

Jiayan Zhao

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Education

- 2016–Dec 2020 **Ph.D.** in Geography, The Pennsylvania State University, USA
Thesis title: Spatial Learning in Virtual Environments
Advisor: Dr. Alexander Klippel
Committee members: Dr. Roger Downs, Dr. Shyam Sundar, and Dr. Ping Li
- 2014–2016 **M.A.** in Geography, University at Albany, State University of New York, USA
Thesis title: Supporting Spatial Orientation: Using Resizable Icons to Visualize Distant Landmarks on Mobile Phones
Advisor: Dr. Rui Li GPA: 3.85
- 2010–2014 **Bachelor of Engineering** in Geological Engineering, Central South University, China
Thesis title: The Analysis of Tectonic Characteristics and Their Evolution in Yuelu Mountain, Hunan Province, China
Advisor: Dr. Qianhong Wu GPA: 83%

Professional Experiences

- 2021/03–present **Postdoctoral Researcher** in the Center for Immersive Experiences, Penn State
- Spring 2020 **Teaching Assistant**, Geography 107: Immersive Technologies, Penn State
- Summer 2019 **Instructor**, Geography 160: Mapping our Changing World, Penn State
- 2018/04–present **Student Director**, the Environmental Perception and Behavioral Geography (EPBG) specialty group, American Association of Geographers (AAG)
- 2016–2020 **Research Assistant** for Dr. Alexander Klippel, Penn State
1. Digital Innovation through Immersive Technologies: Establishing New Paradigms for Environmental Decision Support (Penn State's seed grants)
 2. Collaborative Research: Improving Wayfinding and Navigation in Immersive Virtual Environments (NSF - CHS: Small)
 3. Immersive Virtual Reality (iVR): The Printing Press of the 21st Century and How Learning About Place and Space Will Never be the Same (COIL Research Initiation Grants)
- Summer 2016 **Staff Assistant** for Dr. Rui Li as an Android developer, University at Albany
- 2013–2014 **Creative Program**: The study of Copper Minerals with XPS (Funded by Central South University)
- Summer 2013 **Production Practice** in Baoshan mine, Chenzhou, Hunan Province, China
- Summer 2012 **Strata Map Charting Practice** in Loudi, Hunan Province, China

Journal Articles

1. **Zhao, J.**, Wallgrün, J. O., Sajjadi, P., LaFemina, P. C. & Klippel, A. (2021). Longitudinal effects in the effectiveness of educational virtual field trips. *British Journal of Educational Technology* (in preparation)
2. **Zhao, J.**, Ma, X., Simpson, M., Wallgrün, J. O., Sajjadi, P., & Klippel, A. (2021). Reference Frames and Geographic Scale – Understanding their Relationship in Environmental Learning. Submitted to *Cartography and Geographic Information Science* (in revision)
3. **Zhao, J.**, Sensibaugh, T., Bodenheimer, B., McNamara, T. P., Nazareth, A., Newcombe, N., Minear, M., and Klippel, A. (2020). Desktop versus immersive virtual environments: Effects on spatial learning. *Spatial Cognition & Computation*, 3(3), 1–36. <https://doi.org/10.1080/13875868.2020.1817925>
4. **Zhao, J.**, Simpson, M., Wallgrün, J. O., Sajjadi, P., & Klippel, A. (2020). Exploring the Effects of Geographic Scale on Spatial Learning. In *Cognitive Research: Principles and Implications*, 5(14), 1–18. <https://doi.org/10.1186/s41235-020-00214-9>
5. Li, P., Legault, J., Klippel, A., & **Zhao, J.** (2020). Virtual reality for student learning: Understanding individual differences. *Human Behaviour and Brain*, 28–36. <https://doi.org/10.37716/HBAB.2020010105>
6. **Zhao, J.**, Wallgrün, J. O., LaFemina, P. C., Normandeau, J., & Klippel, A. (2019). Harnessing the power of immersive virtual reality - visualization and analysis of 3D earth science data sets. In *Geo-spatial Information Science*, 22(4), 237–250. <https://doi.org/10.1080/10095020.2019.1621544>
7. Klippel, A., **Zhao, J.**, Oprean, D., Wallgrün, J. O., Stubbs, C., La Femina, P., & Jackson, K. L. (2019). The value of being there: Toward a science of immersive virtual field trips. *Virtual Reality*, 1(4), 24. <https://doi.org/10.1007/s10055-019-00418-5>
8. Klippel, A., **Zhao, J.**, Jackson, K. L., LaFemina, P., Stubbs, C., Oprean, D., Wetzel, R., Wallgrün, J. O., & Blair, J. (2019). Transforming Earth Science Education Through Immersive Experiences. Delivering on a Long Held Promise. In *Journal of Educational Computing Research* 10 (2). <https://doi.org/10.1177/0735633119854025>
9. Legault, J., **Zhao, J.**, Chi, Y.-A., Chen, W., Klippel, A., & Li, P. (2019). Immersive Virtual Reality as an Effective Tool for Second Language Vocabulary Learning. *Languages*, 4(1), 13. <https://doi.org/10.3390/languages4010013>
10. Huang, J., Bagher, M. M., Dohn Ross, H., Piekielek, N., Wallgrün, J. O., **Zhao, J.**, & Klippel, A. (2018). From Archive, to Access, to Experience—Historical Documents as a Basis for Immersive Experiences. *Journal of Map & Geography Libraries*, 14(1), 40–63. <https://doi.org/10.1080/15420353.2018.1498427>
11. Li, R., & **Zhao, J.** (2017). Off-Screen Landmarks on Mobile Devices: Levels of Measurement and the Perception of Distance on Resized Icons. *KI - Künstliche Intelligenz*, 7(27), 1–9. <https://doi.org/10.1007/s13218-016-0471-7>

