HYUNG-IL KIM

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Daejeon 34141, Republic of Korea
291 Daehak-ro, Yuseong-gu

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST) Mar 2016 - Aug 2023
Ph.D. Candidate (Advisor: Woontack Woo)
Graduate School of Culture Technology
Thesis: Integrating Wearable Muscle Sensing for Hand-based Interactions in Mixed Reality

Korea Advanced Institute of Science and Technology (KAIST) Mar 2014 - Feb 2016
M.S. (Advisor: Woontack Woo)
Graduate School of Culture Technology
Thesis: Smartwatch-assisted Robust 6-DOF Hand Tracking System for HMD-based Augmented Reality

Korea Advanced Institute of Science and Technology (KAIST) Feb 2009 - Feb 2014
B.S. (Advisor: In So Kweon)
School of Electrical Engineering

RESEARCH INTERESTS

Augmented Reality, 3D User Interfaces, Wearable Computing, Ubiquitous Virtual Reality

TECHNICAL STRENGTHS

Computer Languages	C#, C++, Python, MATLAB, Java, R
Software & Tools	Unity, LaTeX, Arduino, Visual Studio, OpenCV

RESEARCH EXPERIENCE

KAIST UVR Lab. Mar 2014 - Present
Graduate Researcher *Daejeon, Korea*

· Researching the enhancements for hand-based interactions in AR/VR using wearable devices, including smartwatch and wearable EMG sensors.
· Researching collaborative systems for multi-user AR/VR environments.

Empathic Computing Lab Sep 2018 - Nov 2018
Visiting Researcher *Adelaide, Australia*

· Investigated different avatar appearances on users' perception in a collaborative AR environment.
· Developed AR user interfaces based on wearable sensor fusion.

KAIST UVR Lab. Jan 2014 - Feb 2014
Research Intern *Daejeon, Korea*

· Developed and implemented a gesture-based freehand virtual sculpting system in augmented reality using an egocentric RGB-D camera.

KAIST RCV Lab. Jan 2014 - Feb 2014
Undergraduate Researcher *Daejeon, Korea*

· Developed and implemented a velocity-aware touch interface using an RGB-D sensor, which gives touchpoints and instant touch velocity for each touchpoint. The result can be used for controlling intensity for musical applications like a piano.

PROJECTS

Human Reconstruction for Telepresent Interaction Sep 2017 - Dec 2020
Supported by National Research Foundation

· Developing an integrated remote collaboration system, which tracks users' motion and brings multiple users in common virtual space. Also developing a system to improve the performance of human arm/hand tracking using wrist-worn IMU sensor information.

Geometry-aware Interactive AR Authoring Using a Smartphone in a 3D Glass Environment Jul 2016 - Apr 2017
Supported by National Research Foundation

· Developed interactive in-situ AR authoring system using Microsoft HoloLens and Unity, using a smartphone as a hand-held controller.

Hand-Augmented Object Interaction and Collaboration Technology in HMD-based Coexistence Reality Sep 2014 - Jun 2016
Supported by National Research Foundation

· Implemented hand gesture-based object manipulating application using Unity. Developed 6DOF free-hand object manipulation system for AR HMD, using egocentric RGB-D camera with wrist-worn smartwatch device.

PUBLICATIONS

Hyung-il Kim, Boram Yoon, Seo Young Oh, Woontack Woo, "Visualizing Hand Force with Wearable Muscle Sensing for Enhanced Mixed Reality Remote Collaboration," IEEE Transactions on Visualization and Computer Graphics, special issue *IEEE ISMAR*, 2023 (Accepted)

Boram Yoon, Jae-eun Shin, **Hyung-il Kim**, Seo Young Oh, Dooyoung Kim, Woontack Woo, "Effects of Remote Avatar Transparency on Social Presence in Task-centric Mixed Reality Remote Collaboration," IEEE Transactions on Visualization and Computer Graphics, special issue *IEEE ISMAR*, 2023 (Accepted)

Hui-Shyong Yeo, Erwin Wu, Daehwa Kim, Juyoung Lee, **Hyung-il Kim**, Seo Young Oh, Luna Takagi, Woontack Woo, Hideki Koike, and Aaron J Quigley. 2023. "OmniSense: Exploring Novel Input Sensing and Interaction Techniques on Mobile Device with an Omni-Directional Camera," In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23), April 2328, 2023, Hamburg, Germany. ACM, New York, NY, USA, 18 pages, doi: 10.1145/3544548.3580747

Jae-eun Shin, Boram Yoon, Dooyoung Kim, **Hyung-il Kim** and Woontack Woo, "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), Singapore, 2022, pp. 394-403, doi: 10.1109/ISMAR55827.2022.00055

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), 2022, pp. 674-677, 10.1109/ISMAR-Adjunct57072.2022.00140

Hyung-il Kim, Taehei Kim, Eunhwa Song, Seo Young Oh, Dooyoung Kim and Woontack Woo, "Multi-scale Mixed Reality Collaboration for Digital Twin," 2021 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct), 2021, pp. 435-436, doi: 10.1109/ISMAR-Adjunct54149.2021.00098

Boram Yoon, **Hyung-il Kim**, Seo Young Oh and Woontack Woo, "Evaluating Remote Virtual Hands Models on Social Presence in Hand-based 3D Remote Collaboration," 2020 IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Virtual, 2020, pp. doi: 10.1109/ISMAR50242.2020.00080

Seo Young Oh, Boram Yoon, **Hyung-il Kim**, and Woontack Woo. 2020. "Finger Contact in Gesture Interaction Improves Time-domain Input Accuracy in HMD-based Augmented Reality," In Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems (CHI EA '20). Association for Computing Machinery, New York, NY, USA, 18. doi: 10.1145/3334480.3383098

Jae-eun Shin, Hayun Kim, Callum Parker, **Hyung-il Kim**, Seo Young Oh and Woontack Woo, "Is Any Room Really OK? The Effect of Room Size and Furniture on Presence, Narrative Engagement, and Usability During a Space-Adaptive Augmented Reality Game," 2019 IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Beijing, China, 2019, pp. 135-144, doi: 10.1109/ISMAR.2019.00-11.

