in my room: AR store authoring system for spatial experience in mobile shopping
2022 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)

Seonji Kim, Hyuckjin Jang, Kyung Taek Oh, Seo Young Oh, ****Dooyoung Kim****, Woontack Woo, Jeongmi Lee, Jaehong Ahn, Sang Ho Yoon

CARDS: Comprehensive AR Docent System
2022 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)

Seung Un Lee, Jiyoung Yun, Dain Kim, ****Dooyoung Kim****, Seo Young Oh, Sang Ho Yoon

Multi-scale mixed reality collaboration for digital twin
2021 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)

Hyung-Il Kim, Taehei Kim, Eunhwa Song, Seo Young Oh, ****Dooyoung Kim****, Woontack Woo

🥇 **A user-oriented approach to space-adaptive augmentation: The effects of spatial affordance on narrative experience in an augmented reality detective game**
2021 CHI Conference on Human Factors in Computing Systems - Honorable Mention Award @CHI2021

Jae-eun Shin, Boram Yoon, ****Dooyoung Kim****, Woontack Woo

Adjusting Relative Translation Gains According to Space Size in Redirected Walking for Mixed Reality Mutual Space Generation
2021 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)

****Dooyoung Kim****, Jae-eun Shin, Jeongmi Lee, and Woontack Woo

PATENTS & STANDARDIZATION

(KR) Spatial Extension Using Human Stereoscopic Perception with a Large Wall Display. Filed.

(KR) A System for Real-time Affordance Visualization and Interaction with Meta-Objects based on Dynamic User Context. Filed.

(KR) Object Cluster Registration of Dissimilar Rooms Using Geometric Spatial Affordance Graph to Generate Shared Virtual Spaces. Filed.

(KR) Method of Operating Mixed Reality Telepresence System and Mixed Reality Telepresence System. Issued.

(KR/US) Edge-Centric Space Rescaling Method for Dissimilar Space Registration and the System Thereof. Filed.

(KR/PCT) Method and System for Generating Remote Collaboration Mutual Space. Issued.

(KR/US) Virtual Reality Space Adjusting Method with Relative Translation Gain in Redirected Walking and the System Thereof. Issued.

[Standardization] Spatio-Temporal Mixed and Augmented Reality Experience Description (MAR-ED) for Adaptive Playback, Approval of Preliminary Work Item (PWI) in the 2025 ISO/IEC JTC 1/SC 24 International Standardization Meeting.

AWARDS & SCHOLORSHIPS

Two Best Paper Awards (Top 1%)
2025 International Symposium on Augmented and Mixed Reality (ISMAR) 10/2025

NYU-KAIST Postdoc Collaboration Grant
New York University (NYU) 01/2025

Best Conference Paper Award (1st Prize)
2024 International Symposium on Augmented and Mixed Reality (ISMAR) 10/2024

KAIST Start-up Scholarship
KAIST Alumni Academic Scholarship Foundation 03/2023

APMAR Best Presentation Award
2022 Asia-Pacific Workshop on Mixed and Augmented Reality (APMAR) 12/2022

NCSOFT PhD Scholarship
2022 NCSOFT (Game Development Company) 04/2022

ACM CHI Honorable Mention Award
2021 ACM CHI Conference 05/2021

ACADEMIC ACTIVITIES

International Conference/Symposium Organizing & Chairing
- 2025 IEEE ISMAR, Organizing Committee (Assistant for General Chair & Social Event Chair)
- 2025 IEEE ISMAR, XRMemory'25 Workshop Principal Organizer | XRWorks'25 Workshop Organizer | XRStand Workshop IPC
- 2025 3rd International Symposium on Meta-AI for X (ISMAX), Organizer & Program Chair
- 2025 IEEE VR, 1st XRMemory Workshop Principal Organizer
- 2025 HCI Korea Conference, MetaMuseum Workshop Organizer
- 2024 Korea Computer Congress (KCC), Poster Chair (CG & Interaction) & Metaverse+AI+XR Workshop Organizer
- 2024 Korea Software Congress (KSC), Poster Chair (CG/HCI/AI/Metaverse/AR/VR)
- 2024 2nd International Symposium on Meta-AI for X (ISMAX), Organizer & Web Chair
- 2023 1st International Symposium on Meta-AI for X (ISMAX), Organizer & Student Chair

Invited Talks
- 2024 Korea Computer Congress (KCC), Top-Conference Session
- 2024 University of Minnesota (Prof. Victoria Interrante), Redirected Walking & Spatial AI
- 2023 Korea Computer Congress (KCC), Top-Conference Session
- 2023 Korea Software Congress (KSC), Top-Conference Session
- 2023 HCI Korea Conference, Metaverse Research and Development Session
- 2022 ACM SIGGRAPH Asia Conference, OpenXR BoF Session
- 2022 Asia-Pacific Workshop on Mixed and Augmented Reality (APMAR), Pitch-Your-Work Session

