Seokhyun (Shawn) Hwang

Ph.D. Student | University of Washington

▣ **Human Computer Interaction** ▣ **VR / AR**
▣ **Haptic Interface** ▣ **Wearable Device**

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EDUCATION

▣ **University of Washington, United States** | Information Science, Information School (Expected) — Sep 2024 – Present
Doctor of Philosophy (Ph.D.) (Advisor: Jacob O. Wobbrock)

▣ **Gwangju Institute of Science and Technology, Korea** | Intelligent Robotics, School of Integrated Technology — Sep 2021 – Aug 2023
Master of Science (M.S.) (Advisor: SeungJun Kim)

▣ **Gwangju Institute of Science and Technology, Korea** | Department of Mechanical Engineering — Mar 2017 – Aug 2021
Bachelor of Science (B.S.)

▣ **Boston University, United States** — Jun 2018 – Aug 2018
Exchange Student

PROFESSIONAL EXPERIENCE

▣ **University of Washington & Toyota Research Institute |** Research Assistant — Jan 2025 – Present

▣ **Toyota Research Institute |** Research Intern *(Mentor: Alexandre Filipowicz & Scott Carter (Human-Centered AI Division))* — Jun 2025 – Sep 2025

▣ **University of Washington |** Teaching Assistant — Sep 2024 – Dec 2024

▣ **Massachusetts Institute of Technology** | Visiting Researcher *(Advisor: Wojciech Matusik & Daniela Rus)* — Sep 2023 – Oct 2023

▣ **Gwangju Institute of Science and Technology** | Research Associates — Sep 2023 – Aug 2024

▣ **Gwangju Institute of Science and Technology** | Teaching Assistant — Sep 2021 – Aug 2023

▣ **Human-Centered Intelligence Systems Lab** | Research Intern *(Advisor: SeungJun Kim)* — Jan 2021 – Aug 2021

▣ **Intelligent Medical Robotics Lab** | Research Intern *(Advisor: Jungwon Yoon)* — Jun 2020 – Dec 2020

▣ **BA Energy Lab** | Industrial-Academic Intern — Dec 2019 – Feb 2020

▣ **National University of Laos & Khon Kaen University of Thailand |** Experiment Instructor (Educational Volunteer) — Jul 2019

▣ **2019 GIST Science Camp for local community** | Instructor (Educational Volunteer) — Jan 2019

TECHNICAL STRENGTHS

▣ **Modeling & Designing** | Autodesk Inventor, Fusion 360, Blender, KiCad

▣ **Software & Tools** | Unity, CARLA, MyoSuite, MATLAB, LABVIEW, COMSOL Multiphysics, Cubase, Adobe Premiere Pro, Final Cut Pro

▣ **Programming Languages** | C, C#, R, MATLAB, Python, JAVA

RESEARCH PROJECTS

▣ **Blurring the Boundary Between Reality and Virtuality: Research on Novel Haptic Devices**

• Creation and evaluation of a small, lightweight haptic system that uses electrical muscle stimulation (EMS) combined with biomechanical simulation to stimulate multiple muscles simultaneously, providing users with precise directional haptic force feedback [c.11, c.5, w.4]

• Improvement of the response time limitations of previous thermal haptic devices by using motorized Peltier modules, creating a device capable of providing a high level of realism in situations requiring rapid sensory transitions [c.8, w.1]

• Development of exemplary VR applications utilizing haptic devices in industrial settings [c.11, c.8, w.4] and VR game content [c.5, c.8, w.1]

▣ **Towards Seamless Walking in Virtual Environments: Redirected Walking (RDW)**

• Development and usability testing of various haptic systems to enhance the obstacle avoidance capability of RDW technology, overcoming the physical limitations of real-world space, thereby enhancing the seamless walking experience

• Creation of haptic devices that can provide vestibular stimulation (galvanic, bone conduction vibration, thermal) [c.1, c.3, p.2, pa.1], olfactory stimulation, auditory stimulation [j.2, p.1], and visual stimuli with optical flow [j.1], along with algorithms to determine the optimal type and timing of stimulation

