Angel (Leyi) Cui

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Education

Columbia University, Columbia Engineering *Sep 2024 – Expected May 2025*
MS in Computer Science, Software Systems Track

- Relevant Courses: Programming Languages and Translators, Formal Verification, Code Generation

Columbia University, Barnard College *Sep 2020 – Dec 2023*
BA in Computer Science, Minor in Dance

- GPA: 3.74/4.0; Major GPA: 3.9/4.0; **Dean's List**; **Computer Science Departmental Honor**
- Relevant Courses: Program Synthesis, CS Theory, AI, ML, Cloud Computing, Cryptography, Databases

Work Experiences

ARiSE Lab, Columbia University *New York, NY*
Research Assistant; Advisor: ***Prof. Baishakhi Ray, Prof. Junfeng Yang*** *Sep 2024 – Present*

- Researching methods to reduce vulnerabilities in code generated by LLMs
- Engineered backends for evaluating the proposed method and existing LLMs on generating vulnerable code

Software Design and Analysis Lab, Carnegie Mellon University *Pittsburgh, PA*
Research Assistant; Advisor: ***Prof. Eunsuk Kang, Prof. Matthew L. Bolton*** *May 2023 – Present*

- Extended Fuzzy Mental Model Finite State Machines (FMMs) for modeling human mental model, developed an Alloy-based model checker and an analysis tool to detect mode confusions in FMMs [2] [7]
- Researched use cases and HCI aspect for ATLAS, a tool that solves the constrained LTL learning problem through an encoding in a first-order relational logic and reduction to an instance of the MaxSAT problem [1]
- Conducted a usability study on an open-source EHR system and developed a tool to auto-generate erroneous workflows from software interactions through Carnegie Mellon's REU (REUSE) program.

Barnard Programming Language Lab, Barnard College *New York, NY*
Research Assistant, Advisor: ***Prof. Mark Santolucito*** *May 2022 – Sep 2024*

- Formalized, engineered, and evaluated a machine-learning based run-time validation approach for maintaining the system integrity for system migrations [6]
- Finetuned and benchmarked an LLM pipeline for generating Temporal Stream Logic (TSL) spec [8]
- Designed and implemented user interfaces, and conducted user studies for TSL [3] [4]

Apple Inc. *Jiangmen, China*
Apple Teacher for programming and music *Jun 2021 – Aug 2021*

- Taught 50+ kids computer programming and music in rural areas to promote education equality

ByteDance Ltd. *Beijing, China*
Game Producer and Planner *Oct 2020 – May 2021*

- Sole producer of Hui Su Sha Tang, a music game with 545k views, 41k downloads, and a rating of 8.1/10.0

Selected Publications

Peer Reviewed

[1] **Constrained LTL Specification Learning from Examples**
ICSE 2025: 47th IEEE/ACM International Conference on Software Engineering
Chengjian Zhang, Parv Kapoor, Ian Dardik, ***Leyi Cui***, Romulo Meira-Goes, David Garlan, Eunsuk Kang

[2] **A Formal Approach to the Analysis of Human-Machine Interaction with Fuzzy Logic**
SPLASH 2024: Student Research Competition
Leyi Cui
DOI

[3] **Towards Reactive Synthesis as a Programming Paradigm**
PLATEAU 2024: 14th annual workshop on the intersection of HCI and PL
Leyi Cui, Raven Rothkopf, Mark Santolucito
DOI

[4] **Towards the Usability of Reactive Synthesis: Building Blocks of Temporal Logic**
PLATEAU 2023: 13th annual workshop on the intersection of HCI and PL
Raven Rothkopf, ***Angel Leyi Cui***, Hannah Tongxin Zeng, Arya Sinha, Mark Santolucito
DOI

[5] **On the Two-dimensional Resilient Consensus**
ICCSNT 2019: IEEE 7th International Conference on Computer Science and Network Technology
Leyi Cui

Preprints

[6] **Machine Learning Based Run-time Validation as a Safety Net for System Migrations**
Under Submission to FSE 2025
Leyi Cui, Elifia Muthia, Seth Pullman, Baishakhi Ray, Mark Santolucito

[7] **Fuzzy Mental Model: A Formalism for Reasoning About Confusion in Human Technology Interaction**
Under Submission to Safety Science
Matthew L. Bolton, ***Leyi Cui***, Eunsuk Kang

[8] **Combining LLM Code Generation with Formal Specifications and Reactive Program Synthesis**
Under Submission to AAAI 2025
William Murphy, Nikolaus Holzer, Feitong Qiao, ***Leyi Cui***, Raven Rothkopf, Nathan Koenig, Mark Santolucito

Selected Posters and Presentations

Towards a Formal Approach to the Analysis of Human-Machine Interaction with Fuzzy Logic
Angel (Leyi) Cui
SPLASH 2024: Student Research Competition, **Graduate Student Second Place** *Oct 2024*

Towards Reactive Synthesis as a Programming Paradigm
Angel (Leyi) Cui, Raven Rothkopf, Mark Santolucito
PLATEAU 2024 @ US Berkeley *Feb 2024*

Safe and Reliable Medical Records: Assessing the Robustness of OpenEMR
Angel (Leyi) Cui, Eunsuk Kang
Columbia University DSI Research Fair, **Best Overall Prize** *Nov 2023*
Carnegie Mellon University REUSE Poster Session *Aug 2023*

Advancing the Usability of Temporal Stream Logic
Angel (Leyi) Cui, Raven Rothkopf, Mark Santolucito
Barnard College Summer Research Institute Poster Session *Aug 2022*

Scholarships, Prizes, and Honors

SPLASH 2024: Student Research Competition, **Graduate Student Second Place**
Barnard College, Columbia University, **Dean's List**, **Computer Science Departmental Honors**
2023 Columbia University Undergraduate Computer and Data Science Research Fair **Best Overall Prize**
2023 CMU Research Experiences for Undergraduates in Software Engineering Program **Scholarship Recipient**
Fall 2023 Beyond Barnard Internship Program **Grant Recipient**
2022 Columbia University DevFest **Best Design Prize**
2020 Byte Camp Game Design Track **Winner**
2019 CRC (FRC) Robotics Competition **National 2nd Place**
2018 MIT Energy Hackathon **Third Place, MIT Track Winner**

Teachings and Mentorship

Teaching Assistant, Computer Science Theory, Columbia University *Fall 2022 - Fall 2024*
Instructor: Tal Malkin, Xi Chen, Toniann Pitassi; Students: 400+

Mentor, Barnard Peer Mentoring Program *2022 - 2024*

Mentor, Application Development Initiative, Columbia University *Spring 2022*

Service

Artifact Evaluation Committee for TACAS 2025

Skills

Languages: Java, Python, C++, C, C#, HTML/CSS/JS, SQL, Alloy, LTL, TSL, R

Frameworks/Libraries: Flask, Django, React, MySQL, MongoDB, TensorFlow, Pandas, NumPy, Selenium

Tools: Unity, Linux, Git, Docker, MATLAB, Figma, Adobe Premier, GarageBand

Clubs: Columbia Application Development Initiative; Barnard Better, Enhance, and Advance Research Series in Computer Science; Columbia University Ballet Ensemble (CUBE); Barnard & Columbia Chorus

Activities: Screenwriter of comic "The Female Prince Consort" adapted from Huang Mei Opera