Shufan Yu

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EDUCATION & EXPERIENCE

The Hong Kong Polytechnic University (PolyU) **Hong Kong SAR, China**
Postdoctoral fellow Sep. 2024

- **Brain, Language, and Computation Lab, Advisor: Prof. Ping Li**
- **Research:** Neural coupling during collaborative learning in VR

Central China Normal University (CCNU) **Wuhan, China**
Ph.D. in Educational Technology Sep. 2019 to Dec. 2023

- **Virtual Learning Lab, Advisor: Prof. Qingtang Liu**
- **Thesis:** "Research on the Construction and Application of a Virtual-real Mixed Junior High School Circuit Experiment based on the Theory of Embodied Cognition"

Arizona State University (ASU) **Tempe, AZ, USA**
Visiting Scholar in Cognitive Psychology Nov. 2021 to Dec. 2022

- **Embodied Games Lab, Advisor: Prof. Mina C. Johnson-Glenberg**
- **Project:** Haptic Titration experiment; Tuned Mass Damper simulation

Central China Normal University (CCNU) **Wuhan, China**
M.Sc. in Educational Technology Sep. 2016 to June. 2019

- **Virtual Learning Lab, Advisor: Prof. Qingtang Liu**
- **Thesis:** "Research on the AR-based magnetism experiment"

Yancheng Teachers University **Yancheng, China**
B.Eng. in Digital Media Technology Sep. 2012 to June. 2016

RESEARCH

Research Interest

- XR-based learning
- Cognitive neural science
- Embodied cognition
- Pedagogical agent/avatar

Research Project

Research on the effect of level of embodiment and external representation of a virtual real mixed electric circuit on students' learning performance— funded by excellent doctoral dissertation project of CCNU **PI Sep. 2022 - June. 2023**

- Conduct a 2*2 quasi-experiment to investigate the effects of embodiment and representation of an AR-based electric circuit learning tool on students' learning
- Collect the quantitative and qualitative data
- Data analysis (t-test, ANCOVA, Content analysis)

Research on Key Technologies of constructing Virtual and Real Fusion Experimental

Environment — funded by excellent doctoral dissertation project of CCNU **PI Sep. 2021 - June. 2022**

- Develop an Assembleable AR-based circuit experiment
- Proposed A AR-based circuit calculation algorithm
- Visualizing current direction of AR circuit
- Implementing the auto-generation of circuit graph
- Designing the personalized feedback

Research on the development and implementation of an AR-based magnetism learning tool — funded by innovation project of graduate students of CCNU **PI Sep. 2019 - June. 2020**

- Investigate the key technology to develop a virtual-real mixed magnetism learning tool
- Conduct a quasi-experiment to explore its effects on students' learning
- Data analysis
- Paper writing and publishing

Research on development system for virtual and real fusion experiments of multimodal natural interaction — funded by self-determined researcher funds of CCNU from the colleges' basic research and operation of Ministry of Education in China. **Co-PI June. 2018- June. 2020**

- Design, develop, and assessment some AR/VR-based instructional virtual experiments

Key Technology Research and Demonstration of Tujia music culture digital protection and display — funded by Chinese National Key Technology Research and Development Program of the Ministry of Science and Technology of China. **Co-PI Jan. 2016-Jun. 2019**

- Design and develop the Tujia virtual dance teaching system based on Kinect
- Propose an algorithm calculating students' dancing performance based on Kinect

Journal Articles （*Corresponding author）

J1. Gong, X., **Yu, S***., et al. (2025) Learners' interaction patterns in collaborative programming: An integration of the social epistemic interactions. *Educational Technology & Society* (accepted)

J2. Ma, J., Liu, Q., **Yu, S.**, Liu, J., Li, X., & Wang, C. (2025). What factors influence scientific concept learning? A study based on the fuzzy-set qualitative comparative analysis. *British Journal of Educational Technology*, 56(1), 250–275. https://doi.org/10.1111/bjet.13499

J3. Ma, J., Liu, Q., **Yu, S.**, Li, X., & Liu, J. (2025). Prompting scientific concept learning in augmented reality: impact of the concept map strategy on mental models and cognitive load. *Educational Technology Research and Development*, 0123456789. https://doi.org/10.1007/s11423-025-10470-5

J4. Chen, F., Zhang, S., Liu, Q., **Yu, S.,** Li, X., & Zheng, X. (2025). Supporting learning performance improvement: Role of online group assessment. *Education and Information Technologies*, *30*(1), 1239–1264. https://doi.org/10.1007/s10639-024-12907-5

