ZHU WANG

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https://zhuwang-site.github.io

RESEARCH INTERESTS

My research spans several areas including XR, HCI, robotics, and AI. More specifically, I have been working on: 1. Human balance assessment and rehabilitation with motion analysis, eye-tracking, and force-sensing technologies; 2. XR-based multi-participant collaboration and communication; 3. Interactions with mobile robots and drones; 4. Data-driven content generation and retrieval.

EDUCATION

Ph.D. in Computer Science Sep 2015 – May 2021
New York University, New York, NY
Advisor: Prof. Ken Perlin
Dissertation: Virtual Reality for Human Balance Assessment

M.Sc. in Computer Science Jan 2011 – Dec 2012
New York University, New York, NY

B.Eng. in Computer Science and Technology Sep 2006 – Jun 2010
Huazhong University of Science and Technology, Wuhan, China

PROFESSIONAL EXPERIENCE

Postdoctoral Associate, Future Reality Lab Aug 2021 – present
New York University, New York, NY

- VR-based healthcare system for human balance assessment and rehabilitation.
- Collaborated with Unity Technologies research team on zero-shot multi-modal 3D asset retrieval.
- Mentor undergraduate and graduate students, and work with them on projects including VR-based terrain generation, interaction with mobile robots and drones.

Motion Capture Expert, TURN UP Multimedia Festival May 2020 – Aug 2020
New York, NY & Tucson, AZ
Worked with production and dance teams to integrate the dancers' real-time movements from the motion capture system into visual and interactive experiences for audiences in both New York City and Tucson to share the same musical festival.

Research Assistant, Future Reality Lab Sep 2015 – May 2021
New York University, New York, NY

- Designed VR-based rehab systems for balance interventions. The systems were used by 2 physical therapy clinics in NYC and 1 hospital in California for research studies.
- Designed VR-based motion analysis systems to quantify balance features and estimate the risk of falling based on motion capture and machine learning.
- Jointly designed XR and MR systems for collaborative teaching and learning.
- Conducted empirical studies on the tracking quality of VR systems, and impact of sensory cues in human balance.

Research Intern, Ability Team May 2020 – Aug 2020
Microsoft Research, Redmond, WA
Designed and implemented XR Evaluation Toolkit, an extensible and flexible framework for XR interaction study reproduction.

Affiliated Subject Matter Expert Apr 2020 – Oct 2020
Numerati Partners, New York, NY
Technical peer review and evaluation for an RGB-D scanning solution.

Junior Research Scientist, Media Research Lab Feb 2013 – Feb 2014
New York University, New York, NY
Designed and Developed a mixed reality system which is a VR-based tangible system combined with Oculus Rift, Optitrack and a turntable to mimic a game scene for sculpting and object manipulating in 3D space.

Grant Application Involvement Aug 2016 – Present
New York University, New York, NY
Involved in multiple grant applications. Assisted PIs and co-PIs with both ideation and proposal writing. Selected approved grants:

- Verizon 5G Looking Inside: Cells (Agency: Verizon Corporation. Grant ID: 13441709. PIs: Ken Perlin, Jan Plass. Amount: $1,054,148. Jan 2022 – Jan 2023)
- Sensory Integration of Auditory and Visual Cues in Diverse Contexts Given Age, Vestibular Hypofunction and Hearing Loss (Agency: NIH, NIDCD. Grant ID: R21 DC018101. PI: Anat Lubetzky. Amount: $461,089. Aug 2020 – Jul 2023)
- Vestibular Rehabilitation utilizing Virtual Environments to Train Sensory Integration for Postural Control in a Functional Context (Agency: NIH REACT, PI: Anat Lubetzky, Amount: $63,401. Aug 2019 – Jul 2020)
- Balance Rehabilitation and Assessment using Virtual Environments (Agency: NYU, Technology Acceleration and Commercialization Program. PIs: Ken Perlin, Anat Lubetzky, Ivan Selesnick. Amount: $49,710. Sep 2017 – Aug 2018)
- Development of Experiential Supercomputing: Developing a Transdisciplinary Research and Innovation Holodeck (Agency: NSF, Grant ID: 1626098, PIs: Ken Perlin, Michael Shelley, Jan Plass, Agnieszka Roginska, Winslow Burleson. Amount: $2,589,624. Aug 2016 – Jul 2021)

TEACHING EXPERIENCE

Guest Lecture New York University
Deliver guest lectures and instructions to undergraduate and graduate level classes with durations of 2+ hours and class sizes ranging from 20 to 50. Independently prepared corresponding units for the courses:

- FMTVUT-1153 Introduction to Visual Effects for Animated and Live Action Films (Undergraduate level) Spring 2023
- CSCI-UA.0380-001 Interactive Computing (Undergraduate level) Fall 2022
- CSCI-GA.3033-097 Special Topics in Virtual Reality (Graduate level) Spring 2022

- CSCI-GA.2274-001 Advanced Computer Graphics (Graduate level) Fall 2017

Lab Teaching New York University

- Organize and lead reading and coding seminars for undergraduate and graduate students from NYU Future Reality Lab and cross-laboratory. Fall 2021 – Present
- Mentored 2-4 undergraduate and graduate students each semester for VIP-GY 500X/VIP-UY300X NYU Vertically Integrated Projects (VIP) program. Help each cohort with onboarding, identifying interests, planning research/technical agendas, participating in on-going projects, and initiating projects. Fall 2021 – Present

Teaching Assistant New York University

Assisted professors in lecture preparation, tutorials, demos, office hours, assignment evaluations, and exam evaluations.

