

# Angel (Leyi) Cui

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## EDUCATION

### Columbia Engineering, Columbia University

M.S.; Major in Computer Science, Software Systems Track

New York, NY

Sep 2024 - Expected May 2025

### Barnard College of Columbia University

B.A.; Major in Computer Science; Minor in Dance

New York, NY

Sep 2020 - Dec 2023

- GPA: 3.74; Major GPA: 3.88; Dean's List; Graduate with Departmental Honor
- Relevant Courses: Program Synthesis, CS Theory, AI, ML, Engineering SaaS, Cloud Computing, Cryptography, Databases

## WORK EXPERIENCES

### Barnard Programming Language Lab, Barnard College

Research Assistant

New York, NY

Dec 2023 – Present

- Proposed a machine-learning based run-time verification approach for maintaining the software integrity of migrated softwares
- Migrated Spiral Analysis, a medical software, as a use case for the run-time verification system
- Finetuned and benchmarked the LLM pipeline for generating Temporal Stream Logic specification, a temporal logic specification, to make temporal logic specification engineering more accessible

### Software Design and Analysis Lab, Carnegie Mellon University's REU (REUSE) program

Research Assistant

Pittsburgh, PA

May 2023 – Present

- Extended theory for Fuzzy Mental Model Finite State Machines (FMMFSM), a mental modeling formalism for reasoning about confusion in human technology interaction
- Engineered an FMMFSM analysis tool for simulating FMMFSM and system model transitions and identifying potential mode confusions
- Found use cases and execute evaluations 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 maximal satisfiability (MaxSAT) problem
- Conducted usability study on an open-source EHR system; built a tool that automates the generation of erroneous workflows given an original workflow of interacting with a software, and the testing of the system's behavior according to the input workflow

### Barnard Programming Language Lab, Barnard College Summer Research Institute

Research Assistant

New York, NY

May 2022 – Dec 2022

- Wrote Temporal Stream Logic specification in different use cases to understand the barriers of writing TSL
- Designed and implemented user interfaces to make writing TSL more accessible; conducted user studies
- Implemented TSL tools including simplifying synthesized code and modulo theory for TSL

### ByteDance Ltd.

Game Producer & Planner

Beijing, China

Oct 2020 – May 2021

- Producer and sole designer for Hui Su Sha Tang, a music game with 545k views, 41k downloads, and a rating of 8.1/10.0

### Apple Inc.

Apple Teacher for programming and music

Jiangmen, China

Jun 2021 – Aug 2021

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

## PUBLICATIONS

### Peer-Reviewed

#### Towards a Formal Approach to the Analysis of Human-Machine Interaction

Leyi Cui

Under submission to SPLASH 2024 Student Research Competition

#### Towards Reactive Synthesis as a Programming Paradigm

Leyi Cui\*; Raven Rothkopf\*; Mark Santolucito

PLATEAU2024: 14th annual workshop on the intersection of HCI and PL

#### Towards the Usability of Reactive Synthesis: Building Blocks of Temporal Logic

Raven Rothkopf; Angel Leyi Cui; Hannah Tongxin Zeng; Arya Sinha; Mark Santolucito

PLATEAU2023: 13th annual workshop on the intersection of HCI and PL

#### On the Two-dimensional Resilient Consensus

Leyi Cui

2019 IEEE 7th International Conference on Computer Science and Network Technology (ICCSNT)

## Preprints

## **Fuzzy Mental Model Finite State Machines: A Mental Modeling Formalism for Reasoning about Confusion in Human Technology Interaction**

Matthew L. Bolton; Eunsuk Kang; **Leyi Cui**

## **Guiding LLM Temporal Logic Generation with Explicit Separation of Data and Control**

William Murphy; Nikolaus Holzer; Nathan Koenig; **Leyi Cui**; Raven Rothkopf; Feitong Qiao; Mark Santolucito  
*Arxiv*

## **OpenEMR Usability Evaluations**

**Leyi Cui**; Eunsuk Kang

## **POSTERS AND PRESENTATIONS**

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### **Towards Reactive Synthesis as a Programming Paradigm**

**Angel (Leyi) Cui**, Raven Rothkopf, Mark Santolucito

PLATEAU 2024: 14h annual workshop on the intersection of HCI and PL @ UC Berkeley

*Feb 2024*

### **Safe and Reliable Medical Records: Assessing the Robustness of OpenEMR**

**Angel (Leyi) Cui**, Eunsuk Kang

Columbia University Undergraduate Computer and Data Science 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*

### **Virtual Vitality: Augmenting Clinical Decisions via Expert-Informed Transformers**

Haowen 'John' Wei \*, Ziheng 'Leo' Li \*, Kuang Sun, **Angel (Leyi) Cui**, Kaveri Thakoor, Steven Feiner

Center of Excellence in the Neuroscience of Decision-Making at Columbia University Annual Meeting

*Nov 2023*

## **SCHOLARSHIPS, PRIZES, AND HONORS**

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Barnard College, Columbia University, **Computer Science Departmental Honors**

Barnard College, Columbia University, **Dean's List**

2023 Columbia University Undergraduate Computer and Data Science Research Fair, **Best Overall Prize**

2023 Carnegie Mellon University Research Experiences for Undergraduates in Software Engineering Program **Scholarship**

Fall 2023 Beyond Barnard Internship Program **Grant Receiver**

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**

2018 MIT Energy Hackathon MIT Track, **Winner**

## **TEACHINGS AND MENTORSHIP**

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**Teaching Assistant, Computer Science Theory**, Columbia University

*Fall 2023*

Instructor: Toniann Pitassi, Students: 200

**Barnard Peer Mentoring Program, Mentor**

*2022 - Present*

**Teaching Assistant, Computer Science Theory**, Columbia University

*Spring 2023*

Instructor: Xi Chen, Students: 400

**Teaching Assistant, Computer Science Theory**, Columbia University

*Fall 2022*

Instructor: Tal Malkin, Students: 400

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

*Spring 2022*

## **SKILLS**

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**Languages:** Java, Python, C++, C, C#, HTML/CSS/JS, SQL, R, LaTeX

**Frameworks/Libraries:** Flask, Django, React, PostgreSQL, MySQL, MongoDB, TensorFlow, Pandas, NumPy, OpenCV, Heroku, Selenium

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

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

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