

# Zhengzhe Zhu

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## Objective

Ph.D. Candidate in Computer Engineering, looking for an internship in summer 2023

## Education

### PhD, Electrical & Computer Engineering

Aug 2017-May 2024 (expected)

Purdue University, West Lafayette, IN, USA

Focus: Human-Computer Interaction (HCI), Cloud Development, AR/VR, IoT, Visual Programming

*Published papers in top-tier conferences in CS/HCI (e.g., ACM CHI, ACM UIST, and ACM CSCW)*

### BS, Electrical Engineering & Automation

2012-2016

Nanjing University of Science & Technology, Nanjing, Jiangsu, China

## Research Experience

### Auto-generation of Augmented Reality Tutorials by Embodied Demonstration [CHI 23] 2021-2022

- Developed a system that can create AR tutorials for digital instruments by recording users' operations.
- Designed a hand wearable with pressure sensors for detecting the start and the end of each operation.
- Customized a decision-tree algorithm that recognizes operations based on pressure and gesture data.
- Conducted multiple comparative studies to evaluate respective features of the system.

### Immersive Visual Programming System for Project-based IoT Education in VR [CHI 23] 2021-2022

- Created a VR environment that enabled students to install, program, and experience IoT applications.
- Designed the 3D block-based programming language and its interface based on the affordance of VR.
- Implemented the virtual IoT programming mechanism through event-driven programming.
- Evaluated the effectiveness of the system by conducting quantitative and qualitative usability studies.

### Authoring System Enabling DIYers to Prototype Augmented Reality Toys [UIST 22] 2021-2022

- Proposed a framework of the bidirectional physical-virtual interaction for AR-empowered toys.
- Created an immersive authoring interface for binding AR animations to toys.
- Designed a collection of IoT modules and their communication protocol with the AR headset.
- Implemented the multi-player functionality for AR toys with Azure Spatial Anchor.

### Haptic Toolkit to Support Remote Collaboration in Laboratories [CSCW 22] 2019-2021

- Designed an AR-compatible toolkit to improve social presence through vibration feedback.
- Adopted Bluetooth low energy for phone-toolkit communication to reduce battery consumption.

### Augmented Reality Teleconsulting Robot for Remote Makerspaces [CHI 21] 2020-2021

- Designed and built a desktop-based robot that can be remotely controlled for navigation.
- Built a multi-tier network architecture for robot teleoperation using WebRTC and WebSocket.
- Trained a voice assistant using a cloud-based NLP framework which is accessed via REST APIs.

### Collaborative Augmented Reality Authoring Platform for STEM Education [CHI 20] 2018-2019

- Built a system for easy-creation of AR learning material.
- Designed a collaborative workflow similar to GitHub's for sharing of AR content.
- Implemented a cloud server for storage and transfer AR content among multiple users with AWS S3.

## Skills

- **Languages:** C#, C/C++, Python, Java, Matlab
- **Tools:** Unity3D, Azure, AWS, Docker, WebSocket, WebRTC, Git, PyTorch
- **Courses:** Computational Models & Methods, Computer Network, Operating Systems, Deep Learning

## Leadership Experience & Professional Services

- Team lead for multiple research projects that involved 1 Ph.D. student and 2 masters, 2021-now
- Planned and organized electronic workshops for around 50 primary school students in cooperation with National Writers Association, 2021
- Reviewer for ACM Conference on Human Factors in Computing Systems (CHI 2022, 2023)

## Publications

- **Zhu, Z.**, Liu, Z., Zhang, Y., Zhu, L., Qian, X., Huang, J., Villanueva, A., Peppler, K., & Ramani, K. 2023. LearnIoTVR: An End-to-end Virtual Reality Environment Providing Authentic Learning Experiences for Internet of Things. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (**CHI 2023**).  
*Accepted for publication.*
- Liu, Z.\*, **Zhu, Z.\***, Jiang E., Huang F., Villanueva, A., Qian, X., Wang, T., & Ramani, K. 2023. InstrumentAR: Auto-Generation of Augmented Reality Tutorials for Operating Digital Instruments Through Recording Embodied Demonstration. (\* **represents equal contribution**) In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (**CHI 2023**).  
*Accepted for publication.*
- **Zhu, Z.\***, Liu, Z.\*, Wang, T., Zhang, Y., Qian, X., Raja, P. F., ... & Ramani, K. 2022. MechARspace: An Authoring System Enabling Bidirectional Binding of AR with Toys in Real-time. In Proceedings of the 35th Annual ACM Symposium on User Interface Software and Technology (**UIST 2022**).  
DOI: <https://doi.org/10.1145/3526113.3545668>
- Villanueva, A.\*, **Zhu, Z.\***, Liu, Z., Wang, F., Chidambaram, S., & Ramani, K. 2022. ColabAR: A Toolkit for Remote Collaboration in Tangible Augmented Reality Laboratories. (\* **represents equal contribution**) Proceedings of the ACM on Human-Computer Interaction, 6(CSCW1), 1-22. (**CSCW 2022**).  
DOI: <https://doi.org/10.1145/3512928>
- Villanueva, A., **Zhu, Z.**, Liu, Z., Du, X., Huang, J., Peppler, K. A., & Ramani, K. 2021. RobotAR: An Augmented Reality Compatible Teleconsulting Robotics Toolkit for Augmented Makerspace Experiences. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (**CHI 2021**).  
DOI: <https://doi.org/10.1145/3411764.3445726>
- Villanueva, A., Liu, Z., Kitaguchi, Y., **Zhu, Z.**, Peppler, K., Redick, T., & Ramani, K. 2021. Towards modeling of human skilling for electrical circuitry using augmented reality applications. International Journal of Educational Technology in Higher Education, 18(1), 1-23.  
DOI: <https://doi.org/10.1186/s41239-021-00268-9>
- Villanueva, A., **Zhu, Z.**, Z., Liu, Z., Redick, T., Peppler, K., & Ramani, K. 2020. Meta-AR-App: An authoring platform for collaborative augmented reality in STEM classrooms. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (**CHI 2020**).  
DOI: <https://doi.org/10.1145/3313831.3376146>
- Villanueva, A., Kotak, H., Liu, Z., Mehta, R., Li, K., **Zhu, Z.**, & Ramani, K. 2020. ARbits: Towards a DIY, AR-compatible electrical circuitry toolkit for children. In Proceedings of the 2020 ACM Interaction Design and Children Conference: Extended Abstracts (**IDC EA 2020**).  
DOI: <https://doi.org/10.1145/3397617.3397849>