Peer-Reviewed Conference Publications

1. Sajjadi, P., **Zhao, J.**, Wallgrün, J. O., LaFemina, P., Klippel, A. (2021). Comparing HMD Type and Spatial Ability on the Experiences and Learning of Students in iVFTs. In 2021 7th International Conference of the Immersive Learning Research Network (in review).
2. Sajjadi, P., Klippel, A., Wallgrün, J. O., **Zhao, J.**, Huang, J., Bagher, M. M., Riegel, H., Bursztyn, N. B. (2021). Accepted for 2021 *IEEE Virtual Reality Workshop on K-12 Embodied Learning Through Virtual and Augmented Reality (KELVAR)*.
3. **Zhao, J.**, LaFemina, P., Carr, J., Sajjadi, P., Wallgrün, J. O., & Klippel, A. (2020). Learning in the Field: Comparison of Desktop, Immersive Virtual Reality, and Actual Field Trips for Place-Based STEM Education. *2020 IEEE Virtual Reality Conference* (pp. 893–902). doi:10.1109/VR46266.2020.1581091793502

4. Sajjadi, P., **Zhao, J.**, Wallgrün, J. O., Furman, T., LaFemina, P., Fatemi, A., Zidik, Z. E., & Klippel, A. (2020). The Effect of Virtual Agent Gender and Embodiment on the Experiences and Performance of Students in Virtual Field Trips. *2020 IEEE International Conference on Teaching Assessment, and Learning for Engineering (TALE)*, Takamatsu, Japan, 2020, pp. 221-228, doi: 10.1109/TALE48869.2020.9368457
5. Klippel, A., **Zhao, J.**, Sajjadi, P., Wallgrun, J. O., Bagher, M. M., & Oprean, D. (2020). Immersive Place-based Learning – An Extended Research Framework. In *2020 IEEE Virtual Reality Workshop on K-12 Embodied Learning Through Virtual and Augmented Reality (KELVAR)* (pp. 449–454). doi:10.1109/VRW50115.2020.00095
6. **Zhao, J.** & Klippel, A. (2019). Scale - Unexplored Opportunities for Immersive Technologies in Place-based Learning. *2019 IEEE Virtual Reality Conference* (pp. 155–162). doi:10.1109/VR.2019.8797867
7. Wallgrün, J. O., Masrur, A., **Zhao, J.**, Taylor, A., Knapp, E., Chang, J. S. K. & Klippel, A. (2019). Low-Cost VR Applications to Experience Real World Places Anytime, Anywhere, and with Anyone. In *WEVR: The Fifth IEEE VR Workshop on Everyday Virtual Reality*. doi:10.1109/WEVR.2019.8809593
8. Klippel, A., **Zhao, J.**, Oprean, D., Wallgrun, J. O., & Chang, J. S.-K. (2019). Research Framework for Immersive Virtual Field Trips. In *2019 IEEE Virtual Reality Workshop on K-12 Embodied Learning Through Virtual and Augmented Reality (KELVAR)* (pp. 1612–1617). doi:10.1109/VR.2019.8798153
9. Wallgrün, J. O., Chang, J. S. K., **Zhao, J.**, Sajjadi, P., Oprean, D., Murphy, T., Baka, J., & Klippel, A. (2019). For the Many, Not the One: Designing Low-Cost Joint VR Experiences for Place-Based Learning. *EuroVR 2019 Conference*. doi:10.1007/978-3-030-31908-3_9
10. Klippel, A., Oprean, D., **Zhao, J.**, Wallgrün, J. O., LaFemina, P., Jackson, K., Gowen, E. (2019) Immersive Learning in the Wild: A Progress Report. In: Beck D. et al. (eds) *Immersive Learning Research Network. iLRN 2019. Communications in Computer and Information Science*, vol 1044. Springer, Cham. doi:10.1007/978-3-030-23089-0_1
