Jaehyun Jang

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PERSONAL PROFILE

I am a PhD candidate in School of Computing at KAIST. My research interests lie in computer graphics and computer haptics with a particular focus on extended reality (XR) and mid-air haptics. I focus on mid-air haptic rendering algorithms to produce rich tactile sensation by using (1) real-time simulation, (2) GPGPU algorithm, (3) tactile model estimation.

PRINCIPAL INTERESTS

Haptic rendering, multimodal application, real-time simulation, virtual reality, augmented reality, scientific visualization, and medical visualization.

ACADEMIC BACKGROUND

Ph.D. Computer Science 2016.09 - 2022.02
Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea
- Ph.D. research in haptic rendering under direction of prof. Jinah Park. Dissertation title: Materialized Virtual Touch: Mid-air Haptic Rendering in Extended Reality.

M.Sc. Computer Science 2014.09 - 2016.08
Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea
- M.Sc. research in scientific visualization under direction of prof. Jinah Park. Thesis title: Viewpoint Selection of Treelike Structures. [Link]

B.Sc. Computer Science 2010.02 - 2014.08
Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea

EMPLOYMENT HISTORY

Student Programmer 2014.06 - 2015.05
Kiswe, New Providence (NJ), United States
- Gamification for the interactive livestream service. (front-end and back-end)

Client Programmer (Intern) 2012.04 - 2012.08
Flaskon, Seoul, Republic of Korea
- Client programmer internship.
- Participating in launching a first shooter mobile game named 'Bubble Fighter Adventure'. (UI programming)

AWARDS

- Best demo award, "Fluid Tactile Rendering with Mid-Air Haptic Interface", Korea Haptics Community, 2019.
- Outstanding TA award (Discrete Mathematics), 2017.
- Best distinguished paper award, "The Context-based Viewpoint Selection of Treelike Structures", The Sector Union Conference of Society for Computational Design and Engineering, 2016.
- Best presentation award, "Advanced 3D Roadmap Based on 2D-3D Image Registration and Context-based Visualization", KAIST Special Interest Group on Future Emerging Technology of Medical Imaging, 2016.

- Outstanding TA award (Computer Graphics), 2015.

RESEARCH PROJECTS (at KAIST)

Research at KAIST focusses on the applications of haptic rendering and its application for real-time simulation and medical visualization.

- (2020-2021), Volumertric Data Exploration Technique using Mid-air Haptic and Holographic Display by KAIST and Ultraleap in the context of a "Volume haptic exploration" research.

- (2019-2021), Development of an Immersive Virtual Science Museum that supports Bidirectional and Multimodal Interaction by KAIST in the context of "Volume rendering for the lightfield display" and "Volume haptic exploration" research.

- (2017-2019), HD Haptic Technology for Hyper Reality Contents by Postech, Kyunghee University, Korea University, Koreatech, KAIST, GIST, HVR in the context of "Haptic rendering for unified particle simulation" and "Mid-air haptic rendering for rigid-fluid interaction" research.

- (2017-2018), Modeling and Visualization Techniques for Quantitative Shape Analysis of 3D/4D Cell Images by KAIST in the context of "Live cell segmentation" and "Scientific visualization" research.

- (2015-2016), Development of 3D Model-based Morphometric Method for Assessment of Human Weight-bearing Joint by KAIST in the context of "Viewpoint selection method for vascular medical images" research.

THESIS COMMITTEE

1. Jinah Park (Advisor), Professor, School of Computing, Korea Advanced Institute of Science and Technology.

2. Sung-Eui Yoon, Professor, School of Computing, Korea Advanced Institute of Science and Technology.

3. Sunghee Choi, Associate Professor, School of Computing, Korea Advanced Institute of Science and Technology.

DISSERTATION COMMITTEE

1. Jinah Park (Advisor), Professor, School of Computing, Korea Advanced Institute of Science and Technology.

2. Min H. Kim, Endowed Chiar Professor, School of Computing, Korea Advanced Institute of Science and Technology.

3. Geehyun Lee, Professor, School of Computing, Korea Advanced Institute of Science and Technology.

4. Woontaek Woo, Professor, School of Computing, Korea Advanced Institute of Science and Technology.

5. Jin Ryong Kim, Assistant Professor, Department of Computer Science, University of Texas at Dallas.

PATENTS

1. Jaehyun Jang and Jinah Park, *A Method and Apparatus for Setting Virtual Camera based on Branching Region and Structures for Exploring 3D Treelike Objects*, patent registered for Korea Advanced Institute of Science and Technology, granted by KR, 10-1934202, Jul 2018

2. Jaehyun Jang and Jinah Park, *Method of Providing Virtual Fluid Pressure Field using Ultrasound Haptic Interface*, patent registered for Korea Advanced Institute of Science and Technology, filed by KR, 10-2020-0176583, Dec 2020.

3. Jaehyun Jang and Jinah Park, *Method and Apparatus of Providing Tactile Feedback (Method of Providing Tactile Feedback of Virtual Fluid through Mid-air Haptic Interface)*, patent registered for Korea Advanced Institute of Science and Technology, granted by KR, 10-2245898, Apr 2021.

4. Jaehyun Jang and Jinah Park, *Method and Apparatus of Providing Tactile Feedback for Volume Data Interaction*, patent registered for Korea Advanced Institute of Science and Technology, filed by KR, 10-2021-0078848, Jun 2021.

5. Jaehyun Jang and Jinah Park, *Method for Providing Tactile Feedback based on Interaction with Virtual Fluid and Apparatus for Performing the Same*, patent registered for Korea Advanced Institute of Science and Technology, filed by KR, 10-2021-0176503, Dec, 2021.

PUBLICATIONS

1. J. Jang, J. Park, "The Structure-aware Viewpoint Selection for 3D Branching Structures," presented at the IEEE PacificVis 2018, Apr. 2021. (Poster)

2. J. Jang, J. Park, "Virtual Faucet: Stream Or Spray," presented at the IEEE World Haptics Conference 2019, Jul. 2019. (Hands-on Demo) [Link]

3. Jaehyun Jang and Jinah Park, SPH Fluid Tactile Rendering for Ultrasonic Mid-Air Haptics, *IEEE Transactions on Haptics*, Jan. 2020 [Link]

4. J. Jang, J. Lim, and J. Park, "Real-time volume exploration technique for holographic display," in International Forum on Medical Imaging in Asia 2021, Apr. 2021, vol. 11792, p. 117920V.

5. J. Jang and J. Park, "Interacting with Fluids using Ultrasonic Mid-Air Haptic Device," presented at the IEEE World Haptics Conference 2021. (Hands-on Demo)

6. J. Jang, W. Frier, O. Georgiou, and J. Park, "Using Mid-air Tactile Patterns in Interactive Volume Exploration," presented at the IEEE World Haptics 2021. (Hands-on Demo)