J5. Gong, X., Xu, W., **Yu, S**., Ma, J., & Qiao, A. (2025). Enhancing computational thinking and spatial reasoning skills in gamification programming learning: A comparative study of tangible, block and paper-and-pencil tools. *British Journal of Educational Technology*, 56(1), 80–102. https://doi.org/10.1111/bjet.13482

J6. **Yu, S.**, Liu, Q., Liu, J., Ma, J., & Yang, Y. (2023). Integrating augmented reality into acoustics learning and examining its effectiveness: a case study of Doppler effect. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-12091-y

J7. Liu, J., Liu, Q., **Yu, S.,** Ma, J., Liu, M., & Wu, L. (2023). How do autonomy and learner characteristics combine to influence learners' learning outcomes and cognitive load in virtual reality learning environments? A fuzzy-set qualitative comparative analysis approach. *Education and Information Technologies*, *0123456789*. https://doi.org/10.1007/s10639-023-12262-x

J8. Gong, X., **Yu, S***., Xu, J., Qiao, A., & Han, H. (2023). The effect of PDCA cycle strategy on pupils' tangible programming skills and reflective thinking. *Education and Information Technologies*, *0123456789*. https://doi.org/10.1007/s10639-023-12037-4

J9. Johnson-Glenberg, M. C., Yu, C. S. P., Liu, F., Amador, C., Bao, Y., **Yu, S**., & LiKamWa, R. (202 3). Embodied mixed reality with passive haptics in STEM education: randomized control study wit h chemistry titration. *Frontiers in Virtual Reality*, *4*(July), 1–20. https://doi.org/10.3389/frvir.2023. 1047833

J10. **Yu, S*.**, Liu, Q., Johnson-Glenberg, M. C., Han, M., Ma, J., Ba, S., & Wu, L. (2023). Promoting musical instrument learning in virtual reality environment: Effects of embodiment and visual cues. *Computers & Education*, 198, 104764. https://doi.org/10.1016/j.compedu.2023.104764

J11. Liu, Q., Ma, J., **Yu, S.**, Wang, Q., & Xu, S. (2023). Effects of an Augmented Reality-Based Chemistry Experiential Application on Student Knowledge Gains, Learning Motivation, and Technology Perception. *Journal of Science Education and Technology*, 32, 153–167. https://doi.org/10.1007/s10956-022-10014-z

J12. **Yu, S.**, Liu, Q., Ma, J., Le, H., & Ba, S. (2023). Applying Augmented reality to enhance physics laboratory experience: does learning anxiety matter? *Interactive Learning Environments*, 31(10), 6952–6967. https://doi.org/10.1080/10494820.2022.2057547

J13. Wang, C., & **Yu, S***. (2023). Tablet-to-student ratio matters: Learning performance and mental experience of collaborative inquiry. *Journal of Research on Technology in Education*, 55(4), 646–662. https://doi.org/10.1080/15391523.2021.2015018

J14. Liu, Q., **Yu, S*.,** Chen, W., Wang, Q., & Xu, S. (2021). The effects of an augmented reality based magnetic experimental tool on students' knowledge improvement and cognitive load. *Journal of Computer Assisted Learning*, 37(3), 645–656. https://doi.org/10.1111/jcal.12513

J15. Yang, W., Qingtang, L., Haoyi, H., Hairu, Y., **Shufan, Y.**, Huixiao, L., & Yangyang, Y. (2018). Personal Active Choreographer: Improving the Performance of the Tujia Hand-Waving Dance. *IEEE Consumer Electronics Magazine*, 7(4), 15–25.

Conference Proceedings

C1. Liu, Q., Sun, L., Ma, J., **Yu, S.,** & Wu, L. (2023). Geometry Wall: An Embodied Gesture-based Game for Supporting Spatial Ability. *2022 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE)*, 258–263.

C2. Johnson-Glenberg, M. C., Kapadia, A., Liu, F., Likamwa, R., **Yu, S**., Bennett, A., Kosa, M., Bao, Y., Balanzat, D., & Yu, C. S. P. (2022). *XR - Titration and Civil Engineering: Design Issues & Preliminary Results.* Poster presented at the American Educational Research Association (AERA), San Diego, CA. April, 2022.

