Xiaoyi Tian

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Research Interests

Artificial Intelligence (AI) in Education, Human-AI Interaction, Computational Linguistics, Multimodal Learning Analytics, Collaborative Learning, AI Education

Education

Ph.D. in Human-Centered Computing 2024
University of Florida Gainesville, FL

Dissertation title: Designing for Children to Create Conversational Agents and Learn about Artificial Intelligence

Committee: Kristy Elizabeth Boyer (advisor), Eric Ragan, Jaime Ruiz, Maya Israel

M.S. in Information Science 2020
University of Pittsburgh Pittsburgh, PA

B.Mgmt. in Management Science 2018
Anhui University Hefei, China

Current Appointment

Research Scientist, North Carolina State University 09/2024 - present
Supervisor: Tiffany Barnes Raleigh, NC

- Manage and coordinate faculty collaboration on the Digital Transformation of Education (DTE) cluster, focusing on grant writing and research project partnerships.
- Design and develop AI learning materials and tools for K-12 and undergraduate computing education.
- Manage the STARS AI Scholars Program, lead efforts to broaden participation in computing by mentoring undergraduate students in AI education and supporting their outreach activities to teach children about AI.

Grants

Summary of Proposal Writing Experience

Total amount funded as PI/Co-PI: $1,911,299
Total amount submitted as PI/Co-PI: $15,909,868
Programs & agencies: NSF (ExLENT, CSforAll, IUSE, ITEST), EPA, The Tools Competition
Key focus areas: AI-driven education, including generative AI for teacher training and student learning, improving AI literacy in elementary and middle schools. Other projects target undergraduate STEM education, computing for civic engagement, and developing AI-powered educational tools for all learners.

Funded Grants

[G3] **Beginnings: Experiential Learning for In-Service Teachers: Augmenting Teaching and Learning with Generative AI** ($1,000,000, DUE-2526340; *National Science Foundation-ExLENT Program;* 01/01/2026-12/31/2028; PI: Tiffany Barnes, Co-PI: **Xiaoyi Tian**, Joey Huang, Dongkuan Xu). This project will engage teachers and undergraduate students in a 4-week intensive experiential learning on generative AI, covering a range of topics from building a basic understanding of generative AI, to prompt engineering, to using genAI for teacher tasks, using genAI for student learning, and addressing the ethics of generative AI in K12 classrooms, including cheating and advancing student knowledge through creative use of genAI assignments.

[G2] **ElementaryAI: Leveraging AI Innovation to Enhance School-Wide Literacy Through Active Learning in Montgomery County Elementary Schools** ($901,299, DRL-2524505; *National Science Foundation-CSforAll: Research and RPPs Program;* 10/01/2025-09/30/2028; PI: Tiffany Barnes, Co-PI: **Xiaoyi Tian**, Shiyan Jiang). Through a research practice partnership with the curriculum team in Montgomery County, NC, we seek ways to help all elementary school children build literacy skills through the design and implementation of active AI learning. We leverage local connections to drones and forestry to build interest and engagement in concepts in artificial intelligence and computational thinking while also enhancing student storytelling and reading comprehension.

[G1] **Supporting Student Learning of Generative AI and Large Language Models through AI Chatbot Construction** ($10,000 Catalyst Grant, North Carolina State University; 08/2025-06/2026). PI: Joey Huang; Co-PI: **Xiaoyi Tian**, Tiffany Barnes. This project aims to introduce middle school learners to GenAI and LLM concepts through chatbot development, foster students' AI literacy and ethical awareness and advance research on instructional strategies for integrating AI in K-12 science classrooms.

