

MYUNGIN LEE

◇ College Park, Maryland ◇ myungin@umd.edu ◇ <http://www.myunginlee.com> ◇ +1-805-200-6440

Research Interests

Multi-modal XR Experience based on HCI, Signal Processing, and Machine Learning

Skills: C/C++, C#, Python, MATLAB

Work Experience

University of Maryland, College Park September 2023 ~
Professional Track Faculty (Full-Time Lecturer)

Nokia Bell Labs. Experiments in Art & Technology (E.A.T.), USA June 2020 – August 2020
Summer Research Internship, Spatial-acoustic parameter estimation research.

Republic of Korea Air Force, 3rd Training Wing Group January 2010 – February 2012
Central administrative clerk (Mandatory military service)

Education

University of California, Santa Barbara, Ph.D. in Media Arts and Technology, United States
- "Coherent Digital Multimodal Instrument Design and the Evaluation of Crossmodal Correspondence"
September 2017 – August 2023

Hanyang University, M.Sc. in Electronics and Computer Engineering, Seoul, Korea
- "Blind Estimation of Reverberation Time on Multi-Channel Microphone using Deep Neural Network"
March 2015 – February 2017

Hanyang University, B.Sc. in Electronics and Computer Engineering, Seoul, Korea March 2008 – February 2015

Teaching Experience

Teaching (Instructor)

Spring 2024 IMDM101. Introduction to Immersive Media (UMD)
Spring 2024. IMDM290. Collaborative Studio I: Image + Time (UMD)

Fall 2023. IMDM101. Introduction to Immersive Media (UMD)
Fall 2023. IMDM327. Computational Virtual Reality (UMD)

Fall 2022. MUS109IA+MUS209IA+MAT276IA: Direct Digital Synthesis - Processing and Composition (UCSB)
Winter 2022. MUS109IA+MUS209IA+MAT276IA: Direct Digital Synthesis - Processing and Composition (UCSB)

Research Experience

- Professional Track Faculty** [Lecturer] **September 2023 – Present**
Immersive Media Design Program, the Department of Computer Science, University of Maryland College Park, MD, US
- **(WIP) NASA's Immersive Ocean Project**
 - An immersive interactive artwork at the intersection of new media art, Earth systems and ocean ecosystem science
 - Scheduled the Premiere at XXX (anonymized due to embargo)
 - **(WIP) Brain XR Interaction Design**
 - Ongoing Multiuser BCI research
 - FractalBrain: Neuro-interactive VR using EEG for Mindfulness (CHI 2024 Interactivity)
 - **(WIP) XR Quantum Intuition**
 - Ongoing Quantum Intuition research collaborating with physicists.
 - **(WIP) VR/AR Creative Instrument**
 - Ongoing NIME research. Spatial Orchestra (CHI 2024 Interactivity)

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Graduate Student Researcher [Ph.D. Study]

September 2017 – August 2023

AlloSphere Research Group in Media Arts and Technology, University of California, Santa Barbara, US

- Advisor: Prof. JoAnn Kuchera-Morin, Prof. Curtis Roads, & Prof. Misha Sra

- **(WIP) Sensorium (World Ocean project)**

- A work of art and of science that sets out to synthesize the survival problems that the world ocean faces in our emerging heat-shocked future.
- Inspired by the late Eco-Art Pioneer, Emeritus Professor Newton Harrison (UCSD) & Research Professor (UCSC) and conceived by the Center for the Study of the Force Majeure, based at the University of California, Santa Cruz.
- Premiere in Pacific Standard Time (PST) 2024 exhibition by the Getty Foundation

- **Parasitic signals: Multimodal Sonata for Real-time Interactive Simulation of the SARS-CoV-2 Virus**

- Collaboration with bio-scientists at Johannes Kepler University, Linz, Austria.
- Developed real-time audio-visual simulation based on atomic force microscope data (AFM) and virus behavior for the art installation. Exhibition and full paper in Ars Electronica Festival 2022 and IEEE VIS Arts Program 2023

- **A Multi-modal, multi-user interactive instrument in 3D space using the smartphone for gesture control**

- Developed gesture-based smartphone 3D interface using signal processing and machine learning (*NIME2021*).
- Developed Newtonian physics-based audiovisual & gestural instruments for multiple users (up to 14 people)
- Developed audiovisual & gestural granular synthesizer (*ACM SIGGRAPH SPARK 2022, ICMC2024*)

- **TINC (Toolkit for Interactive Computation)**

NSF grant # OAC 2004693: "Elements: Cyber-infrastructure for Interactive Computation and Display of Materials Datasets."