- CSCI-GA.3033-097 Special Topics in Virtual Reality (Graduate level) Spring 2022
- CSCI-GA.2250-002 Operation system (Graduate level) Spring 2018
- CSCI-GA.2274-001 Advanced Computer Graphics (Graduate level) Fall 2017
- CSCI-GA.3033-097 Computer Graphics (Graduate level) Fall 2015

Research Advising New York University

Mentor students through weekly and on-demand meetings over one or multiple semesters. Helped students identify research interests, conduct literature reviews, develop research skills, formulate research questions, design research projects, and publish results.

- Sean (Xiaoan) Liu (New York University, M.S.) Spring 2024 – Present
- Alex (Pincun) Liu (New York University, B.S.) Fall 2023 – Present
- Yushen Hu (New York University, B.S.) Fall 2022 – Present
- Keru Wang (New York University, Ph.D. candidate) Fall 2021 – Present
- Brayton Lordianto (University of California, Berkeley, M.S.) Fall 2023 – Spring 2024
- Yuhan Wang (Harvard University, M.S.) Spring 2023 – Spring 2024
- Karl Rosenberg (New York University, Ph.D.) Fall 2021 – Spring 2023
- Cleo Xiao (University of Copenhagen, Ph.D. candidate) Spring 2023
- Steven (Dong Woo) Yoo (Northeastern University, Ph.D. candidate) Fall 2021 – Fall 2022

PUBLICATIONS

Full List (Google Scholar) † Equal contribution * Equal advising

1. Yushen Hu, Keru Wang, **Zhu Wang***, Ken Perlin*. Generative Terrain Fast Prototyping in Virtual Reality with Freehand Sketching Interface. ACM SIGGRAPH Asia XR Demo 2024 (will be publicly available in Dec 2024)

2. Keru Wang, Pincun Liu, Yuhan Hu, Xianan Liu, **Zhu Wang**, Ken Perlin. A Collaborative Multimodal XR Physical Design Environment. ACM SIGGRAPH Asia XR Demo 2024 (will be publicly available in Dec 2024)

3. Yushen Hu, Keru Wang, Yuli Shao, Jan Plass, **Zhu Wang***, Ken Perlin*. *Generative Terrain Authoring with Mid-air Hand Sketching in Virtual Reality.* ACM VRST 2024 (will be publicly available in Oct 2024)

4. Keru Wang, **Zhu Wang**, Ken Nakagaki, Ken Perlin. *"Push-That-There": Tabletop Multi-robot Object Manipulation via Multimodal 'Object-level Instruction'*. ACM Designing Interactive Systems (DIS) Conference, Jul 2024

5. Yi Wu, Agnieszka Roginska, Keru Wang, **Zhu Wang**, Ken Perlin. *A Spatial Audio System for Co-Located Multi-Participant Extended Reality Experiences.* The 29th International Conference on Auditory Display (ICAD 2024), Jun 2024

6. Keru Wang, **Zhu Wang**, Ken Perlin. *Asymmetrical VR for Education*. ACM SIGGRAPH 2022 Immersive Pavilion, Aug 2023

7. Anat V Lubetzky, Daphna Harel, Santosh Krishnamoorthy, Gene Fu, Brittani Morris, Andrew Medlin, **Zhu Wang**, Ken Perlin, Agnieszka Roginska, Maura Cosetti, Jennifer Kelly. *Decrease in Head Sway as a Measure of Sensory Integration Following Vestibular Rehabilitation: A Randomized Controlled Trial.* Journal of Vestibular Research, Mar 2023

8. Kristofer Schlachter†, Benjamin Ahlbrand†, **Zhu Wang**, Ken Perlin, Valerio Ortenzi. *Zero-Shot Multi-Modal Artist-Controlled Retrieval and Exploration of 3D Object Sets.* SIGGRAPH Asia 2022 Technical Communications, Dec 2022

9. Anat V Lubetzky, Jennifer L Kelly, Daphna Harel, Agnieszka Roginska, Bryan D Hujsak, **Zhu Wang**, Ken Perlin, Maura Cosetti. *Insight into postural control in unilateral sensorineural hearing loss and vestibular hypofunction.* PLoS One. Oct 2022

10. Keru Wang, **Zhu Wang**, Karl Rosenberg, Zhenyi He, Dong Woo Yoo, Un Joo Christopher, Ken Perlin. *Mixed Reality Collaboration for Complementary Working Styles.* ACM SIGGRAPH 2022 Immersive Pavilion, July 2022

11. Anat V. Lubetzky, Jennifer Kelly, **Zhu Wang**, Marta Gospodarek, Gene Fu, John Sutera, Bryan D. Hujsak. *Contextual sensory integration training via head mounted display for individuals with vestibular disorders: a feasibility study.* disability and rehabilitation: assistive technology, Issue 1, Volume 17, 2022.

