

# Bitakram

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## Professional Experience

- 2023- Current      **Visiting Research Scholar**, Department of Electrical Engineering & Computer Sciences, University of California, Berkeley
- 2022 – Current      **Research Assistant Professor**, Department of Computer Science, North Carolina State University
- 2019 – 2022      **Teaching Assistant Professor**, Department of Computer Science, North Carolina State University
- 2017 – 2019      **Research Assistant**, Center for Educational Informatics, North Carolina State University
- 2016 – 2017      **Research Assistant**, Friday Institute for Educational Innovation, North Carolina State University
- 2015 – 2016      **Research Assistant**, Department of Teacher Education and Learning Sciences, North Carolina State University
- 2014 – 2015      **Research Assistant**, Visualization and Graphics Group, University of Calgary

## Education

- August 2019      **Ph.D.**, Computer Science, *North Carolina State University*  
Thesis Title: Stealth Assessment of Students' Computer Science Focal Knowledge, Skills, and Abilities in Game-Based Learning Environments (Committee: James Lester (Advisor), Eric Wiebe (Co-advisor), Min Chi, Thomas Price)
- August 2015      **M.Sc.**, Computer Science, *University of Calgary, Canada*  
Thesis Title: CINAPACT-splines: A Family of Infinitely Smooth, Accurate, and Compactly Supported Splines (Advisor: Osman Alim, Co-advisor: Faramarz Samavati)
- May 2013      **B.Sc.**, Computer Engineering, *Sharif University of Technology, Iran*  
Thesis Title: Enhancement of Mammography Images Including Contrast Enhancing and Noise Reduction using Diffusion Filters and Wavelet Transform (Advisor: Mohammad Manzouri)

## Research Interests

**AI-Enabled Learning Technologies:** Conducting human-centered design for developing usable, impactful, and equitable adaptive learning technologies.

**Learning Analytics:** Utilizing educational data mining for accurate, data-driven, and sequence-based assessment of students' cognitive, meta-cognitive, and affective states.

**Computer Science Education Research:** Design, implementation, and evaluation of innovative computer science curricula and technology for a diverse range of students.

**Equity and Diversity in Computing Education:** Improving equity and diversity in computing education through evidence-based pedagogical, psychological, and sociological interventions.

## ***Honors & Awards***

- Best Paper Award, SIGCSE 2023.
- Best Paper Award, SIGCSE 2022.
- Friday Institute Graduate Student Fellows Award, 2018.
- Graduate Student Fellowship, University of Calgary, 2013-2014.

## ***Publications***

### ***Peer-Reviewed Publications in Journals (3)***

1. Marwan, S., **Akram, B.**, Barnes, T., and Price, W. (2022). Adaptive Immediate Feedback for Block-Based Programming: Design and Evaluation. *IEEE Transactions on Learning Technologies (TLT)*, 15(3), 406-420.
2. Rachmatullah, A., **Akram, B.**, Boulden, D., Mott, B., Boyer, K., Lester, J., & Wiebe, E. (2020). Development and Validation of the Middle Grades Computer Science Concept Inventory (MG-CSCI) assessment. *EURASIA Journal of Mathematics, Science and Technology Education (EJMSTE)*, 16(5), 1-11.
3. Boulden, D., Wiebe, E., **Akram, B.**, Buffum, P., Aksit, O., Mott, B., Boyer, K., and Lester, J. (2018). Computational Thinking Integration into Middle Grades Science Classrooms: Strategies for Meeting the Challenges. *Middle Grades Review*, 4( 3), 1-16.