Grant Proposals Submitted (Under Review)

CORAL: Empowering Children Co-Design of Social Robots that Foster AI Literacy and Intergenerational Connection ($1,000,000 proposal submitted to *NSF-Future CoRe* as **PI**). This project investigates how children can meaningfully participate as co-designers of humanoid social robots that address the needs of older adults. Because programming robots requires complex reasoning and computational thinking, we aim to lower barriers by developing new technical and pedagogical approaches that foster elementary learners' creativity. The project advances understanding of how youth learn computing through human-centered design while creating scalable, programming-free platforms for socially expressive robots.

iConnector: IUSE Collaborative Networks for Education, Community Transformation, Opportunities, & Research ($6,750,000 proposal submitted to *National Science Foundation-IUSE Center* as **co-PI**, under review). The proposed IUSE Center will serve as community-based hub for potential and NSF-funded investigators who accelerate improvements to transform the quality and effectiveness of undergraduate STEM education. The iConnector goals are to expand the scope and influence of IUSE:EDU findings, facilitate integrative STEM Education research, and advance the careers of faculty from underrepresented groups in STEM.

Dottie Impacts Youth (DIY): Empowering K-16 Students for Community Change by Integrating Computing, Sustainability, and Civic Engagement ($2,999,868 proposal submitted to *U.S. Environmental Protection Agency* as **co-PI**, under review). This proposal aims to facilitate a leadership development program that engages youth, their families, and teachers in government processes for environmental justice through school-based and other outreach initiatives.

Awards and Honors

Best Paper Award Nominee, American Educational Research Association (AERA'25) 2025
Best Student Paper Award Nominee, American Educational Research Association (AERA'25) 2025
Best Lightning Talk (Second Place), Science by the Shore Conference 2024
Three Minute Thesis Award (Second Place), University of Florida 2023
Best Short Paper Award, International Learning Analytics and Knowledge Conference (LAK'23) 2023
Best Paper Award, ACM Technical Symposium on Computer Science Education (SIGCSE'23) 2023
Gartner Group Graduate Fellowship, University of Florida 2022, 2023
Outstanding Undergraduate Thesis (Top 1% in the Class), Anhui University 2018
Academic Excellence Scholarship, Anhui University 2015 & 2016 & 2017
Merit Student, Anhui University 2015 & 2017

Publications (Google Scholar Page)

Peer-Reviewed Journal Articles

[J5] **Tian, X.**, Griffith, A. E., Price, Z., Boyer, K. E., & Tang, K. (2025). Investigating linguistic alignment in collaborative dialogue: A study of syntactic and lexical patterns in middle school students. *Language and Speech*, *68*(3), 63–86. https://doi.org/10.1177/00238309241234565

[J4] Song, Y., Weisberg, L. R., Zhang, S., **Tian, X.**, Boyer, K. E., & Israel, M. (2024). A framework for inclusive AI learning design for diverse learners. *Computers and Education: Artificial Intelligence*, *6*, 100212. https://doi.org/10.1016/j.caeai.2024.100212

[J3] Song, Y., Xing, W., Li, C., **Tian, X.**, & Ma, Y. (2024). Investigating the relationship between math literacy and linguistic synchrony in online mathematical discussions through large scale data analytics. *British Journal of Educational Technology*, *55*(5), 2226–2256. https://doi.org/10.1111/bjet.13444

[J2] **Tian, X.**, Kumar, A., Solomon, C. E., Calder, K. D., Katuka, G. A., Song, Y., Celepkolu, M., Pezzullo, L., Barrett, J., Boyer, K. E., & Israel, M. (2023). AMBY: A development environment for youth to create conversational agents. *International Journal of Child-Computer Interaction*, *38*, 100618. https://doi.org/10.1016/j.ijcci.2023.100618

[J1] **Tian, X.**, Risha, Z., Ahmed, I., Lekshmi Narayanan, A. B., & Biehl, J. (2021). Let's talk it out: A chatbot for effective study habit behavioral change. *Proceedings of the ACM on Human-Computer Interaction*, *5*(CSCW1), 1–32. https://doi.org/10.1145/3449171

Peer-Reviewed Conference Proceedings

[C11] Alam, N., Fazeli, K., **Tian, X.**, Chi, M., & Barnes, T. (2025). Determining problem type using deep reinforcement learning in a data-driven intelligent tutor. *International Conference on Artificial Intelligence in Education*, 141–148. https://doi.org/10.1007/978-3-031-98465-5_18