• Further implementation of algorithms to improve RDW's spatial scalability by predicting user paths through real-time sensing of walking data and deep learning-based user path prediction – responsible for implementing the real-time gait sensor streaming system [p.4]

▣ **Utilizing Haptic Technology for Accessibility**

• Development and implementation of a hat-shaped haptic device that induces the “Hanger reflex” to expand the field of vision for people with low vision [c.6]

• Development of an intelligent walker that integrates pressure sensors, linear actuators, and motorized wheels, dynamically changing its form to match the patient's intent and the surrounding environment, aimed at improving rehabilitation performance for patients with lower body motor impairments [c.9, w.2]

▣ **Interactions Between Autonomous Vehicles (AVs) and People**

• Development and evaluation of a haptic system that activates muscles via EMS based on the content and movement of the vehicle to address motion sickness, a major limitation of VR use in AVs [c.4, w.3]

• Development and evaluation of an in-car VR locomotion system that allows users to freely explore the environment, rather than simply observing content on predetermined routes [c.10, p.3, cc.1, cc.2]

• Creation and distribution of a comprehensive dataset of AV passengers’ real-time needs and biometric signals [c.7]

• Development and design evaluation of an AR-based virtual agent for communication between AVs and pedestrians [c.2]

CONFERENCES & JOURNALS

[c.14] **Hwang, S.,** Shen, X., Filipowicz, A., Best, A., Costa, J., Carter, S., Fogarty, J., Wobbrock, J., "A Framework for Adapting In-Car Touchscreen Interfaces to Driver Behaviors, Perception, and Cognition." *Proceedings of the 2026 CHI conference on Human Factors in Computing Systems*

[c.13] Shen, X.*, **Hwang, S.*,** Kong, J., Filipowicz, A., Best, A., Costa, J., Carter, S., Fogarty, J., Wobbrock, J., "Touchscreens in Motion: Quantifying the Impact of Cognitive Load on Distracted Drivers." *Proceedings of the 2025 ACM Symposium on User Interface Software and Technology*

[j.3] Ataya, A., Elsharkawy, A., Lee, J., **Hwang, S.,** Seong, M., and Kim, S. "ReD shoes: actuated footwear for multisensory redirected walking in virtual reality." *Virtual Reality **29**, 158 (2025)*

[c.12] Kang, Y., Park, J., **Hwang, S.,** Seong, M., Kim, G., Kim, S. "You're the One Whom I'm Talking To: The Role of Contextual External Human-Machine Interfaces in Multi-Road User Conflict Scenarios." *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol. 9, No.3*

[c.11] **Hwang, S.*,** Kang, S.*, Oh, J.*, Park, J., Shin, S., Luo, Y., DelPreto, J., Lee, S., Lee, K., Matusik, W., Rus, D., Kim, S. "TelePulse: Enhancing the Teleoperation Experience through Biomechanical Simulation-Based Electrical Muscle Stimulation in Virtual Reality." *Proceedings of the 2025 CHI conference on Human Factors in Computing Systems* **Best Paper**

[c.10] Gim, B., **Hwang, S.,** Kang, S., Kim, G., Yeo, D., Kim, S. "I Want to Break Free: Enabling User-Applied Active Locomotion in In-Car VR through Contextual Cues." *Proceedings of the 2025 CHI conference on Human Factors in Computing Systems*

[c.9] Choi, Y., **Hwang, S.,** Moon, J., Lee, H., Yeo, D., Seong, M., Luo, Y., Kim, S., Matusik, W., Rus, D., Kim, K "Adaptive Walker: User Intention and Environmentally Aware Intelligent Walker with High-resolution Tactile and IMU Sensor." *2025 IEEE International Conference on Robotics & Automation*