- The Toolkit for Interactive Computation (TINC) provides a set of C++ and python classes to assist in the interactive exploration of large datasets by managing parameter spaces, interactive computation, and caching of data (<https://github.com/AlloSphere-Research-Group/tinc>).
- Developed interactive Monte Carlo simulation and quantum computation
- Collaboration with computational material scientists at UC Santa Barbara

- **The AlloSphere & AlloLib**

The *AlloSphere* is a three-story full-surround, multimodal, immersive facility in the Media Arts and Technology at the University of California, Santa Barbara to represent large and complex data, including immersive visualization, sonification, and interactivity. *AlloLib* is a cross-platform suite of C++ components for building interactive multimedia tools and applications.

- Participating in the development of the system (<https://github.com/AlloSphere-Research-Group/allolib>)

- **Music source conducting based on gestural control using machine learning**

Music interaction with gesture recognition of conducting gestures using controllers with gestural sensors.

- Developed and performed machine learning and signal processing-based music interaction system.

Graduate Student Researcher [Master's Study]

March 2015 – February 2017

Acoustic, Speech Signal Processing and Machine Learning Lab., Hanyang University, Seoul, Korea

- Website: <https://dsp.hanyang.ac.kr> - Advisor: Prof. Joon-Hyuk Chang

- **Reverberation time estimation using machine learning:**

Obtaining room acoustic information from sound sources received by microphones.

- Conducted a study with single & multi-channel-based algorithms using deep neural networks.
- Developed an estimation algorithm for dereverberation and acoustic models (research with *LG electronics*).

- **Machine learning**

- Performed experiments on the application of various machine learning techniques with *Pytorch*, *TensorFlow*, and *MATLAB*
- Applications: reverberation time estimation, acoustic models, jointly trained neural network, bandwidth expansion, and gesture interpretation (research with *Samsung electronics*).

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Publications & Patents

Publications

- **Myungin Lee**, Jongwoo Yim, "AlloThresher: Multimodal Granular Synthesizer," International Computer Music Conference (ICMC), June 2024.
- Jamie Ngoc Dinh, You-Jin Kim, **Myungin Lee**, "FractalBrain: Neuro-interactive VR using EEG for Mindfulness," CHI Interactivity, May 2024. (Corresponding Author)
- You-Jin Kim, **Myungin Lee**, Marko Peljhan, JoAnn Kuchera-Morin, Tobias Höllerer, "Spatial Orchestra: Locomotion Music Instruments through Spatial Exploration," CHI Interactivity, May 2024.
- **Myungin Lee**, Sabina Hyoju Ahn, Yoojin Oh, JoAnn Kuchera-Morin, "Parasitic signals: Multimodal Sonata for Real-time Interactive Simulation of the SARS-CoV-2 Virus," IEEE VIS Arts Program, Oct., 2023
- **Myungin Lee**, "Entangled: A Multi-Modal, Multi-User Interactive Instrument in Virtual 3D Space Using the Smartphone for Gesture Control," *New Interfaces for Musical Expression (NIME'21)*, Jun., 2021.
- **Myungin Lee**, "A Multi-User Interactive Instrument in the 3D Space Using the Gesture of Smartphones," *Korea Electro-Acoustic Music Society's Annual Conference (KEAMSAC)*, Oct., 2019
- **Myungin Lee**, "Deep neural network based music source conducting system," *International Computer Music Conference (ICMC)*, Aug., 2018.
- **Myungin Lee**, Joon-Hyuk Chang, "Deep neural network based blind estimation of reverberation time based on multi-channel microphones," *Acta Acustica united with Acustica*, May, 2018.
- **Myungin Lee**, Joon-Hyuk Chang, "Blind Estimation of Reverberation Time on Multi-Channel Microphone using Deep Neural Network," Master's thesis, Feb, 2017.
- **Myungin Lee**, Joon-Hyuk Chang, "Blind Estimation of Reverberation Time using Deep Neural Network," *IEEE International Conference on Network Infrastructure and Digital Content (IC-NIDC)*, Sep., 2016.
- Jeehye Lee, **Myungin Lee**, Joon-Hyuk Chang, "Ensemble of Jointly Trained Deep Neural Network-Based Acoustic Models for Reverberant Speech Recognition," *arXiv:1608.04983*, 2016.

Reviewing Experience

- *International Computer Music Conference (ICMC) 2019*

Patents

- Multichannel Microphone-based Reverberation Time Estimation Method and Device which use Deep Neural Network Technical Field, US Patent: US10854218B2, 2017.
- Multi-Channel Microphone based Reverberation Time Estimation using Deep Neural Network, Korea Patent: KR101871604B1, 2016.