[C10] Droujkov, D., Emerson, A., Carpenter, D., **Tian, X.**, Azevedo, R., & Barnes, T. (2025). Investigating the impact of confusion and agency on motivation in a game-based learning environment. *Proceedings of International Conference on Artificial Intelligence in Education*, 177–189. https://doi.org/10.1007/978-3-031-98420-4_13

[C9] **Tian, X.**, Mannekote, A., Solomon, C. E., Song, Y., Wise, C. F., Mcklin, T., Barrett, J., Boyer, K. E., & Israel, M. (2024). Examining LLM prompting strategies for automatic evaluation of learner-created computational artifacts. *Proceedings of the 17th International Conference on Educational Data Mining (EDM)*, 698–706. https://doi.org/10.5281/zenodo.12729922

[C8] Song, Y., **Tian, X.**, Regatti, N., Katuka, G. A., Israel, M., & Boyer, K. E. (2024). Artificial intelligence unplugged: Designing unplugged activities for a conversational AI summer camp. *Proceedings of the 55th ACM Technical Symposium on Computer Science Education V. 1*, 1272–1278. https://doi.org/10.1145/3626252.3630783

[C7] Song, Y., Xing, W., **Tian, X.**, & Li, C. (2023). Are we on the same page? Modeling linguistic synchrony and math literacy in mathematical discussions. *LAK23: 13th International Learning Analytics and Knowledge Conference*, 599–605. **[Best Short Paper Award]**. https://doi.org/10.1145/3576050.3576082

[C6] Katuka, G. A., Auguste, Y., Song, Y., **Tian, X.**, Kumar, A., Celepkolu, M., Boyer, K. E., Barrett, J., Israel, M., & McKlin, T. (2023). A summer camp experience to engage middle school learners in AI through conversational app development. *Proceedings of the 54th ACM Technical Symposium on Computer Science Education V. 1*, 813–819. **[Best Paper Award]**. https://doi.org/10.1145/3545945.3569864

[C5] Song, Y., Katuka, G. A., Barrett, J., **Tian, X.**, Kumar, A., McKlin, T., Celepkolu, M., Boyer, K. E., & Israel, M. (2023). AI made by youth: A conversational AI curriculum for middle school summer camps. *Proceedings of the Thirty-Seventh AAAI Conference on Artificial Intelligence and Thirty-Fifth Innovative Applications of Artificial Intelligence Conference and Thirteenth AAAI Symposium on Educational Advances in Artificial Intelligence*. https://doi.org/10.1609/aaai.v37i13.26882

[C4] Bounajim, D., Rachmatullah, A., Hinckle, M., Mott, B., Lester, J., Smith, A., Emerson, A., Morshed Fahid, F., **Tian, X.**, Wiggins, J. B., et al. (2021). Applying cognitive load theory to examine stem undergraduate students' experiences in an adaptive learning environment: A mixed-methods study. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *65*(1), 556–560. https://doi.org/10.1177/1071181321651249

[C3] **Tian, X.**, Wiggins, J. B., Fahid, F. M., Emerson, A., Bounajim, D., Smith, A., Boyer, K. E., Wiebe, E., Mott, B., & Lester, J. (2021). Modeling frustration trajectories and problem-solving behaviors in adaptive learning environments for introductory computer science. *Proceedings of International Conference on Artificial Intelligence in Education*, 355–360. https://doi.org/10.1007/978-3-030-78270-2_63

[C2] Morshed Fahid, F., **Tian, X.**, Emerson, A., B. Wiggins, J., Bounajim, D., Smith, A., Wiebe, E., Mott, B., Elizabeth Boyer, K., & Lester, J. (2021). Progression trajectory-based student modeling for novice block-based programming. *Proceedings of the 29th ACM Conference on User Modeling, Adaptation and Personalization*, 189–200. https://doi.org/10.1145/3450613.3456833

[C1] **Tian, X.**, Lubold, N., Friedman, L., & Walker, E. (2020). Understanding rapport over multiple sessions with a social, teachable robot. *Proceedings of International Conference on Artificial Intelligence in Education*, 318–323. https://doi.org/10.1007/978-3-030-52240-7_58