12. **Zhu Wang**, Liraz Arie, Anat V. Lubetzky, Ken Perlin. *VRGaitAnalytics: Visualizing Dual Task Cost for VR Gait Assessment*. ACM VRST 2021, Dec 2021.

13. **Zhu Wang**, Anat V. Lubetzky, Ken Perlin. *Walking Balance Assessment with Eye-tracking and Spatial Data Visualization.* ACM SIGGRAPH 2021 Immersive Pavilion, Aug 2021.

14. **Zhu Wang**, Anat V. Lubetzky, Charles Hendee, Marta Gospodarek, Ken Perlin. *A Virtual Obstacle Course within Diverse Sensory Environments.* ACM SIGGRAPH 2020 Immersive Pavilion, Aug 2020

15. Anat V. Lubetzky, **Zhu Wang**, Tal Krasovsky. *Head mounted displays for capturing head kinematics in postural tasks.* Journal Of Biomechanics, Feb 2019

16. Moshe Mh Aharoni, Anat V. Lubetzky, **Zhu Wang**, Maya Goldman, Tal Krasovsky. *A Virtual Reality Four-Square Step Test for Quantifying Dynamic Balance Performance in People with Persistent Postural Perceptual Dizziness.* IEEE ICVR Conference, Jul 2019

17. Anat V. Lubetzky, Jennifer Kelly, **Zhu Wang**, Makan TaghaviDilamani, Marta Gospodarek, Gene Fu, Erin Kuchlewski, Bryan Hujsak. *Head-Mounted Display Application for Contextual Sensory Integration Training: Design, Implementation, Challenges and Patient Outcomes.* IEEE ICVR Conference, July 2019

18. **Zhu Wang**, Anat Lubetzky, Marta Gospodarek, Makan TaghaviDilamani, Ken Perlin. *Virtual Environments for Rehabilitation of Postural Control Dysfunction.* ArXiv, Nov 2018.

19. Tiago Machado, Ivan Bravi, **Zhu Wang**, Andy Nealen, Julian Togelius. *Shopping for Game Mechanics*. 7th Workshop on Procedural Content Generation, Aug 2016.

20. **Zhu Wang**, Tao Huang, Sha Wen. *Face detection by improved AdaBoost.* 2012 IEEE ICCSNT, Dec 2012

21. **Zhu Wang.** *Real-Time Simulation of Infrared Scene.* 2012 IEEE IASP, Nov 2012.

22. **Zhu Wang**, Tao Huang, Sha Wen. *A File Integrity Monitoring System Based on Virtual Machine.* 2012 IEEE IMCCC, Dec 2012.

23. Yuhan Wang, Keru Wang, **Zhu Wang***, Ken Perlin*. *RoboTerrain: A Scalable Shape-changing Interface Using Actuated Support Beams.* In submission to ACM TEI 2024

PRESENTATION, TALK, EXHIBITION

1. Panel discussion, Siggraph Immersive Pavilion, Siggraph 2022

2. Speaker, Metaverse Applications and Research Session, Toronto Youth STEM & Innovation Conference 2022

3. **Zhu Wang**, Anat Lubetzky, Charles Hendee, Rufei Sheng, Louis Iannuzzi, Ken Perlin. Human Balance Assessment Using Pressure-sensing Technologies. Poster presentation, The Center of Health and Rehabilitation Research Showcase, NYU, Oct 2019

4. **Zhu Wang**, Makan TaghaviDilamani, Anat V. Lubetzky. *Virtual Reality Rehabilitation for Fall Prevention.* Presentation and demo at the NYU Technology Summit, Nov 2018.

5. **Zhu Wang**, Anat Lubetzky, Charles Hendee*. Virtual Environments, Floor Sensors and Head Sensors for Assessment of Postural Control Dysfunction.* InsurTech Science and Engineering Expo, New York, NY, Aug 2018

6. **Zhu Wang**, Omar Shapira, Ken Perlin. *Tangible Mixed Reality System*. NY Tech Meetup, Nov 2013

AWARDS AND HONORS

Winner of the 2nd Annual Innovators in Aging Award ($10,000) Jun 2019
NYU Aging Incubator

Outstanding Undergraduate Jun 2010
Huazhong University of Science and Technology, China

3rd prize, National Colleges and Universities Information Security Competition Aug 2009
Ministry of Education, China

ACADEMIC SERVICE

Program Committee Member

- ACM ETRA 2022, 2023, 2024
- IEEE ICVR 2022

Reviewer

- EICS PACM 2023
- TEI 2023
- ISMAR 2022, 2023
- IEEE VR 2022, 2023
- ACM CHI 2021, 2022
- ACM AutomotiveUI 2021
- ACM UbiComp/ISWC 2021, 2022, 2023, 2024
- ACM IDC 2021
- ChinaVis 2021
- IASDR 2021
- ACM UIST 2018, 2019
- ACM ETRA 2022, 2023
- ACM CSCW 2022