### ***Peer-Reviewed Papers in Conference Proceedings (13)***

4. Hog, M., Shi, Y., Leinonen, Y., Babalola, D., Lynch, C., Price, T., **Akram, B.** (2024). Detecting ChatGPT-Generated Code Submissions in a CS1 Course Using Machine Learning Models. To Appear in *Proceeding of the the 55th ACM Technical Symposium on Computer Science Education (SIGCSE)*.
5. Hoq, M., Chilla, S., Ranjbar, M., Brusilovsky, P., **Akram, B.** (2023). SANN: Programming Code Representation Using Attention Neural Network with Optimized Subtree Extraction. In *Proceedings of the 32<sup>nd</sup> ACM International Conference on Information and Knowledge Management (CIKM)*. pp. 783-792.
6. Hoq, M., Brusilovsky, P., **Akram, B.** (2023). Analysis of an Explainable Student Performance Prediction Model in an Introductory Programming Course. In *Proceedings of the 16<sup>th</sup> International Conference on Educational Data Mining (EDM)*. pp. 79-90.
7. Harred, R., Barnes, T., Fisk, S., **Akram, B.**, Price, T., & Yoder, S. (2023). Do Intentions to Persist Predict Short-Term Computing Course Enrollments: A Scale Development, Validation, and Reliability Analysis. In *Proceedings of the 54th ACM Technical Symposium on Computer Science Education*. pp. 1062-1068. **(Best Paper Award)**.
8. Wang, W., Bobbadi, B., Meur, A., **Akram, B.**, Barnes, T., Martens C., and, Price, T. (2022). Exploring Design Choices to Support Novices' Example Use During Creative Open-Ended Programming. In *Proceedings of the 52<sup>nd</sup> ACM SIGCSE Technical Symposium on Computer Science Education (SIGCSE)*. pp. 619-625. **(Best Paper Award)**.

9. Hunt C., Yoder S., Comment T., Price T., **Akram B.**, Battestilli, L., Barnes, T., and Fisk S. (2022). Gender, Self-Assessment, and Persistence in Computing: How gender differences in self-assessed ability reduce women's persistence in computer science. In *Proceedings of the 18<sup>th</sup> ACM Conference on International Computing Education Research (ICER)*, pp. 73-83.
10. **Akram B.**, Fisk S., Yoder S., Hunt C., Price T., Battestilli L., and Barnes, T. (2022). Increasing Students' Persistence in Computer Science through a Lightweight Scalable Intervention. In *Proceedings of the 27<sup>th</sup> Annual conference on Innovation and Technology in Computer Science Education (ITiCSE)*, pp. 526-532.
11. **Akram, B.**, Yoder, S., Tatar, C., Boorugu, S., Aderemi, I., and Jiang, S. (2022). Towards an AI-infused Interdisciplinary Curriculum for Middle-grade Classrooms. In *Proceedings of the Twelfth AAAI Symposium on Educational Advances in Artificial Intelligence (EAAI)*, pp. 12681-12688.
12. Jiang, S., et. Al. (2022). Agents, Models, and Ethics: Importance of Interdisciplinary Explorations in AI Education. In *Proceedings of the 16th International Conference of the Learning Sciences (ICLS)*, pp. 1763-1770.
13. Min, W., Mott, B., Park, K., Taylor, S., **Akram, B.**, Wiebe, E., & Lester, J. (2020). Promoting computer science learning with block-based programming and narrative-centered gameplay. In *Proceedings of the 2<sup>nd</sup> IEEE Conference on Games (CoG)*, pp. 654-657.
14. Lytle, N., Cateté, V., Dong, Y., Boulden, D., **Akram, B.**, Houchins, J., Barnes, T. and Wiebe, E., (2019). CEO: A Triangulated Evaluation of a Modeling-Based CT-Infused CS Activity for Non-CS Middle Grade Students. In *Proceedings of the 1<sup>st</sup> ACM Conference on Global Computing Education (CompEd)*, pp. 58-64.
15. **Akram, B.**, Min, W., Wiebe, E., Mott, B., Boyer, K., and Lester. J. (2018). Improving Stealth Assessment in Game-based Learning with LSTM-based Analytics. In *Proceedings of the 11<sup>th</sup> International Conference on Educational Data Mining (EDM)*, pp. 208-218.
16. **Akram, B.**, Alim, U., and Samavati, F. (2015). CINAPACT-splines: A family of infinitely smooth, accurate and compactly supported splines. In *Proceedings of the 10<sup>th</sup> International Symposium on Visual Computing (ISVC)*, pp. 819-829.