[c.8] Kang, S., Kim, G., **Hwang, S.,** Park, J., Elsharkawy, A., and Kim, S. "Flip-Pelt: Motor-Driven Peltier Elements for Rapid Thermal Stimulation and Congruent Pressure Feedback in Virtual Reality." *Proceedings of the 2024 ACM Symposium on User Interface Software and Technology*

[c.7] Kim, G., **Hwang, S.,** Seong, M., Yeo, D., Rus, D., and Kim, S. "TimelyTale: A Multimodal Dataset Assessing Passenger's Demands for Explanations in Highly Automated Vehicles." *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol. 8, No.3*

[c.6] Jo, T., Yeo, D., Kim, G., **Hwang, S.,** and Kim, S. "WatchCap: Improving Scanning Efficiency in People with Low Vision through Compensatory Head Movement Stimulation." *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, Vol. 8, No. 2*

[j.2] Lee, J., **Hwang, S.,** Kim, K., and Kim, S. "Evaluation of Visual, Auditory, and Olfactory Stimulus-Based Attractors for Intermittent Reorientation in Virtual Reality Locomotion." *Virtual Reality **28**, 104 (2024)*

[c.5] **Hwang, S.,** Oh, J., Kang, S., Seong, M., Elsharkawy, A., and Kim, S. "ErgoPulse: Electrifying Your Lower Body With Biomechanical Simulation-based Electrical Muscle Stimulation Haptic System in Virtual Reality." *Proceedings of the 2024 CHI conference on Human Factors in Computing Systems* **Honorable Mention**

[c.4] Elsharkawy, A., Ataya, A., Yeo, D., An, E., **Hwang, S.,** and Kim, S. "SYNC-VR: Synchronizing Your Senses to Conquer Motion Sickness for Enriching In-Vehicle Virtual Reality." *Proceedings of the 2024 CHI conference on Human Factors in Computing Systems* **Honorable Mention**

[j.1] Lee, J., **Hwang, S.,** Ataya, A., and Kim, S. "Effect of Optical Flow and User VR Familiarity on Curvature Gain Thresholds for Redirected Walking." *Virtual Reality **28**, 35 (2024)*

[c.3] **Hwang, S.,** Kim, Y., Seo, Y, and Kim, S. "Enhancing Seamless Walking in Virtual Reality: Application of Bone-Conduction Vibration in Redirected Walking." *2023 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)* **Honorable Mention**

[c.2] Kang, Y., Choi, S., An, E., **Hwang, S.,** and Kim, S. "Designing Virtual Agent Human–Machine Interfaces Depending on the Communication and Anthropomorphism Levels in Augmented Reality." *Proceedings of the 2023 International Conference on Automotive UI* **Honorable Mention**

[c.1] **Hwang, S.,** Lee, J., Kim, Y., Seo, Y, and Kim, S. "Electrical, Vibrational, and Cooling Stimuli-Based Redirected Walking: Comparison of Various Vestibular Stimulation-Based Redirected Walking Systems." *Proceedings of the 2023 CHI conference on Human Factors in Computing Systems*

POSTERS & WORKSHOPS

[w.4] **Hwang, S.,** Kang, S., Oh, J., Park, J., Shin, S., Luo, Y., DelPreto, J., Matusik, W., Rus, D., and Kim, S. "Proposal of a Framework for Enhancing Teleoperation Experience with Biomechanical Simulation-Based Electrical Muscle Stimulation in Virtual Reality." *UbiComp '24: Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing*

[w.3] Elsharkawy, A., Ataya, A., Yeo, D., Seong, M., **Hwang, S.,** DelPreto, J., Matusik, W., Rus, D., and Kim, S. "Adaptive In-Vehicle Virtual Reality for Reducing Motion Sickness: Manipulating Passenger Posture During Driving Events." *UbiComp '24: Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing*

[w.2] Choi, Y., Yeo, D., **Hwang, S.,** Seong, M., Moon, J., Luo, Y., Matusik, W., Rus, D., and Kim, K. "Intelligence Walker: A Seamless Mobility Assist Device for the Elderly." *2024 IEEE ICRA Workshop on Wearable*

