Xiaoyi Tian

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Research Interests

CS and AI Education, Human-Centered Design, Computational Linguistics, Learning Analytics

Education

Ph.D. in Human-Centered Computing 08/2024 (expected)
University of Florida Gainesville, FL

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

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

Experience

Graduate Research Assistant | Advisor: Kristy Boyer 08/2020 - present
LearnDialogue Lab, University of Florida Gainesville, FL

- 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.
- 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.
- Modeled linguistic alignment and its relationship with satisfaction outcome in collaborative programming dialogues using Bayesian mixed-effect models

Research Intern | Supervisors: Amy Ogan, Michael Madaio 10/2019 - 07/2020
Human-Computer Interaction Institute, Carnegie Mellon University 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 | Supervisor: Erin Walker 04/2019 - 05/2020
Facet Lab, University of Pittsburgh 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

Projects

Automated Assessment of Computational Artifacts using LLMs | Individual research 07/2023 - present
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 | Collaborative project (lead) at UF01/2021 - 08/2023
Research 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 | Collaborative project (lead) at Pitt 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

Awards and Honors

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)

Journal Articles

J6 **A Framework for Inclusive AI Learning Design for Diverse Learners**
Yukyeong Song, Lauren Weisberg, Shan Zhang, **Xiaoyi Tian**, Kristy Elizabeth Boyer, and Maya Israel.
Computers and Education: Artificial Intelligence.. 2024. In press.

J5 **Investigating Linguistic Alignment in Collaborative Dialogue: A Study of Syntactic and Lexical Patterns in Middle School Students**
Xiaoyi Tian, Amanda E. Griffith, Zane Price, Kristy Elizabeth Boyer, and Kevin Tang.
Language and Speech. 2024. In press.

J4 **Investigating the Relationship between Math Literacy and Linguistic Synchrony in Online Mathematical Discussions through Large Scale Data Analytics**
Yukyeong Song, Wanli Xing, Chenglu Li, **Xiaoyi Tian**, Yingbo Ma.
British Journal of Educational Technology. 2024. In press.

J3 **AMBY: A Development Environment for Youth to Create Conversational Agents**
Xiaoyi Tian, Amit Kumar, Carly E Solomon, Kaceja D Calder, Gloria Ashiya Katuka, Yukyeong Song, Mehmet Celepkolu, Lydia Pezzullo, Joanne Barrett, Kristy Elizabeth Boyer, Maya Israel.
International Journal of Child-Computer Interaction. vol. 38, 2023, pp. 100618.

J2 **Let's Talk It Out: A Chatbot for Effective Study Habit Behavioral Change**
Xiaoyi Tian, Zak Risha, Ishrat Ahmed, Arun Balajiee Lekshmi Narayanan, Jacob Biehl.
Proceedings of the ACM on Human-Computer Interaction. 5, CSCW1. April. 2021.

J1 **Online Educational Information Quality Modeling and Perceived Difference Comparison**
Xiaoyi Tian, Jing Li, Qin Yu.
In *Journal of Hefei Normal University.* 2016, 34(5).

Peer-Reviewed Conference Papers

C8 **Artificial Intelligence Unplugged: Designing Unplugged Activities for a Conversational AI Summer Camp**
Yukyeong Song, **Xiaoyi Tian**, Nandika Regatti, Gloria Ashiya Katuka, Kristy Elizabeth Boyer and Maya Israel
Proceedings of the 55th ACM Technical Symposium on Computer Science Education (SIGCSE). March. 2024.

C7 **Are We on the Same Page? Modeling Linguistic Synchrony and Math Literacy in Mathematical Discussions** [Best Short Paper Award]
Yukyeong Song, Wanli Xing, **Xiaoyi Tian** and Chenglu Li
13th International Learning Analytics and Knowledge Conference (LAK). March. 2023.

C6 **A Summer Camp Experience to Engage Middle School Learners in AI through Conversational App Development [Best Paper Award]**
Gloria Ashiya Katuka, Yvonika Auguste, Yukyeong Song, **Xiaoyi Tian**, Amit Kumar, Mehmet Celepkolu, Kristy Elizabeth Boyer, Joanne Barrett, Maya Israel, Tom McKlin.
Proceedings of the 54th ACM Technical Symposium on Computer Science Education (SIGCSE). March. 2023.

