Siyu Wu

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https://siyuwu528.github.io/
Google Scholar

EDUCATION

Pennsylvania State University *University Park, PA*
PhD in Informatics: Information Sciences & Technology *Expected Grad May 2026*

- Research Area: Neural Symbolic AI & Data Science & HCI & Instructional Tech

Utah State University *Logan, UT*
Master of Science: Instructional Technology & Learning Science *Aug 2022*

- Research Thesis: Modeling a Pandemic: Investigating Student Learning about Disease Spread in the Context of Agent-Based Modeling (2022). All Graduate Theses and Dissertations. 9706.

WORK EXPERIENCE

Bosch Research and Technology Center
AI Intern *Pittsburgh, PA May 2024 – August*

- Implement, apply, and evaluate cognitive neuro-symbolic algorithms to:
  - Process relevant information for decision-making tasks.
  - Generate synthetic data from cognitive simulations.
  - Infuse distilled data into large language models.

  This pipeline was effectively applied to concrete use cases at Bosch.
- Led to two papers and the filing of one patent.

Pennsylvania State University *University Park, PA*
Teaching Assistant*:* College of IST *Aug 2024 – Current*

- Supported teaching of Data Mining 557, a fundamental course for MS and PhD students on the AI and DS track

Learning Design Assistant*:* Office of Learning Design, College of IST *Jan 2024 – May 2024*

- Heads to conduct accessibility evaluation in IST World campus courses, resolved 1 full online course document accessibility issues, and enhanced 1 full online course CSS accessibility issues.

Research Assistant: Applied Cognitive Science Lab *Dec 2022 – Jan 2024*

- Leads a team to design an autonomous driving agent using intelligent systems incorporating cognitive modeling techniques (ACT-R) & extended robotic hands & eyes. Achieves 1200% performance improvement compared to previous agent for the same task.

Model Developer: Center for Science and Schools (CSATS) *June 2023 – July 2023*

- Headed team to reinvigorate a stagnant Nettango project. Improved an agent-based computational Nettango model in the context of Pollinator phenomenon. Specifically, incorporated student intuition by adding relevant blocks to the model, and created a flowchart and an e-learning curriculum focused on modeling.

Research Assistant: National Science Foundation Grant Project *Aug 2022 – May 2023*

- Supported to conduct statistical data analysis using SPSS & perform data visualization using Tableau to examine & present how feedback design in an automatic writing analysis system.

Utah State University *Logan, UT*
Research Assistant: National Science Foundation Grant Project *Jan 2020 – Aug 2022*

- Self-started the deployment & implementation of agent-based block-based computational models using the NetLogo programming language & Nettango platform. Created a suite of models for middle school students. Qualitative analysis demonstrated the effectiveness of this instructional tool for learning about complex public health phenomena

Research Assistant: National Institute of Food Agriculture Grant Project Sep *2021– Aug 2022*

- Headed the development of a user-centered website. Used HTML, CSS, and JavaScript for the front-end, and JavaScript, PHP, and SQL for the back-end database. Successfully delivered an accessible website that allowed users to search through over 100 curricula via a user-friendly interface. https://smartfoodscapes.com/education/ed-home.html

Web Accessibility Evaluator: WebAim, Disability Research center *Sep 2021– Oct 2021*

Brex Inc. *San Francisco, CA*
Instructional Technology Intern *May 2021– Dec 2021*

- Coordinated to develop the online training courses for onboarding using Articulate Storyline, Photoshop, and Adobe Suite, resulting in the conversion of a week of onboarding training to an online format.

US PATENT

System and Method for a Cognitive Architecture Utilized in Manufacturing. Siyu Wu (original inventor), Alessandro Oltramari (joint inventor). United States application or PCT international application number 18/888,659, filed on September 18, 2024.