Posters and Workshop Papers (Lightly Reviewed)

[W7] Riahi, B., **Tian, X.**, Limke, A., Storozhevykh, V., Cateté, V., Barnes, T., Lytle, N., & Singh, K. (2025). Snapclass: An ai-enhanced classroom management system for block-based programming. *2025 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*, 1–3

[W6] Tithi, S. D., **Tian, X.**, Chi, M., & Barnes, T. (2025). Investigating the impact and student perceptions of guided parsons problems for learning logic with subgoals. *9th Educational Data Mining in Computer Science Education (CSEDM) Workshop*. https://doi.org/10.48550/arXiv.2505.04712

[W5] **Tian, X.**, Borchers, C., Boyer, K. E., & Israel, M. (2025). Combining log data and collaborative dialogue features to predict project quality in middle school ai education. *9th Educational Data Mining in Computer Science Education (CSEDM) Workshop*. https://doi.org/10.48550/arXiv.2506.11326

[W4] Limke, A., Islam, S., Riahi, B., **Tian, X.**, Hill, M., Catete, V., & Barnes, T. (2025). What does it take to support problem solving in programming classrooms? a new framework from the k-12 teacher

perspective. *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems.* https://doi.org/10.1145/3706599.3719763

[**W3**] Song, Y., **Tian, X.**, Barrett, J., Israel, M., & Boyer, K. E. (2023). Guide, safety net, project tester, and more: Investigating the roles of facilitators in an ai summer camp. *Proceedings of the 17th International Conference of the Learning Sciences-ICLS 2023*, 2013–2014. https://doi.org/10.22318/icls2023.548176

[**W2**] Kumar, A., **Tian, X.**, Celepkolu, M., Israel, M., & Boyer, K. E. (2022). Early design of a conversational ai development platform for middle schoolers. *2022 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*, 1–3. https://doi.org/10.1109/VL/HCC53370.2022.9833129

[**W1**] Buddemeyer, A., **Tian, X.**, & Walker, E. (2022). Dominance as an indicator of rapport and learning in human-agent communication. *Student Research Workshop in Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL).* https://doi.org/10.48550/arXiv.2212.02361

Preprints

[**P3**] Tithi, S. D., Ramesh, A. K., DiMarco, C., **Tian, X.**, Alam, N., Fazeli, K., & Barnes, T. (2025). The promise and limits of llms in constructing proofs and hints for logic problems in intelligent tutoring systems. *arXiv preprint arXiv:2505.04736.* https://doi.org/10.48550/arXiv.2505.04736

[**P2**] Mannekote, A., **Tian, X.**, Boyer, K. E., & Dorr, B. J. (2024). Can similarity-based domain-ordering reduce catastrophic forgetting for intent recognition? *arXiv preprint arXiv:2402.14155.* https://doi.org/10.48550/arXiv.2402.14155

[**P1**] **Tian, X.** & Boyer, K. E. (2023). A review of digital learning environments for teaching natural language processing in k-12 education. *arXiv preprint arXiv:2310.01603.* https://doi.org/10.48550/arXiv.2310.01603

Academic and Community Services

Proposal Review Panelist for National Science Foundation 2025
Track Chair of Experience Reports for RESPECT Conference 2025
Ad-hoc Proposal Reviewer of National Science Foundation 2024
Reviewer of International Journal of Human-Computer Interaction
Reviewer of International Journal of Human-Computer Studies
Reviewer of Applied Computing and Informatics
Reviewer of ACM Transactions on Computing Education (TOCE)
Reviewer of ACM Technical Symposium on Computer Science Education (SIGCSE TS) 2024, 2025
Reviewer of International Conference on Artificial Intelligence in Education (AIED) 2025
Reviewer of ACM Conference on International Computing Education Research (ICER) 2024
Reviewer of Workshop on Innovative Use of NLP for Building Educational Applications (BEA) 2024
Reviewer of International Society of the Learning Sciences (ISLS) 2023
Reviewer of ACM CHI Conference on Human Factors in Computing Systems (CHI) 2023, 2024, 2025
Reviewer of International Conference on Educational Data Mining (EDM) 2022
Reviewer of ACM Conference on Computer-Supported Cooperative Work (CSCW) 2020, 2023
Microsoft TEALS volunteer, teacher for high school computer science (CS1, Python), Fall 2022