Peer-Reviewed Panels, Posters and Workshops in Conference Proceedings (9)

17. Hoq, M., Vandenberg, J., Mott, B., Lester, J., Norouzi, N., and **Akram, B.** (2024). Towards Attention-Based Automatic Misconception Identification in Introductory Programming Courses. To Appear in *Proceeding of the the 55th ACM Technical Symposium on Computer Science Education (SIGCSE)*.
18. Niousha, R., Hoq, M., **Akram, B.**, and Norouzi, N. (2024). Use of Large Language Models for Extracting Knowledge Components in CS1 Programming Exercises. To Appear in *Proceeding of the the 55th ACM Technical Symposium on Computer Science Education (SIGCSE)*.
19. **Akram, B.**, Leinonen, J., Norouzi, N., Prather, J., Zhang, L. (2024). AI in Computing Education from Research to Practice. To Appear in *Proceeding of the the 55th ACM Technical Symposium on Computer Science Education (SIGCSE)*.
20. **Akram, B.**, Ahmed Magooda (2023). Analysis of Students' Problem-Solving Behavior when Using Copilot for Open-Ended Programming Projects. In *Proceedings of the 19<sup>th</sup> ACM Conference on International Computing Education Research (ICER)*, pp. 32-32.
21. **Akram, B.**, Jiang, S. (2023). Investigation of Students' Learning, Interest, and Career Aspirations in an Integrated Science and Artificial Intelligence Learning Environment (i-SAIL). In *Proceedings of the 19<sup>th</sup> ACM Conference on International Computing Education Research (ICER)*, pp.33-34.
22. Battestilli, L., Fisk, S, Hunt, C., **Akram, B.**, Yoder, S., Price, T., and Barnes, T. (2022). Automating Personalized Feedback to Improve Students' Persistence in Computing. In *Proceedings of the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE)*, pp.1197-1197.

23. **Akram, B.**, Azizolsoltani, H., Min, W., Navied, A., Wiebe, E., Mott, B., Boyer, K., and Lester, J. (2020). Automated Assessment of Computer Science Competencies from Student Programs with Gaussian Process Regression. In *Proceedings of the 13<sup>th</sup> International Conference on Educational Data Mining (EDM)*, pp. 555-560.
24. **Akram, B.**, Min, W., Wiebe, E., Navied, A., Mott, B., Boyer, K. E., & Lester, J. (2020). A conceptual assessment framework for K-12 computer science rubric design. In *Proceedings of the 51st ACM Technical Symposium on Computer Science Education (SIGCSE)*, pp. 1328-1328.
25. **Akram, B.**, Min, W., Wiebe, E., Mott, B., Boyer, K.E. and Lester, J. (2019). Assessing Middle School Students' Computational Thinking Through Programming Trajectory Analysis. In *Proceedings of the 50<sup>th</sup> ACM Technical Symposium on Computer Science Education (SIGCSE)*, pp. 1269-1269.

Peer-Reviewed Publications in Workshops (7)

26. Hoq, M., Shi, Y., Leinonen, J., Babalola, D., Lynch, C., **Akram, B.** (2023). Detecting ChatGPT-Generated Code in a CS1 Course. In *CEUR Workshop Proceedings of the 24<sup>th</sup> International Conference on Artificial Intelligence in Education*.
27. Yoder, S., Hoq M., Brusilovsky, P., **Akram, B.** (2022) Exploring Sequential Code Embeddings for Predicting Student Success in an Introductory Programming Course. In *Proceedings of the Zenodo 6th Computer Science Educational Data Mining Workshop at 15<sup>th</sup> educational data mining conference (CSEDM@EDM)*.
28. Marsden, J., Yoder, S., **Akram, B.** (2022). Predicting Student Performance with Control Flow Graph Embeddings. In *Proceedings of the Zenodo 6th Computer Science Educational Data Mining Workshop at 15<sup>th</sup> educational data mining conference (CSEDM@EDM)*.
29. Hoq, M., Brusilovsky, P., **Akram, B.** (2022). SANN: A Subtree-based Attention Neural Network Model for Student Success Prediction Through Source Code Analysis. In *Proceedings of the Zenodo 6th Computer Science Educational Data Mining Workshop at 15<sup>th</sup> educational data mining conference (CSEDM@EDM)*.
30. Yoder, S., Tatar, C., Aderemi, I., Boorugu, S., Jiang, S., and **Akram, B.** (2021). Gaining Insight into Effective Teaching of AI Problem-Solving Through CSEDM: A Case Study. In *CEUR Proceedings of the 3<sup>rd</sup> Computer Science Educational Data Mining Workshop at 14<sup>th</sup> educational data mining conference (CSEDM@EDM)*.
31. **Akram, B.**, Azizolsoltani, H., Min, W., Wiebe, E., Navied, A., Mott, B., Boyer, K., & Lester, J. (2020). A Data-Driven Approach to Automatically Assessing Concept-Level CS Competencies Based on Student Programs. In *CEUR Workshop Proceedings of the 4<sup>st</sup> Computer Science Educational Data Mining Workshop at 13<sup>th</sup> educational data mining conference (CSEDM@EDM)*.
32. Catete, V., Lytle, N., Dong, Y., Boulden, D., **Akram, B.**, Houchins, J., Barnes, T., Wiebe, E., Lester, J., Mott, B., Boyer, K. (2018). Infusing Computational Thinking into Middle Grade Science Classrooms: Lessons Learned. In *Proceedings of the 13th Workshop in Primary and Secondary Computing Education*, pp. 1–6.