11. Oprean, D., Verniz, D., **Zhao, J.**, Wallgrün, J. O., Duarte, J., & Klippel, A. (2018). Remote studio site experiences: Investigating the potential to develop the immersive site visit. In T. Fukada, W. Huang, P. Janssen, K. Crolla, & S. Alhadidi (Eds.), *Learning, Adapting and Prototyping, Proceedings of the 23rd International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) 2018*. Hong Kong: The Association for Computer-Aided Architectural Design Research in Asia.
12. **Zhao, J.**, Lafemina, P., Wallgrun, J. O., Oprean, D., & Klippel, A. (2017). iVR for the geosciences. *2017 IEEE Virtual Reality Workshop on K-12 Embodied Learning through Virtual & Augmented Reality (KELVAR)*. doi:10.1109/kelvar.2017.7961557
13. Masrur, A., **Zhao, J.**, Wallgrün, J. O., LaFemina, P., & Klippel, A. (2017). Immersive applications for informal and interactive learning for earth sciences. In B. Bach et al. (Eds.), *Workshop on Immersive Analytics. Exploring Future Interaction and Visualization Technologies for Data Analytics*. In conjunction with IEEE VIS, Phoenix, Arizona, USA, October 1st, 2017.
14. Simpson, M., **Zhao, J.**, & Klippel, A. (2017). Take a walk: Evaluating movement types for data visualization in immersive virtual reality. In B. Bach et al. (Eds.), *Workshop on Immersive Analytics. Exploring Future Interaction and Visualization Technologies for Data Analytics*. In conjunction with IEEE VIS, Phoenix, Arizona, USA, October 1st, 2017.
15. Wallgrün, J. O., Huang, J., **Zhao, J.**, Ebert, C., Roddy, P., Murtha, T., Awe, J., Klippel, A. (2017). Immersive Technologies and Experiences for Archaeological site exploration and analysis. In P. Fogliaroni, A. Ballatore, & E. Clementini (Eds.), *Proceedings of Workshops and Posters at 13th International Conference on Spatial Information Theory (COSIT 2017)* (pp. 307–314). Berlin: Springer. doi:10.1007/978-3-319-63946-8_48
16. Wallgrün, J. O., Huang, J., **Zhao, J.**, Masrur, A., & Klippel, A. (2017). A framework for low-cost multi-platform VR and AR site experiences. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* (pp. 263-270). doi:10.5194/isprs-archives-XLII-2-W8-263-2017

17. Oprean, D., Wallgrün, J. O., Pinto, D. J. M., Verniz, D., Zhao, J., & Klippel, A. (2018). Developing and Evaluating VR Field Trips. In P. Fogliaroni, A. Ballatore, & E. Clementini (Eds.): *Lecture notes in geoinformation and cartography, Proceedings of workshops and posters at the 13th International Conference on Spatial Information Theory (COSIT 2017)*. Cham: Springer. https://doi.org/10.1007/978-3-319-63946-8_22
18. **Zhao, J.**, & Li, R. (2016). Visualizing distance objects on mobile phones: Choice of resizable icons. In S. M. Freundschuh (Ed.), *Conference Proceedings, AutoCarto2016. The 21st International Research Symposium on Computer-based Cartography and GIScience*, Albuquerque, New Mexico, USA. September 14-16, 2016. (pp. 239–250). CaGIS.