AWARDS

- Future Leaders Summit Recipient (Fully funded and only one in PSU) hosted by the Michigan Institute for Data Science (MIDAS), University of Michigan. Nominated by C Lee Giles *April 2024*
- SBP-BRIMS 2023 conference scholarship *2023,2024*
- Dr. William Rothwell Distinguished Professor Fund *Apr2023 – 2024*
- Robert Graham Endowed Fellowship, Penn State University *Aug 2022 – 2024*
- Graduate Enhancement Award, Utah State University *Aug 2021– Aug 2022*

GRANT PROPOSAL

Enhancing LLMs with a Neuro-Symbolic Architecture (ACT-R) for explanation, decision making, and reasoning by Frank E Ritter, C Lee Giles, and Siyu Wu. Proposal submitted to OpenAI: Superalignment Fast Grant. My role: Co-PI and collaborator Submitted not funded

SELECTED PUBLICATIONS

(Published, accepted, submitted, complete list of publications see google scholar)

Journal:

- Wu. S., Oltramari. A., Francis. J., Giles. L., and Ritter. F. Cognitive LLMs: Toward Human-Like Artificial Intelligence by Integrating Cognitive Architectures and Large Language Models for Manufacturing Decision-Making. Under Review of Special Issue on Trustworthy Neurosymbolic AI in the Journal of Neural Symbolic Artificial Intelligence.
- Wu. S., Oltramari. A., Ritter. F. VSM-ACTR 2: A Human-Like Decision Making Model with Metacognition for Manufacturing Solutions. Under Review of *Journal of Computational and Mathematical Organization Theory*

Conference:

- **Best Student Paper Award**
  Wu, S., Oltramari, A., Ritter, F. E. (June, 2024) VSM-ACT-R: Toward Using Cognitive Architecture For Manufacturing Solutions. In proceedings of 17th International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMs).
- Wu, S., Ferreira, R., Ritter, F. E., Walter., L. (2024) Comparing LLMs for Prompt-Enhanced ACT-R and Soar Model Development: A Case Study in Cognitive Simulation. Proceedings of 38th Annual Association for the Advancement of Artificial Intelligence (AAAI) Conference on Artificial Intelligence Fall Symposium Series on Integrating Cognitive Architecture and Generative Models at Arlington, Virginia, USA.DOI: https://doi.org/10.1609/aaaiss.v2i1.27710
- Wu, S., Bagherzadeh, A., Ritter, F. E., Tehranchi, F. (2023) Long Road Ahead: Lessons Learned from the (soon to be) Longest Running Cognitive Model. Proceedings of 21st International Conference on Cognitive Modeling (ICCM) at the University of Amsterdam, the Netherlands. 281-287.
- Wu, S., Bagherzadeh, A., Ritter, F. E., Tehranchi, F. (2023) Cognition Models Bake-off: Lessons Learned from Creating Long-Running Cognitive Models. In proceedings 16th International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMs) 342-343.
- Wu, S., Swanson, H., Sherin, B., Wilensky, U. (2023). Using Agent-based Computational Modeling Microworlds to Help Middle School Students Learn about Epidemiology. Paper

presented at the [2023] annual meeting of the American Educational Research Association. Retrieved [March, 4th. 2024], from the AERA Online Paper Repository.

- Wu, S., Swanson, H., Sherin, B., Wilensky, U. (2022). Investigating student learning about disease spread and prevention in the context of agent-based computational modeling. Proceedings of the 16th International Conference of the Learning Sciences - ICLS 2022. (pp. 1245 - 1248). Hiroshima, Japan: International Society of the Learning Sciences
- Kim. C., Puntambekar. S., Lee. E., Gnesdilow D., Dey, I., Cang, X., Wu, S., Passonneau, R. (2023) Understanding of a Law of Science and Its Relation to Science Writing with Automated Feedback. Proceedings of 17th International Conference of the Learning Sciences - ICLS 2023

Book:

- Roy. K., Wu. S., Oltramari. A. (Sep, 2024) Neurosymbolic Cognitive Methods for Enhancing Foundation Model-based Reasoning, Handbook on Neurosymbolic AI and Knowledge Graphs, IOS press, https://scholarcommons.sc.edu/csce_facpub/310/

Preprint:

- Wu. S., Oltramari. A., Francis. J., Giles. L., and Ritter. F. (2024) Cognitive LLMs: Towards Integrating Cognitive Architectures and Large Language Models for Manufacturing Decision-making. https://www.arxiv.org/abs/2408.09176

SELECTED RELEVANT PRESENTATIONS

(Complete list of presentations available upon request)

- Oltramari. A., Wu. S. (2024) Cognitively inspired Decision Intelligence for Manufacturing. Bosch Neural Symbolic AI global research team meeting presentation.
- Wu, S.(2024). LLAMA-ACT-R: Use Neuro-Symbolic Architecture (ACT-R) for LLM Decision Making in Manufacturing. 2024 Soar Workshop Presentation at University of Michigan, Ann Arbor.
- Wu, S., Giles, C. L., & Ritter, F. E. (2024). LLAMA-ACT-R, a neuro-symbolic architecture (ACT-R) for LLM decision making. In Poster presented in Annual Ethical AI Symposium. University of Michigan Institute for Data Science.
- Wu, S., Giles, C. L., & Ritter, F. E. (2024). LLAMA-ACT-R, a neuro-symbolic architecture (ACT-R) for LLM decision making. In Poster presented in Penn State University AI week.
- Wu, S., Jackson, S., Strauss, S., Dai, X., Dinç, E., Kim, E., Kim, G., Luo, Y., Zhao. R. (2024, Mar). Heus omnibus linguistae audite vocem populi: Hey all you linguists, listen to the people's voices. Poster presented to the 2024 Conference of the American Association for Applied Linguistics (AAAL), Houston, TX.
- Wu, S. Bagherzadeh, A., Ritter, F., Tehranchi, F (2023, June). Long Road Ahead: Lessons Learned from the (soon to be) Longest Running Cognitive Model. Poster for the 2023 Graduate Women in Science National Conference, PA, USA
- Wu.S. (2023, March). Student Learning in the Context of Agent-based Computational Modeling Microworlds. Lightening talk for the 2023 Symposium for Teaching and Learning with Technology at Penn State University Park Campus
- Northup. J., Wu. S. (2022, November). CSS Pitfalls for Screen Readers. Conference workshop presentation in 25th annual Accessing Higher Ground Accessible Media, Web and Technology Conference, Denver, Colorado

SERVICE TO THE PROFESSION AND COMMUNITY

• **Reviewer**	Conference on Robot Learning (CoRL)	*2024*
• **Program Committee &Reviewer**	International Conference on Neural symbolic Reasoning and Learning (NeSy)	*May 2024- Current*
• **Reviewer**	IEEE Transactions on Knowledge and Data Engineering	*April 2024 – Current*
• **Reviewer**	Journal of Neurosymbolic Artificial Intelligence	*Dec 2023 – Current*
• **Member**	Advanced Association of Artificial Intelligence (AAAI)	*Sep 2023 – Current*
• **Member**	IEEE, Institute of Electrical and Electronics Engineers	*Jul 2023 – Current*
• **Member**	Center for Socially Responsible Artificial Intelligence, PSU	*Jul 2023 – Current*
• **Program Committee &Reviewer**	ICLS/CSCL 2023, International Society of Learning Sciences	*Nov 2022 – 2023*
• **Digital Committee Co-Chair**	Leading Organizational Change Through Innovation Conference	*May 2023– 2024*
• **Member**	American Educational Research Association	*Jul 2021 – Current*

MEDIA COVERAGE

Penn State News (March 2024): Informatics student to attend MIDAS future leaders summit
Utah State University News (Aug 2022): Spotlight: Siyu Wu

TECHNICAL SKILLS

Programming: Fluency in Python, especially the scientific Python stack (Jupyter/Pandas/Sklearn/PyTorch, Stan), Cognition architecture (ACT-R) programming, NetLogo Programming, HTML, CSS, PHP, SQL, JavaScript
Learning Design Technologies: Agent-based modeling, UX/UI, Articulate Storyline
Software: SPSS, Tableau