Edited Volumes (2 Journals, 3 Workshops)

33. **Akram, B.**, Price, T., Shi, Y., Brusilovsky, P., and I-Han, S. (2023). To be published in the *Proceedings of the Workshop on Computer Science Educational Data Mining at the 13<sup>th</sup> International Conference on Learning Analytics and Knowledge (CSEDM@LAK)*.
34. Price, T., I-Han, S., Brusilovsky, P., **Akram, B.**, and Leinonen J. (2023). Published as *Proceedings of the JEDM Special issue on CSEDM: Educational Data Mining for Computing Education*.
35. Norouzi, N., **Akram, B.** (2023). Published as *Proceedings of the EngageCSEdu Special Issue on AI, Data Science, and ML*.

36. **Akram, B.**, Price, T., Shi, Y., Brusilovsky, P., and I-Han, S. (2022). Published as *Proceedings of the Workshop on Computer Science Educational Data Mining at the 15<sup>th</sup> International Conference on Educational Data Mining (CSEDM@EDM)*. ([see here](#))
37. **Akram, B.**, Price, T., Shi, Y., Brusilovsky, P., and I-Han, S. (2021). Published as *Proceedings of the Workshop on Computer Science Educational Data Mining at the 14<sup>th</sup> International Conference on Educational Data Mining (CSEDM@EDM)*. ([see here](#))

### Thesis

38. **Akram, B.**, (2019). *Assessment of Students' Computer Science Focal Knowledge, Skills, and Abilities in Game-Based Learning Environments*. North Carolina State University, Raleigh, NC, USA.
39. **Akram, B.**, (2015). *CINAPACT-splines: A Family of Infinitely Smooth, Accurate and Compactly Supported Splines*. University of Calgary, Calgary, Canada.