Students Mentored (*denotes co-authored publications)

Graduate Students
Sutapa Dey Tithi*, Ph.D. Computer Science, North Carolina State University
Kimia Fazeli, Ph.D. Computer Science, North Carolina State University

Benyamin T. Tabarsi, Ph.D. Computer Science, North Carolina State University
Tahreem Yasir, Ph.D. Computer Science, North Carolina State University

Undergraduate Students
Omar Maslamani, B.S. Computer Science, University of Florida
Yvonika Auguste*, B.S. Health Education and Behavior, University of Florida
Carly Solomon*, B.S. Computer Science, University of Florida
Kaceja Calder*, B.S. Computer Science, University of Florida
Chandler Wiggins, B.S. Computer Science, University of Florida
Alex Johnson, B.S. Computer Science, University of Florida
David Vallejo-Lozano, B.S. Computer Science, University of Florida
Madison Edward, B.S. Computer Science, University of Florida
Nandika Regatti*, B.S. Computer Science, University of Florida
Shiyi Qiu, B.S. Computer Science, University of Florida
Deniz Ozturk, B.S. Computer Science, North Carolina State University
Jibran Adil, B.S. Computer Science, University of North Carolina at Chapel Hill
Sreekar Edula, B.S. Computer Science, University of North Carolina at Charlotte

Work Experience

Graduate Research Assistant, University of Florida 08/2020 - 08/2024
Supervisor: Kristy Boyer Gainesville, FL

- Managed an NSF ITEST project (DIALOGS: Fostering Computer Science and AI Learning through Youth-Led Conversational App Development Experiences; $1.5M; DRL-2048480; 03/15/21—03/15/25), overseeing all aspects of the project, including research design, learning tool development, curriculum and assessment development, data collection and analysis, professional development for undergraduates, middle school summer camp, classroom studies, project report writing and research dissemination
- Designed and developed a novel learning tool, AMBY, for children to create conversational agents. In AMBY, users can create a chatbot, input training data, formulate responses and deploy the chatbot on a website or phone
- Conducted contextual inquiry and usability studies with 46 children (aged 12-13) and 11 adults to understand user experiences and challenges while using AMBY. The analysis contributes design implications for conversational AI authoring tools that empower AI learning for children
- Conducted research under an NSF IUSE project (PRIME: Engaging STEM Undergraduate Students in Computer Science with Intelligent Tutoring Systems; $2M; DUE-1626235, DUE-1625908; 08/25/2016—08/15/21), clustered affective states and problem-solving behaviors of 86 undergraduate students in an adaptive block-based programming environment for novice learners. This study provided insight into how frustration trajectory models can guide system adaptivity during problem-solving episodes

Research Intern, Carnegie Mellon University 10/2019 - 07/2020
Supervisors: Amy Ogan, Michael Madaio Pittsburgh, PA

- Automated data collection for a child literacy system used by 500+ participants in Côte d'Ivoire over 8 months
- Visualized user phonological awareness curriculum progression of 8 units and 1,000+ weekly logs of learning actions

Research Assistant, University of Pittsburgh 04/2019 - 05/2020
Supervisor: Erin Walker Pittsburgh, PA

- Conducted qualitative research on multi-sessions rapport management of middle school learners with a social robot
- Utilized Independent Component Analysis (ICA) to model linguistic rapport components extracted from human coding and automated LIWC measurements

Talks and Presentations

Conference Presentation, American Educational Research Association (AERA'25) 04/2025
Automatic Evaluation of Conversational AI Chatbots Using Large Language Models

Conference Presentation, American Educational Research Association (AERA'25) 04/2025
"My Bot Can Talk about Science!": Fostering AI Learning in a Middle School Classroom