[w.1] Kang, S., Kim, G., **Hwang, S.,** Park, J., Elsharkawy, A., and Kim, S. "Dual-sided Peltier Elements for Rapid Thermal Feedback in Wearables." *2024 IEEE ICRA Workshop on Wearable*

[p.4] Kim, Y., **Hwang, S.,** Oh, J., and Kim, S. "GaitWay: Gait Data-Based VR Locomotion Prediction System Robust to Visual Distraction." *Extended Abstracts of the 2024 CHI conference on Human Factors in Computing Systems*

[p.3] Gim, B., Kang, S., Kim, G, Yeo, D., **Hwang, S.,** and Kim, S. "Curving the Virtual Route: Applying Redirected Steering Gains for Active Locomotion in In-Car VR." *Extended Abstracts of the 2024 CHI conference on Human Factors in Computing Systems*

[p.2] **Hwang, S.,** Lee, J., Kim, Y., and Kim, S. "REVES: Redirection Enhancement Using Four-Pole Vestibular Electrode Stimulation." *Extended Abstracts of the 2022 CHI conference on Human Factors in Computing Systems*

[p.1] Lee, J., **Hwang, S.,** Kim, K., and Kim, S. "Auditory and Olfactory Stimuli-Based Attractors to Induce Reorientation in Virtual Reality Forward Redirected Walking." *Extended Abstracts of the 2022 CHI conference on Human Factors in Computing Systems*

PATENTS & COPYRIGHTED CONTENTS

[pa.2] Kim, S., Kang, S., Kim, G., **Hwang, S.,** Park, J., Elsharkawy, A. "Haptic wearable devices for tactile experiences." *KR Patent App. KR102541073*

[pa.1] **Hwang, S.,** Lee, J., Kim, Y., Seo, Y., and Kim, S. "Method and System for Supporting Walking in Virtual Environment." *US Patent App. US20250159408A1 | KR Patent App. KR20250069327A*

[cc.1, 2] Kim, S., Kang, S., Kang, Y., Kim, K., Seong, M., An, E., Yang, H., Yeo, D., Oh, J., Jeon, H., Jo, T., and **Hwang, S.** "Mobility-Linked Virtual Reality-Based Underwater Exploration Immersive Content Game Software (**[cc.2]:** Underwater Exploration & Ocean Trash Collection Game). & (**[cc.1]:** Underwater Exploration & Underwater Gem Collection Game)." *Copyright for Computer Program Works **[cc.2]:** C-2022-050134 & **[cc.1]:** C-2022-050133 (KR)*

AWARDS & HONORS

- **University Research Partnership, Toyota Research Institute** — Jan 2025 – Present
- **Best Paper, 2025 CHI conference on Human Factors in Computing Systems** | Top 1% of Conference Papers [c.11] — May 2025
- **Special Recognitions, ACM TEI** | Outstanding Reviews in 2025 TEI — Sep 2025
- **Seed for Science, De Luca Foundation** — Feb 2025

- **Gell Mason Endowed Fellowship, University of Washington** — Sep 2024
- **Provost-Funded Fellow, University of Washington** — Sep 2024
- **Startup Funding, University of Washington** — Sep 2024
- **Special Recognitions, ACM IMWUT** | Outstanding Reviews in 2024 IMWUT — Aug 2024
- **Honorable Mentions, 2024 CHI conference on Human Factors in Computing Systems** | Top 5% of Conference Papers [c.5] — May 2024
- **Honorable Mentions, 2024 CHI conference on Human Factors in Computing Systems** | Top 5% of Conference Papers [c.4] — May 2024
- **Honorable Mentions, IEEE International Symposium on Mixed and Augmented Reality** | 2nd Prize of Conference Papers [c.3] — Oct 2023
- **Honorable Mentions, International ACM Conference on Automotive UI** | Top 5% of Conference Papers [c.2] — Sep 2023
- **Special Recognitions, ACM UIST** | Outstanding Reviews in 2023 UIST — May 2023
- **Government-Sponsored Scholarship, Korea** | Master's Degree Government Scholarship — Sep 2021 – Aug 2023
- **President Award, GIST** | 1st Prize in Table Tennis Robot at the 4th GIST Creative Convergence Competition in 2020 — Aug 2020
- **Scholarship for Academic Excellence** — Sep 2020 – Dec 2020
- **Industry-Academic Cooperation Scholarship** — Dec 2019 – Feb 2020
- **Scholarship for Overseas Summer Semester Exchange Students** | Boston University Exchange Student Scholarship — Jun 2018 – Aug 2018
- **Government-Sponsored Scholarship, Korea** | Bachelor's Degree Government Scholarship — Mar 2017 – Aug 2021