International Program Committee (IPC) & Guest Editor & Peer-Review
- Lead Guest Editor - Special Issue on "XRMemory" in Springer Virtual Reality Journal (IF: 5.0)
- IEEE ISMAR - 2025 (IPC), 2024, 2023, 2022, 2021
- IEEE VR - 2026 (IPC), 2025 (IPC), 2024, 2023, 2022
- ACM VRST - 2025 (IPC), 2024 (IPC)
- ACM CHI - 2026, 2025, 2024, 2023
- ACM CSCW - 2024
- IEEE/ACM HRI - 2023

COMMUNITY & OUTREACH EDUCATION

Multi-User Game Development with Unity
KAIST Center for Gifted Education 03/2022 - 12/2022

- Authored two complete sets of original course materials, including textbooks and practical exercises, for separate summer and winter programs on multi-user game development with Unity.
- Designed and instructed the online course for gifted middle school students, teaching foundational concepts in network programming.

Python Coach
NAVER 07/2021 - 08/2021

- Provided online coaching and mentorship for students in the 'PY4E' (Python for Everybody) foundational programming course.
- Graded weekly assignments and managed the academic progress for a cohort of learners, providing targeted feedback.

VR Content Creation with Quest2
Arko Museum 10/2021 - 12/2021

- Led a weekly workshop on VR content creation for media artists, teaching foundational Unity skills for the Meta Quest 2.
- Provided technical mentorship to artists, helping them translate their creative concepts into interactive VR experiences.

UNIVERSITY INSTRUCTION & MENTORSHIP

Graduate Course Co-Instructor

KAIST Graduate School of Culture Technology / Graduate School of Metaverse 2022 - Present

- Co-led project-based graduate courses including:
  - 2025 ARP700: AR project mentoring, Lecture about Spatial AI & XRMemory
  - 2024 ARP700: AR project mentoring, Lecture about XR & Spatial Computing
  - 2024 MV600: AR/Metaverse project mentoring, Lecture about MR telepresence
  - 2023 CTP445:AR basic knowledge, hosting discussion sessions, SLAM with OpenCV
  - 2022 GCT555: Unity & AR/VR teaching for graduate school students - Hololens2, MRTK with Unity
  - 2022 CTP445: Unity & AR/VR teaching for graduate school students - Smartphone, ARCore with Unity

Graduate Student Mentorship

KAIST Graduate School of Culture Technology / Graduate School of Metaverse 2023 - Present

- **Seonji Kim, PhD Student in Culture Technology** 2023 - Present
  - Research Topics: Spatial AI, AR/VR, 3D scene understanding, space matching, MR telepresence
  - Outcome:
    - Co-authored a paper that received the Best Conference Paper Award at IEEE ISMAR 2024
    - First-authored a paper accepted to IEEE VR 2024
    - First-authored a poster paper accepted to IEEE ISMAR 2022
    - First author manuscript currently under review at IEEE VR 2026

- **Selin Choi, PhD Student in Culture Technology** 2023 - Present
  - Research Topics: Spatial AI, AR/VR, scene understanding, MR scene recording
  - Outcome:
    - Co-authored a paper that received the Best Conference Paper Award at IEEE ISMAR 2024
    - First author a manuscript currently under review at IEEE VR 2026

- **Jinseok Hong, PhD Student in Metaverse** 2024 - Present
  - Research Topics: Spatial AI, AR/VR, LLM, authoring, scene understanding
  - Outcome:
    - Co-authored a paper accepted to IEEE TVCG 2025

- **Minju Baeck, PhD Student in Culture Technology** 2024 - Present
  - Research Topics: Multimodal feedback, AR/VR, affective computing, perception, HCI
  - Outcome:
    - First-authored a paper accepted to IEEE TVCG 2025

- **Taewook Ha, PhD Student in Culture Technology** 2024 - Present
  - Research Topics: Spatial AI, AR/VR, computer vision, 3D scene reconstruction, 3D scene understanding
  - Outcome:
    - First-authored a poster paper accepted to IEEE ISMAR 2025
    - First author a manuscript currently under review at IEEE VR 2026

- **Seokyoung Kim, MS Student in Metaverse** 2024 - Present
  - Research Topics: Spatial AI, AR/VR, computer vision, 3D scene reconstruction, 3D scene understanding
  - Outcome:
    - First-authored a poster paper accepted to ACM UIST 2026
    - First author two manuscripts currently under review at IEEE VR 2026

- **Heejeong Ko, MS Student in Culture Technology** 2024 - Present
  - Research Topics: Spatial AI, AR/VR, event detection, 3D scene understanding, adaptive playback
  - Outcome:
    - Co-authored a paper accepted to IEEE TVCG 2025
    - First-author a paper accepted to HCI Korea 2025

Undergraduate Student Mentorship

KAIST School of Electronic and Electrical Engineering 2021

- **Minwoo Song, BS in Electrical Engineering** (2021)
  - Research Project: VR, computer graphics, visualization
  - Outcome: First-author a paper accepted to Korea Software Congress 2021