

# Yangruirui ZHOU

Email: [yrrzhou@bu.edu](mailto:yrrzhou@bu.edu)

Tel: (+1) 857-763-9402

Webpage: [zyrrron.github.io](https://zyrrron.github.io)

---

## EDUCATION

---

**Boston University, Boston, MA**

09/2020-01/2026

Doctor of Philosophy (Ph.D.) in Computer Engineering

**GPA:** 3.91/4.00

**Advisor:** Douglas Densmore

**Research Focus:** AI-enabled microfluidic CAD, formal verification, and multicellular biological system design.

**University of Electronic Science and Technology of China (UESTC), Chengdu, China**

09/2016-06/2020

Bachelor of Engineering in Software Engineering (*Elite program*)

**GPA:** 3.94/4.00 (Rank: 6/740)

**Thesis:** Analysis of Postoperative Applications of Pose Tracking Algorithms.

## RESEARCH INTERESTS

---

- [1] AI-driven design automation for biological and microfluidic systems
- [2] Constraint-based optimization and graph algorithms for multicellular computation
- [3] Formal verification and compiler infrastructures for biological CAD
- [4] Large language model (LLM)-enabled scientific design and laboratory automation
- [5] Data-driven platforms for programmable biological systems and automated experimentation

## PUBLICATIONS

---

**Google Scholar** (<https://scholar.google.com/citations?user=Zel-iSQAAAAJ&hl=en>)

### Journals:

[J1, IEEE-TCAD] **Zhou, Y.**, Oliveira, S. M., Sanka, R., McIntyre, D., & Densmore, D. (2024). Vespa: Logic-Level Constraint-Based Validation for Continuous-Flow Microfluidic Devices.

**(Formal verification and constraint-based validation for large-scale microfluidic systems)**

[J2, Nature Chemical Biology] Padmakumar, J. P., Sun, J. J., Cho, W., **Zhou, Y.**, Krenz, C., Han, W. Z., ... & Voigt, C. A. (2024). Partitioning of a 2-bit hash function across 66 communicating cells.

**(Distributed multicellular biological computation, experimental validation)**

[J3, IEEE-TCBB] **Zhou, Y.**, Voigt, C. A., & Densmore, D. (2025). Constraint-Based Sub-Graph Partitioning for Multi-Cellular Biological Networks.

**(Graph-based optimization for scalable multicellular biological systems)**

### Conferences & Workshops:

[C1, IWBD'A22] A Conceptual Interactive Microfluidic Design and Control Workflow

[C2, IWBD'A25] LaNVis: Biological Constraint-based Large Network Visualizer (Accepted for oral presentation)

### Manuscripts in Preparation:

[J4, in progress, targeting Nature Computational Science] *Neptune: Web-based Automated Design and Synthesis Platform for Microfluidic Devices.*

**(LLM-enabled natural language design, formal grammar, automated synthesis and fabrication for microfluidics)**

## RESEARCH EXPERIENCE

---

**Boston University, Boston, MA**

07/2020-Now

Research Assistant, **CIDAR lab** (Supervisor: Prof. **Douglas Densmore**)

<b>Massachusetts Institute of Technology, Boston, MA</b>	11/2022-Now
Collaborative Research Assistant, <b>Voigt lab</b> (Supervisor: Prof. <b>Christopher Voigt</b> )	
<b>The Chinese University of Hong Kong, Hong Kong, China</b>	03/2023-Now
Collaborative Research Assistant, <b>Ho lab</b> (Supervisor: Prof. <b>Tsung-Yi Ho</b> )	
<b>University of California, Santa Barbara, CA</b>	06-08/2019
Student Research Internship, <b>Four eye's lab</b> (Supervisor: Prof. <b>Matthew Turk</b> and Prof. <b>Tobias Höllerer</b> )	

## AWARDS & HONORS

---

iGEM " <b>Gold medal</b> " (Student Mentor, wiki: <a href="https://2024.igem.wiki/bostonu/">https://2024.igem.wiki/bostonu/</a> )	11/2024
China Youth Science and Technology Innovation Award (Nominated by UESTC)	05/2020
<b>Most Outstanding Students of UESTC 2019</b> (成电杰出学生, <b>10/5000</b> in UESTC, <b>1/740</b> in department)	12/2019
iGEM " <b>Gold medal</b> " and " <b>Best Software Project</b> " (wiki: <a href="https://2019.igem.org/Team:UESTC-Software">https://2019.igem.org/Team:UESTC-Software</a> )	11/2019
Outstanding Graduates Award of UESTC	10/2019
"Wu Liang Ye" Enterprise Scholarship ( <b>2/740</b> in Software Engineering department)	09/2019

## PROFESSIONAL SERVICES & ACTIVITIES

---

International Workshop on Bio-Design Automation (IWBD'A25), <b>Oral Presentation</b>	09/2025
International Genetically Engineered Machine competition (iGEM'19, iGEM'24)	11/2019, 11/2024
Inventor/Contributor, <b>Patent: Agricultural Heavy Metal Biosensor-Integrated Device</b>	05-11/2024
Student Mentor of iGEM team: BostonU	04-10/2024
Chicago BioEngineering Conference (CBEC'24)	09/2024
Teaching Assistant, <b>EC504: Advanced Data Structures and Algorithms</b> , Boston University	01-05/2022, 01-05/2023
Engineering Biology Research Consortium (EBRC'23)	06/2023
International Workshop on Bio-Design Automation (IWBD'A22), Poster Presentation	10/2022

## MENTORSHIP

---

Mentor, <b>EBRC Mentorship for Undergraduate and Master's Students Program (EMUMS)</b>	04/2025-Now
Direct Mentor, <b>Eric Xie</b> , Undergraduate Research Assistant, CIDAR Lab	06/2023-Now
Student Software Mentor, <b>iGEM Boston University Team</b> in 2024	04-10/2024

## JOURNAL REVIEWER

---

IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (IEEE-TCAD)
eLife
International Conference on Computer-Aided Design (ICCAD'22)

## TECHNICAL SKILLS

---

**AI & Data Science:** PyTorch, TensorFlow, NetworkX  
**Systems & Software:** Python, C/C++, Java, TypeScript, HTML, Linux Shell, LaTeX  
**Biological & Microfluidic Fabrication:** CNC milling, laser cutting  
**Design & Modeling Tools:** Fusion 360

## PROFESSIONAL SOCIETIES

---

Institute of Electrical and Electronics Engineers (IEEE, graduate student membership)	02/2024-Now
---	-------------