# Angel (Leyi) Cui

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## EDUCATION

**Columbia Engineering, Columbia University** — ***New York, NY***
*M.S.; Major in Computer Science, Software Systems Track* — *Sep 2024 - Expected Dec 2024*

**Barnard College, Columbia University** — ***New York, NY***
*B.A.; Major in Computer Science; Minor in Dance* — *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** — ***New York, NY***
*Research Assistant* — *Dec 2023 – Present*

- Formalized a machine-learning based run-time verification approach for maintaining the software integrity of migrated softwares; engineered Spiral Analysis, a medical software, as a use case
- Presented and engineered an approach of structuring a LLM-based multi-agent system's behavior through formal temporal logic
- 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** — ***Pittsburgh, PA***
*Research Assistant* — *May 2023 – Present*

- Designed theory for Fuzzy Mental Model Finite State Machines, a mental modeling formalism for reasoning about confusion in human technology interaction; built simulator for checking mode errors between the human mental model and system model
- 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** — ***New York, NY***
*Research Assistant* — *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.** — ***Beijing, China***
*Game Producer & Planner* — *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.** — ***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

## PUBLICATIONS

### Peer-Reviewed

**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*

**Constrained LTL Specification Learning from Examples**
Changjian Zhang; Parv Kapoor; Ian Dardik; Leyi Cui; Romulo Meira-Goes; David Garlan; Eunsuk Kang
*Under submission to ICSE 2025*

**Making Temporal Logic Specification Engineering more Accessible with LLMs**
William Murphy; Nikolaus Holzer; Nathan Koenig; Leyi Cui; Raven Rothkopf; Feitong Qiao; Mark Santolucito
*Under submission to LOPSTR 2024*

**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**

**OpenEMR Usability Evaluations**
**Leyi Cui**; Eunsuk Kang

## POSTERS AND PRESENTATIONS

**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 Rothkoph, 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

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

**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

**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