### Research Presentations (17)

1. Panelist, AI in Computing Education from Research to Practice, SIGCSE 2024.
2. Speaker, Modeling Students' CS Competencies and Course Performance in Introductory Programming Classrooms, University of California at Berkeley, October 2023.
3. Speaker, A Hypothesis-Driven Learning Analytics Approach to Assessing Students' Computer Science Focal Knowledge, Skills, and, Abilities, University of Pittsburgh, August 2020.
4. Speaker, Computer Science Education for a New Generation, University of Illinois, Urbana-Champaign, March 2019.
5. Speaker, Computer Science Education for a New Generation, Colorado School of Mines, March 2019.
6. Speaker, Computer Science Education for a New Generation, Lehigh University, March 2019.
7. Speaker, Computer Science Education for a New Generation, California State University, Los Angeles, March 2019.
8. Speaker, Computer Science Education for a New Generation, North Carolina State University, February 2019.
9. Speaker, Computer Science Education for a New Generation, University of North Carolina at Chapel Hill, February 2019.
10. Speaker, Computer Science Education for a New Generation, Virginia Polytechnic Institute and State University, February 2019.
11. Wiebe, E., Rachmatullah, A., **Akram, B.**, Mott, B., Boyer, K., and Lester, J. (2020). Measurement of Computational Thinking and CS Conceptual Understanding in Middle Grades Classrooms. Presented at the 2020 *American Educational Research Association (AERA) Annual Meeting*, San Francisco, California.
12. Boulden, D., Houchins, j., Rachmatullah, A., Vandenberg, j., **Akram, B.**, Catete, V., Lytle, N., Barnes, T., Wiebe, E. (2020). A Situated Professional Development Approach to Build Teacher Efficacy for Computational Modeling. Presented at the 2020 *American Educational Research Association (AERA) Annual Meeting*, San Francisco, California.
13. Houchins, j., Boulden, D., Rachmatullah, A., **Akram, B.**, Wiebe, E., Lytle, N., Catete, V., Barnes, T. (2020). Scaffolding Use, Modify, Create: Facilitating the Progression to Computational Thinking in Middle Grades Science. Presented at the 2020 *American Educational Research Association (AERA) Annual Meeting*, San Francisco, California.
14. Rachmatullah, A., Wiebe, E., Boulden, D., Houchins, j., **Akram, B.**, Mott, B., Boyer, K., Lester, J. (2020). The Impact of Prior Programming Experiences and Attitudes on Computer Science Concepts Learning. Presented at the 2020 *American Educational Research Association (AERA) Annual Meeting*, San Francisco, California.

15. **Akram, B.**, Min, W., Wiebe, E., Mott, B., Boyer, K., and Lester, J. (2019). Toward a Semi-Automated Evidence-Centered Dashboard Framework for Computer Science Teachers. Presented at *the 3<sup>rd</sup> Computer Science Educational Data Mining Workshop at the 20<sup>th</sup> International Conference on Artificial Intelligence in Education (CSEDM@AIED)*, Chicago, Illinois.
16. **Akram, B.**, Smith, A., Smith, C., Aksit, O., Wiebe, E., and Lester, J. (2017). Computationally-Enabled Modeling Environments: Simulating Epidemic Diseases in Science Classrooms using Block-based Programming. Presented at the *2017 National Association for Research in Science Teaching (NARST)*, San Antonio, USA.

## ***Sponsored Research Activity***

### Total Funds (\$2,319,620)

National Science Foundation (Improving Undergraduate STEM Education Program)

Project: *Transforming Introductory Computer Science Instruction with an AI-Driven Classroom Assistant*, 2023-2027.

Role: Principal Investigator (Co-PIs: J. Lester, B. Mott, J. Vandenberg)

Multi-PI Collaborative Project:

Collaborating Institution: University of California – Berkeley.

Collaborating PI: N. Norouzi.

Total Award: \$1,999,637

Award: \$1,723,467

National Science Foundation (Improving Undergraduate STEM Education Program)

Project: *Analysis of a Simple, Low-cost Intervention's Impact on Retention of Women in Computer Science*, 2020-2023

Role: Principle Investigator (Co-PIs: T. Barnes, T. Price, L. Battestilli)

Multi-PI Collaborative Project:

Collaborating Institution: Kent State University.

Collaborating PI: S. Fisk.

Total Award: \$300,000

Award: \$174,983

National Science Foundation (Special Projects - CNS, CYBERINFRASTRUCTURE)

Project: *CSE Early Research Scholars Program (ERSP)*, 2020-2022.

Role: Co-Principle-Investigator (PI: V. Catete, Co-PIs: S. Heckman, T. Barnes, L. Battestilli, B. Adams, C. Martins)

Subaward Project:

Collaborating Institution: University of California – San Diego.

Collaborating PI: C. Alvarado.

Total Award: \$600,000

Award: \$20,000

Friday Institute for Educational Innovation, NCSU

Project: *Multimodal AI literacy: Supporting the Learning of Artificial Intelligence (AI) through Multimodal Narrative Creation*, 2020-2021.