Speaker, STARS AI Scholars Webinar Series 02/2025
AMBY: A Tool for Children to Create Conversational Agents

Guest Lecturer, Natural Language Processing course, Utah State University 11/2024
Designing for Children to Create Conversational Agents and Learn about Artificial Intelligence

Invited Speaker, CAST AI Quarterly Convening 06/2024
How Can We Make AI Learning More Inclusive: A New Framework

Speaker, Child-Centered AI Design Workshop, ACM Conference on Human Factors in Computing Systems (CHI) 05/2024
Designing for Children to Create Conversational Agents and Learn about Artificial Intelligence

Speaker, AI in K-12 education seminar, University of Florida 11/2023
Empowering Youth in AI Learning: DIALOGS curriculum and AMBY interface

Guest speaker, PAWS research seminar, University of Pittsburgh 04/2023
Learner Modeling and Design of CS & AI Learning Environments

Guest speaker, AI workshop for Florida middle school teachers, University of Florida 07/2022
Camp DIALOGS: Teaching Conversational AI in Middle School Summer Camps

Guest speaker, Human-Computer Interaction course, University of Florida 03/2021
Let's Talk It Out: A Chatbot for Effective Study Behavioral Change

Selected Projects

AI Hallucination Awareness Toolkit 05/2025 - present

Developing and evaluating an instructional system that integrates hallucination detection features into chatbot development, improving students' AI literacy, confidence, and ability to build trustworthy chatbots.

- Developed an AI hallucination awareness scaffolding system (Fact Check, Model Comparison, Response Confidence, Document Verification, Repeat Questions) to support chatbot development learning.
- Led a comparative study measuring its impact on students' AI understanding, confidence, and chatbot quality, analyzing data from surveys, chatbot configurations, and focus groups.
- Identified design opportunities to enhance educational tools and curricula for managing LLM hallucinations.

Automated Assessment of Computational Artifacts using LLMs 08/2023 - 08/2024

Developing a large language model (LLM)-based evaluation module to enhance open-ended project evaluation methods and reduce teacher workloads

- Developed a rubric for assessing learner-created conversational AI artifacts, encompassing four dimensions: project ideation, AI development, conversational design and end-user satisfaction
- Examined GPT-4's ability to assess learner-created artifacts, highlighting its effectiveness and limitations across different artifact dimensions
- Investigated the trade-offs between rubric-based and example-based prompting strategies, showing that few-shot learning with contextual examples improves LLMs' grading accuracy

Linguistic Alignment in Collaborative Learning Dialogues 01/2021 - 08/2023

Investigating on the role of linguistic alignment in middle school students collaborative problem solving dialogues

- Parsed the syntactic structure and extracted lexical types for both task-relevant and non-task words
- Calculated linguistic alignment on both syntax level and lexicon level for each dialogue exchange
- Performed Beyasian mixed-effect modeling on linguistic alignment and students' satisfaction toward their partner

StudyBuddy: A Chatbot for Effective Study Habits 09/2019 - 10/2020

Designing a chatbot prototype to induce and sustain study behavioral change for university first-year students

- Utilized mix-method to investigate the feasibility of chatbots for study behavioral change of college students
- Developed a chatbot prototype in Slack using DialogFlow and Slack API
- Conducted in-depth interviews with 8 students, 5 faculty and a usability survey with 118 students
- Offered design recommendations for chatbots on building trust with users, incorporating gender and individual differences, importance of context, balancing between immediate help and long-term support

Skills

User-Centered Research: Contextual inquiry, interview, survey, storyboard, usability testing, persona, qualitative coding, dialogue act tagging, thematic analysis, ethnography, case study

Computational Toolkit: Python (spaCy, NLTK, Scikit-Learn, Pandas, NumPy, Matplotlib), R (lme4, brms, dplyr, tidyverse, ggplot2), OpenAI, LangChain, SPSS, JMP, Stata

Statistical Methods: ANOVA, regression analysis, mixed-effect models, Bayesian modeling

Last updated: September 8, 2025