INVITED TALKS

- **Toyota Research Institute** | Invited Presentation (hosted by Alexandre Filipowicz) — Aug 2025
- **University of Chicago, Human Computer Integration Lab** | Invited Presentation (hosted by Pedro Lopes) — Jan 2024
- **HCI Korea 2024, ACM SIGCHI** | Invited Presentation on "Vestibular Stimuli-Based Redirected Walking" (hosted by Inseok Hwang) — Jan 2024

ACADEMIC SERVICE

- **Associate Chair**
  - UbiComp/ISWC 2024 Workshop on AI-infused Physical Systems (I4U) ⏳ **Service recognition for AC contributions**
- **Conference Reviewer**
  - CHI (4 in 2026, 4 in 2025); CHI LBW (1 in 2026, 2 in 2024, 1 in 2023); TEI (1 in 2025 ⏳ **Recognition for an outstanding review**); VRST (1 in 2024); UIST (1 in 2023 ⏳ **Recognition for an outstanding review**); EuroHaptics (2 in 2026)
- **Journal Reviewer**
  - International Journal of Human–Computer Interaction (3 in 2024, 5 in 2025, 2 in 2026; incl. multi-round reviews)

MEDIA COVERAGE

- **"UW study finds touch screens in cars create a multitasking problem that impacts driving."** — Dec 2025
  - Outlets: UW News; GeekWire; KIRO Seattle's morning News; KOMO News
- **"Expanding virtual space by 43%: Developing technology that overcomes VR walking limitations."** — Dec 2025
  - Outlets: HelloDD; Herald Business; News1 Korea; Newsworker
- **"Grandma, you no longer have to push a stroller: AI-equipped walking robot for older adults."** — Jun 2025
  - Outlets: The Robot News; E-News Today; E-Dong-A; Newsworker; NEWSIS; AI Times; Seoul Economic Daily
- **"Shaken car? No problem" – Enjoy VR without motion-sickness even while riding.."** — May 2025
  - Outlets: OhmyNews; Namdo Ilbo; Herald Business; Web Economy
- **"Robot's received force transmitted directly to human arm: Joint development by GIST and MIT."** — May 2025
  - Outlets: Digital Chosun Ilbo; AI Times; Yonhap News Agency; EBN; News1 Korea; Newsworker
- **"Autonomous driving safety information displayed at the right moment: GIST-MIT paper receives top 1% award."** — Oct 2024
  - Outlets: NEWSIS; The University Journal; E-News Today; Newsworker
- **"Wearable hat helps low-vision users by turning their heads more: WatchCap developed."** — Sep 2024
  - Outlets: Brain Media; Medical News; ITDaily; Dong-A Science; Wide Economy; NEWSIS; The University Journal; News1 Korea; iNews24
- **"GIST research team receives two Honorable Mention awards at ACM CHI 2024 for VR interface work."** — May 2024
  - Outlets: Namdo Ilbo; AI Times; ITDaily
- **"GIST virtual-reality interface research wins best-paper awards at IEEE ISMAR 2023."** — Nov 2023
  - Outlets: BoanNews; AI Times; NEWSIS; News1 Korea; AVING News; Newsworker; Newspim