Role: Principal Investigator (PI: Shiyang Jiang)

Award: \$10,000

Data Science Academy, NCSU

Project: *Promoting Youth Critical Data Literacy through Computing and Community Storytelling with Data*, 2021-2022

Role: Principal Investigator (PI: Shiyan Jiang)

Award: \$9,754

## ***Teaching Experience***

### *Instructor Experience (4 Courses, 11 Sections, 552 Students)*

- **Introduction to Artificial Intelligence, CSC520 (3 semesters, 179 students)**, North Carolina State University, an introduction to artificial intelligence for undergraduate and graduate students.
- **Introduction to Artificial Intelligence, CSC 411 (2 semesters, 122 students)**, North Carolina State University, an introduction to artificial intelligence for undergraduate and graduate students.
- **Computer Science Principles - The Beauty and Joy of Computing (2 Semesters, 118 students)**, North Carolina State University, an introductory programming course for non-CS students.
- **Introduction to Computing- Java (4 semesters, 133 students)**, North Carolina State University, an introductory programming course for CS students.

### *Advising*

- Current Ph.D. Committee chair - 3 (6 accepted conference papers, 6 accepted workshop papers)
- Ph.D. Committee member - 4
- Graduate-level independent research - 9
- Undergraduate-level independent research - 10

### *K-12 Teaching Experience*

- Developed and taught AI/CS-infused STEM curricula for middle-grade science classrooms.
- Developed and evaluated innovative learning technologies for effective delivery of AI/CS-infused STEM curricula to middle-grade students.
- Developed, organized, and facilitated multiple professional development workshops for K-12 teachers to facilitate the design and teaching of CS curricula in K-12 classrooms during summers and the academic year.
- Developed and taught CS curricula to K-12 students during multiday summer workshops, elective CS classrooms, and after-school programs.

## ***Inclusion and Diversity Efforts***

### *K-12 Outreach:*

- Engaging K-12 teachers and students with accessible, engaging, and relevant AI and CS-infused STEM curriculum.
- Innovative technology design and development for effective delivery of the curriculum.
- Conducting Teacher Development workshops to facilitate integration of AI and CS-infused STEM curricula in K-12 classrooms.
- *Undergraduate Underrepresented Students' Outreach*
  - Collaborating in adaptation and implementation of an early research course to engage freshman and sophomore underrepresented students at NC State University with computer science research.
  - mentoring multiple underrepresented students for independent undergraduate research.

- Co-organizing summer schools and workshops to promote engagement with CS and CS education research for underrepresented students.

## ***Professional Service and Memberships***

### *Conference and Workshop Program Committees*

- Workshop & Tutorial Track Co-Chair: Educational Data Mining (EDM) Conference, 2024
- Computer Science Education Research SPLICE Workshop Co-Organizer, LearnLab Summer School, Carnegie Mellon, 2023
- Workshop chair: Computer Science Educational Data Mining (CSEDM) workshop at the Learning Analytics and Knowledge (LAK) Conference (2023)
- Workshop chair: Computer Science Educational Data Mining (CSEDM) workshop at the Educational Data Mining (EDM) Conference (2021, 2022)

### *Conference and Workshop Reviewing*

- Associate Committee Member, ACM SIGCSE Technical Symposium on Computer Science Education (SIGCSE)
- Associate Committee Member, ACM Global Computing Education Conference (CompEd)
- Program Committee Member, NeurIPS'23 Workshop on Generative AI in Education GAIED
- Program Committee Member, Educational Data Mining (EDM)
- Program Committee Member, Artificial Intelligence in Education (AIED)
- Program Committee Member, Innovation and Technology in Computer Science Education (ITiCSE)
- Program Committee Member, ACM SIGCSE Technical Symposium on Computer Science Education (SIGCSE)
- Program Committee Member, Computer Science Educational Data Mining (CSEDM) Workshop at Educational Data Mining Conference (EDM)
- Program Committee Member, Research in Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT)
- Program Committee Member, Educational Advances in Artificial Intelligence (EAAI)

### *Journal Reviewing*

- International Journal of STEM Education

### *Grant Proposal Reviewing*

- National Science Foundation Research Proposal Ad-Hoc Reviewer (1 proposal, 2020)

### *Professional Associations:*

- Association for Computing Machinery (ACM)
- ACM Special Interest Group on Computer Science Education (SIGCSE)
- National Center for Women & Information Technology (NCWIT)
- International Educational Data Mining Society
- International AI in Education Society
- Society for Learning Analytics Research (SoLAR)