Hui-Shyong Yeo, Juyoung Lee, **Hyung-il Kim**, Aakar Gupta, Andrea Bianchi, Daniel Vogel, Hideki Koike, Woontack Woo, and Aaron Quigley. 2019. "WRIST: Watch-Ring Interaction and Sensing Technique for Wrist Gestures and Macro-Micro Pointing. In Proceedings of the 21st International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI '19)." Association for Computing Machinery, New York, NY, USA, Article 19, 115. DOI: 10.1145/3338286.3340130.

Boram Yoon, **Hyung-il Kim**, Gun A. Lee, Mark Billinghurst and Woontack Woo, "The Effect of Avatar Appearance on Social Presence in an Augmented Reality Remote Collaboration," 2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), Osaka, Japan, 2019, pp. 547-556, doi: 10.1109/VR.2019.8797719.

Hyung-il Kim, Juyoung Lee, Hui-Shyong Yeo, Aaron Quigley, and Woontack Woo. "Swag demo: smart watch assisted gesture interaction for mixed reality head-mounted display," In Adjunct Proceedings of the IEEE International Symposium for Mixed and Augmented Reality 2018. 2018.

Jeongmin Yu, Jinwoo Jeon, Jinwoo Park, Gabyong Park, **Hyung-il Kim**, Woontack Woo, "Geometry-Aware Interactive AR Authoring Using a Smartphone in a Wearable AR Environment," HCI International 2017, Jul. 2017. doi: 10.1007/978-3-319-58697-7_31

Jeongmin Yu, Jin-u Jeon, Gabyong Park, **Hyung-il Kim**, Woontack Woo, "A Unified Framework for Remote Collaboration Using Interactive AR Authoring and Hands Tracking," HCI International 2016, Jul. 2016. doi: 10.1007/978-3-319-39862-4_13

Hyung-il Kim, Woontack Woo, "Smartwatch-assisted Robust 6-DOF Hand Tracking System for Object Manipulation in HMD-based Augmented Reality," IEEE Symposium on 3D User Interfaces (3DUI) 2016, pp.249-250, Mar. 2016. doi: 10.1109/3DUI.2016.7460065 **(People's Choice Award)**

Sung-A Jang, **Hyung-il Kim**, Woontack Woo, Graham Wakefield, "AiRSculpt: A Wearable Augmented Reality 3D Sculpting System, HCI International 2014, Jun. 2014. doi: 10.1007/978-3-319-07788-8_13

HONORS AND AWARDS

Best Implementation Award October 2022
MobileHCI 2022 Student Design Competition

Honorable Mention Award October 2016
1st Asian Workshop on User Interface (AUI 2016)

Honorable Mention Award April 2016
Asia-Pacific Workshop on Mixed Reality (APMR) 2016

People's Choice Poster Award March 2016
IEEE Symposium on 3D User Interfaces (3DUI) 2016

National Science and Engineering Undergraduate Scholarship 2009 - 2013
Granted by Korea Student Aid Foundation

ACADEMIC SERVICE

Reviewer
CHI 2019, CHI 2019 LBW, IEEE VR 2019, CHI PLAY 2019 WIP, IEEE VR 2020, CHI 2020 LBW, DIS 2020, SIGGRAPH Asia Emerging Technologies 2020, IEEE VR 2022, ISMAR 2022 Posters, CHI 2023, ISMAR 2023
Journal on Multimodal User Interfaces

Student Volunteer
IEEE VR 2019

Program Chair June 2018
13th International Symposium on Ubiquitous Virtual Reality (ISUVR 2018), Daejeon, Korea

Student Volunteer Chair Feb 2018
9th Augmented Human International Conference (AH 2018), Seoul, Korea

Organizing Chair June 2017
12th International Symposium on Ubiquitous Virtual Reality (ISUVR 2017), Osaka, Japan

TEACHING AND MENTORING EXPERIENCE

Graduate School of Culture Technology, KAIST Mar 2014 - Present
Teaching Assistant *Daejeon, Korea*

· Java Programming and C++ Programming for Beginners (2014 Fall, 2016 Spring)
· 3D Interaction Design (2016 Fall, 2018 Spring)
· Augmented Reality (2017 Spring)
· Augmented Human (2018 Fall)

Korea Science Academy of KAIST Mar 2014 - Oct 2016
Graduate Mentor *Busan, Korea*

· Mentored graduation research of 6 Korea Science Academy students for three years, as part of KAIST HRP (High School Research Program).

Korea IT Volunteers Jul 2012 - Aug 2012
Voluntary Lecturer *Chisinau, Moldova*

· As part of the *Korea IT Volunteers* program supported by the National Information Society Agency (NIA), taught Java programming at Free International University of Moldova (ULIM).

REFERENCES

Available upon request.