C5 **AI Made By Youth: A Conversational AI Curriculum for Middle School Summer Camps**
Yukyeong Song, Gloria Ashiya Katuka, Joanne Barrett, **Xiaoyi Tian**, Amit Kumar, Tom McKlin, Mehmet Celepkolu, Maya Israel and Kristy Elizabeth Boyer
The Thirteenth Symposium on Educational Advances in Artificial Intelligence (EAAI). February. 2023.

C4 **Applying Cognitive Load Theory to Examine STEM Undergraduate Students' Experiences in An Adaptive Learning Environment: A Mixed-Methods Study**
Dolly Bounajim, Arif Rachmatullah, Madeline Hinckle, Bradford Mott, James Lester, Andy Smith, Andrew Emerson, Fahmid Morshed Fahid, **Xiaoyi Tian**, Joseph B Wiggins, Kristy Elizabeth Boyer, Eric Wiebe.
Proceedings of the Human Factors and Ergonomics Society Annual Meeting. October. 2021.

C3 **Modeling Frustration Trajectories and Problem-Solving Behaviors in Adaptive Learning Environments for Introductory Computer Science**
Xiaoyi Tian, Joseph B. Wiggins, Fahmid Morshed Fahid, Andrew Emerson, Dolly Bounajim, Andy Smith, Kristy Elizabeth Boyer, Eric Wiebe, Bradford Mott, James Lester.
Proceedings of International Conference on Artificial Intelligence in Education (AIED). July. 2021.

C2 **Progression Trajectory-Based Student Modeling for Novice Block-Based Programming**
Fahmid Morshed Fahid, **Xiaoyi Tian**, Andrew Emerson, Joseph B. Wiggins, Dolly Bounajim, Andy Smith, Eric Wiebe, Bradford Mott, Kristy Elizabeth Boyer, James Lester.
Proceedings of the 29th ACM Conference on User Modeling, Adaptation and Personalization (UMAP). July. 2021.

C1 **Understanding Rapport over Multiple Sessions with a Social, Teachable Robot**
Xiaoyi Tian, Nichola Lubold, Leah Friedman, Erin Walker.
Proceedings of International Conference on Artificial Intelligence in Education (AIED). July. 2020.

Workshop Papers and Posters

W3 **Guide, Safety Net, Project Tester, and More: Investigating the Roles of Facilitators in an Artificial Intelligence Summer Camp**
Yukyeong Song, **Xiaoyi Tian**, Joanne Barrett, Maya Israel, Kristy Elizabeth Boyer.
Poster in *International Conference of the Learning Sciences (ICLS 2023)*. June. 2023.

W2 **Early Design of a Conversational AI Development Platform for Middle Schoolers**
Amit Kumar, **Xiaoyi Tian**, Mehmet Celepkolu, Maya Israel, Kristy Elizabeth Boyer.
Poster in *2022 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*. September. 2022.

W1 **Dominance as an Indicator of Rapport and Learning in Human-Agent Communication**
Amanda Buddemeyer, **Xiaoyi Tian**, Erin Walker.
Student Research Workshop in *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*. July. 2020.

Academic and Community Services

Microsoft TEALS volunteer, teacher for high school computer science (CS1, Python) 08/2022 - 12/2022
Reviewer of ACM Transactions on Computing Education (TOCE)
Reviewer of ACM Technical Symposium on Computer Science Education (SIGCSE TS) 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
Reviewer of International Conference on Educational Data Mining (EDM) 2022
Reviewer of ACM Conference on Computer-Supported Cooperative Work (CSCW) 2020, 2023

Invited Talks and seminars

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

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

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

Guest speaker of undergraduate HCI course, University of Florida 03/2021
Let's Talk It Out: A Chabot for Effective Study Behavioral Change

Skills

User-Centered Research: Contextual inquiry, interview, survey, storyboard, usability testing, persona, qualitative coding, dialogue act tagging, ethnography, case study
Statistical Analysis: R, SPSS, JMP, Stata
Programming Languages and Frameworks: Python, HTML, CSS, Bootstrap, Javascript, Java, C, VB, SQL, MATLAB, Blazor, React, Blockly

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