C3. Liu, J., Liu, Q., **Yu, S**., Ma, J., Liu, M., & Wu, L. (2022). Which Types of Learners Are Suitable for the Virtual Reality Environment: A fsQCA Approach. *2022 8th International Conference of the Immersive Learning Research Network (ILRN)*, 1–5. https://doi.org/10.23919/iLRN55037.2022.9815913

C4. Qingtang, L., Yuwei, J., Jindian, L., Miaomiao, H., Jingjing, M., & **Shufan, Y**. (2021). Design and Implementation of Virtual Sanxian Teaching System. *2021 IEEE International Conference on Engineering, Technology & Education (TALE)*, 938–943. https://doi.org/10.1109/TALE52509.2021.9678770

C5. **Shufan, Y.**, Qingtang, L., Suxiao, X., Yuanyuan, Y., & Linjing, W. (2018). Design and Practice

of Exploratory Virtual Experiment in Physics Discipline. *Proceedings of the 2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*, Wollongong, Australia. (presentation)

C6. Liu, Q., **Yu, S**., Lin, L., Xu, S., & Wu, L. (2018). Design and Implementation of an Immersive Virtual Reality Biological Courseware—Miraculous Eyeball. *Proceedings of the 2018 International Conference on Blended Learning (ICBL),* Kansai, Japan. (presentation)

C7. Liu, Q., **Yu, S.**, Wang, Y., Le, H., & Yuan, Y. (2017). A hand-waving dance teaching system based on kinect. *Proceedings of the 2017 International Conference on Blended Learning (ICBL),* Hongkong, China. (presentation)

C8. Liu, Q., Xu, S., **Yu, S.**, Yang, Y., Wu, L., & Ba, S. (2019). Design and implementation of an ar-based inquiry courseware - Magnetic field. *Proceedings of the 2019 International Symposium on Educational Technology (ISET),* Hradec Králové, Czech Republic.

C9. Zhai, X. M., Meng, N., & **Yu, S**. (2019). Investigating Using Behaviors of E-dictionary with Multiple Design: A Perspective from the Integration of Eye-Tracking Technique and Stimulated Recall. *Proceedings of the 2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*, Wollongong, Australia.

C10. Yang, Y., Liu, Q., Wu, L., Xu, S., **Yu, S.**, & Zhang, N. (2019). Design and development of mobile augmented reality for mathematical experiments. *Proceedings of the 2019 International Symposium on Educational Technology (ISET),* Hradec Králové, Czech Republic.

Software Copyright

- An education game based on Leapmotion -- cellular immunity
- A Tujia Hand-waving dance teaching system based on kinect
- A Tujia Sayeerhe dance teaching system based on kinect
- A virtual experiment platform based on AR technology
- Experimental system of light polarization based on augmented reality technology

Chinese National Invention Patent

- Liu, Q., **Yu, S.,** Jiang, Y., Han, M., Zhou, S., Ma, J., Wu, L. (2023) A Computational Method and System for an Assemblable Virtual-Real Fusion Experimental Circuit. ZL 2021 1 0813426.9
- Liu, Q., **Yu, S.,** Ma, J., Xu, S., Zheng, X., Yang, W., Wu, L. (2023) A magnetic field visualization method, system, and equipment for virtual-real fusion experiments. ZL 2020 1 1393486.1
- Liu, Q., **Yu, S.,** Li, Y., Zhang, Y., Yuan, Y., Wang, Y., Huang, J., Wu, L. (2021) A teaching method and system for virtual dance. ZL 2018 1 0548334.0
- Liu, Q., Wang, Y., **Yu, S.,** Wu, L., Huang, J., Zhang, Y., Chang, Y., Yuan, Y. (2019) An assessment method for virtual dance system. ZL 2017 1 0774286.2

HONORS AND AWARDS

- National Scholarship for Graduate Students, Ministry of Education of the PRC, 2021.
- First prize, the 3rd "iTeach" National College Students Digital Education Application Innovation Competition, Ministry of Education of the PRC, 2019.
- Second Prize, the "Internet+" competition of the school of Educational information technology, CCNU, 2018
- National Scholarship for Graduate Students, Ministry of Education of the PRC, 2018.

- The scholarship for outstanding graduates, CCUN, 2017

PROFESSIONAL MEMBERSHIP

- Immersive Learning Research Network (iLRN)

REVIEWER

- Journal of computer assisted learning
- IEEE transactions on learning technology
- Computers & Education
- Education and information technologies
- Journal of Research on Technology in Education
- Journal of educational computing research
- Universal Access in the Information Society
- International Journal of Human–Computer Interaction

PROFESSIONAL SKILL

- **Specialized software:** SPSS, Visual Studio, Mplus, Photoshop, Premiere, 3DS max etc
- **Data analysis**: GLM, HLM, Network analysis (ENA, ONA), sequential analysis (LSA)
- **Programing language**: C, C #, R, HTML, Jekyll
- **3D game engine technology**: UNITY
- **XR development**: Vuforia, VR_TK