Other Conference Publications

1. Sajjadi, P., **Zhao, J.**, Wallgrün, J. O., LaFemina, P., & Klippel, A. (2021). HMD Type and Spatial Ability: Effects on the Experiences and Learning of Students in Immersive Virtual Field Trips [poster]. Accepted for *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*.
2. **Zhao, J.**, Simpson, M., Wallgrün, J. O., Sajjadi, P., & Klippel, A. (2020). Extended Realities – How Changing Scale Affects Spatial Learning [poster]. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)* (pp. 601–602). doi:10.1109/VRW50115.2020.00151
3. Klippel, A., Wallgrün, J. O., **Zhao, J.**, Oprean, D., Chang, S. K., LaFemina, P. C., Pejman, S., Bagher, M.M. (2019). Place-based education - an immersive technologies perspective [abstract]. In: *Fall Meeting of American Geophysical Union (AGU)*; 2019 Dec 9–13; San Francisco, CA. Abstract ED12A-04.
4. LaFemina, P. C., Klippel, A., Carr, J. C., **Zhao, J.**, Wallgrün, J. O., Oprean, D., Chang, S. K., Jackson, K. L. (2019). Bringing the Field to the Classroom: Immersive Virtual Fieldtrips in Undergraduate Geoscience Courses [poster]. In: *Fall Meeting of American Geophysical Union (AGU)*; 2019 Dec 9–13; San Francisco, CA. Abstract nr ED53E-0885.
5. Klippel, A., Wallgrün, J. O., Masrur, A., **Zhao, J.**, & Peter LaFemina (2019). Warping space and time - xR reviving educational tool of the 19th century. In *IEEE VR Poster*. doi:10.1109/VR.2019.8797897
6. Klippel, A., **Zhao, J.**, Wallgrün, J. O., Oprean, D., Stubbs, C., Jackson, K. L., & LaFemina, P. C. (2018). The Value of Being There: Toward a Science of Immersive Virtual Field Trips [abstract]. In: *Fall Meeting of American Geophysical Union (AGU)*; 2018 Dec 10–14; Washington, DC. Abstract nr ED54B-07.
7. **Zhao, J.**, Wallgrün, J. O., LaFemina, P. C., DiBiase, R. A., Carr, J. C. & Klippel, A. (2018). Toward a Universal Workbench for Visualization and Quantitative Exploration of Earth Science Data in Immersive Virtual Reality [abstract]. In: *Fall Meeting of American Geophysical Union (AGU)*; 2018 Dec 10–14; Washington, DC. Abstract nr IN53B-04.
8. **Zhao, J.**, Klippel, A., Minear, M., Newcombe, N., Bodenheimer, B., McNamara, Bodenheimer, B., McNamara, T., Nazareth, A., & Sensibaugh, T. (2018). Walking and learning in a large-scale mediated space: Impacts of viewpoint transition and proprioceptive feedback on spatial learning in virtual reality [abstract]. In *COGNITIVE PROCESSING* (Vol. 19, S55-S55). Retrieved from <https://link.springer.com/content/pdf/10.1007%2Fs10339-018-0884-3.pdf>

Presentations

1. Learning in the field: Comparison of desktop, immersive virtual reality, and actual field trips for place-based STEM education. *2020 IEEE Virtual Reality Conference*, Atlanta, GA (03/26/2020)
2. Extended Realities – How Changing Scale Affects Spatial Learning. *IEEE VR Poster*, Atlanta, GA (03/23/2020–03/25/2020)
3. Iovist Scale - An Unexplored Opportunity for Spatial Learning in Virtual Environments. *AAG*, Washington, D.C. (04/05/2019)

4. David and Goliath – Visual Accessibility in Spatial Learning. *EMS Graduate Research Showcase and Reception* [poster], University Park, PA (10/23/2019)
5. Toward a Universal Workbench for Visualization and Quantitative Exploration of Earth Science Data in Immersive Virtual Reality. *AGU Fall Meeting*, Washington, D.C. (12/14/2018)
6. Walking and learning in a large-scale mediated space: Impacts of viewpoint transition and proprioceptive feedback on spatial learning in virtual reality. *ICSC*, Rome, Italy (09/11/2018)
7. Walking and learning in a large-scale mediated space: Impacts of viewpoint transition and proprioceptive feedback on spatial learning in virtual reality. *Spatial Cognition 2018 Doctoral Colloquium*, Tübingen, Germany (09/08/2018)
8. Effects of isovist scale on spatial learning. *Virtual environments as geo/spatial labs workshop (Spatial Cognition)*, Tübingen, Germany (09/05/2018)
9. Walking and Learning in a Large-Scale Mediated Space: Impacts of viewpoint transition and body-based cues on spatial learning in virtual reality. *Data Blitz (2nd Interdisciplinary Navigation Symposium)*, Mont-Tremblant, Canada (06/26/2018)
10. Walking and Learning in a Large-Scale Mediated Space: Impacts of viewpoint transition and proprioceptive feedback on spatial learning in virtual reality. *AAG Annual Meeting*, New Orleans, LA (04/11/2018).
11. Walking and Learning in a Large-Scale Mediated Space: The impacts of viewpoint transition on spatial learning in virtual reality. *Thinking Within 2017*, University Park, PA (12/02/2017)
12. Developing a VR Toolbox for Geoscience Research and Education. *AAG Annual Meeting*, Boston, MA (04/06/2017)
13. iVR for the Geosciences. *KELVAR Workshop (IEEE VR)*, Los Angeles, CA (03/19/2017)
14. iVR in Education: Collecting, Visualizing, and Sharing Information in a Virtual Space. *MAD-AAG*, Fairfax, VA (11/18/2016)
15. Visualizing Distant Objects on Mobile Phones: Choice of Resizable Icons. *AutoCarto*, Albuquerque, NM (09/16/2016)
16. Using Resizable Icons to Visualize Distant Landmarks on Mobile Devices [poster]. *The 2015 New York State Geospatial Conference*, Albany, NY (10/28/2015–10/30/2015)