Invited Talk

- July 2024, About AlloThresher, Multimodal Granular Instrument Design, Seoul National University, Korea,
- February 2024, Pioneering Interactive Art and Artists from the 1960s to 2000, ACM SIGGRAPH DAC SPARKS, Online.
- July 2023, Coherent multi-modal instrument design in digital media, Ewha Womans University, Korea,
- July 2023, Coherent multi-modal instrument design in digital media, Seoul National University, Korea,
- April 2023, Coherent multi-modal instrument design in digital media, University of Maryland College Park, MD, USA
- December 2022, ACM SIGGRAPH Digital Art Community SPARKS: New Media Architecture(s): A Speculative Vision of Change in the Arts, Design, & Sciences, Online.
- May 2022 & 2023, CMPSC190D Introduction to Allolib, UCSB, Santa Barbara, USA
- January 2020, CS291A, AR Interaction/Interface for Future User Interfaces. UCSB, Santa Barbara, USA

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Performance and Exhibitions

- (Scheduled) February 2025, Exhibition, "*Waving (NASA)*," Premiere at XXX (anonymized due to embargo)
 - September 2024, Exhibition, "*Sensorium: The Voice of the World Ocean*," **PST 2024 Getty Biennale**, California, USA
 - July 2024, Performance, "All Threshed," International Computer Music Conference (**ICMC**) 2024, Seoul, Korea
 - October 2023, Exhibition, "*Parasitic Signals: Coexistence with the SARS-CoV-2 virus*," **IEEE VIS**, Melbourne, Australia
 - June 2023, Audiovisual concert (Tech Direct), Premiere of "*Man in the Mangroves*" by James Andy Moorer, **AlloSphere**, UCSB, Santa Barbara, USA
 - 2019 – 2023, Regular Demonstration, AlloSphere Contents, **AlloSphere**, UCSB, Santa Barbara, USA
 - February 2023, Exhibition, "*Coexistence with the SARS-CoV-2 virus*," Santa Barbara Center for Art, Science and Technology (**SBCAST**), Santa Barbara, USA
 - October 2022, Spatial audio concert (Tech Direct), Premiere of "*Musics of the Sphere*" by Dr. Robert Morris, **AlloSphere**, UCSB, Santa Barbara, USA
 - September 2022, Exhibition, "*Coexistence with the SARS-CoV-2 virus*," **Ars Electronica Festival**, Linz, Austria
 - May 2022, Audiovisual Concert (Direction), "*AlloLib Audiovisual Concert*," **SYMADES 2022**, the California NanoSystems Institute, UCSB, Santa Barbara, USA
 - April 2022, Exhibition (Tech Support), "*Last Whispers*" by Lena Herzog, **AlloSphere**, UCSB, Santa Barbara, USA
 - June 2019, Art installation, "*A Multi-User Interactive Instrument in the 3D Space Using the Gesture of Smartphones*," **the MAT 2019 End of Year Show: MADE [at] UCSB**, the California NanoSystems Institute, UCSB, Santa Barbara, USA
 - April 2019, CREATE Ensemble Performance, "*Ballet Mécanique (2019)*," at **Lotte Lehmann Concert Hall**, UCSB, Santa Barbara, USA
 - August 2018, Art installation, "*Deep neural network based music source conducting system*," International Computer Music Conference (**ICMC**), Daegu, Korea.
 - June 2018, Art installation, "*Deep neural network based music source conducting system*," **the MAT 2018 End of Year Show: Invisible Machine**, the California NanoSystems Institute, UCSB, Santa Barbara, USA
 - June 2018, CREATE Ensemble Performance, "*Loading (2018)*," at Santa Barbara Center for Art, Science and Technology (**SBCAST**), Santa Barbara, USA
 - May 2018, CREATE Ensemble Performance, "*Loading (2018)*," at **Lotte Lehmann Concert Hall**, UCSB, Santa Barbara, USA
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Awards & Fellowships

- National Science Foundation Grant No. 2004693: 2021 – 2023
 - *Elements: Cyber-infrastructure for Interactive Computation and Display of Materials Datasets*
- Graduate Student Research Fellowship, TA, Teaching Associate in the AlloSphere Research Group 2018 – 2023
- *Signal Intelligence Research Center (SIRC)* Fellowship, Defense Acquisition Program Administration 2015 – 2016
 - A study on technique of distinguishing voice for voice recovery
- *Brain Korea 21 Plus (BK 21 Plus) Scholarship*, National Research Foundation of Korea 2015 – 2016
- *Advanced Research Center Program* Fellowship, National Research Foundation of Korea 2015 – 2016
 - Development of Core Technologies for High-Performance Speech Processing in Future Wearable Devices
- *Nano-Material Technology Development Program* Fellowship, National Research Foundation of Korea 2015 – 2016
 - Development of signal processing technique based on Biomimetic tactile sensor for texture perception
- 2nd Award in the Department of Electronic Engineering's Graduation Competition 2014
 - Adaptive multi-channel audio spatialization