Honors and Awards

2018, 2019	Winner of the AAG EPBG Specialty Group Saarinen Student Paper Competition
2018	Outstanding Research Assistant, Department of Geography, Penn State
2017, 2018	Erickson Fund in Geography, Department of Geography, Penn State
2016-2020	Penn State Geography Graduate Assistantship
2015	AAG Cartography Specialty Group Master's Thesis Research Grants
2013	Second-class scholarship, Central South University
2012	Third-class scholarship, Central South University

Ad-Hoc Reviewer

iLRN 2020: 6th International Conference of the Immersive Learning Research Network, 2021 (4)
 Behaviour & Information Technology, 2021
 Journal of Environmental Psychology, 2021 (2)
 International Journal of Human-Computer Interaction, 2020
 Annals of the American Association of Geographers, 2020
 Journal of Location Based Services, 2020
 iLRN 2020: 6th International Conference of the Immersive Learning Research Network, 2020
 Journal of Technology in Human Services, 2019

Journal of IEEE Transactions on Visualization and Computer Graphics, 2019
Cartography and Geographic Information Science, 2016 (1), 2020 (4)

Professional Services

2020/03 Conference volunteer, IEEE VR 2020, Atlanta, GA
2019/04 Session chair, Spatial Cognition in Virtual Environments: Opportunity Through Immersive Technologies.
AAG 2019, Washington, D.C.
2018/09 Workshop co-organizer, Virtual environments as geo/spatial labs, Spatial Cognition 2018, Tübingen,
Germany
2017/03 Conference volunteer, IEEE VR 2017, Los Angeles, CA

Skills

Computer Software Unity3D, Android Studio, RStudio, SPSS, Agisoft PhotoScan, MeshLab, CloudCompare,
ERDAS IMAGINE, Esri ArcGIS, Mapbox, Microsoft Excel, Qualtrics, WordPress
Programming C#, R, Java, Python, JavaScript, GNU Octave, LaTeX

Memberships

2018–Present **Member**, American Geophysical Union
2015–Present **Member**, Association of American Geographers

Public Outreach

16. **Immersive Technology Open House**, Center for Immersive Experiences, Penn State University, 11/12/2019
15. **SCDC Flash Symposium and Open House**, College of Arts and Architecture, Penn State University,
9/24/2019
14. **Discovery Space**, State College, PA, 3/18/2019
13. **EMS Reception**, AGU Fall Meeting, Washington DC, 12/13/2018
12. **GIS Day**, Pattee Library, Penn State University, 11/13/2018
11. **Virtual Reality Open House**, Earth and Mineral Sciences Library, Penn State University, ~30 participants,
11/08/2018
10. **Haunted-U Science Night**, the Life Sciences Building and Whitmore Laboratory, Penn State University,
10/20/2018
9. **The Immersive Technologies Open House**, Department of Geography, Penn State University, ~20
participants, 10/20/2018
8. **Visiting Professor and students from the Institute of Remote Sensing and GIS within the College of Earth
and Space science, Peking University**, 10/2/2018
7. **Central Pennsylvania Festival of the Arts**, State College, Official Penn State Booth, 7/14/2018
6. **EMS Graduation Reception**, Penn State University, 5/04/2018
5. **3D and Immersive Technologies for Geospatial Sciences session**, AAG Annual Meeting, New Orleans, LA,
4/13/2018
4. **Thinking Within Symposium**, the Penn State Stuckeman School, Penn State University, ~43 participants,
12/2/2017
3. **LEAP class**, Willard Building, Penn State University, 17 students, 7/25/2017.
2. **The Nittany Jamboree Scout event**, Medlar Field, Penn State University, 9/16/2017
1. **PSU Immersive Reality Symposium** (Industry and Showcases), HUB-Robeson Center, Penn State University,
10/31/2016

