

Jining Huang, PhD

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EDUCATION

- 2015 to 2023 California Institute of Technology, Pasadena, California, USA
PhD in Bioengineering
Advisor: Dr. Niles A. Pierce
- 2010 to 2015 University of Waterloo, Waterloo, Ontario, Canada
BASc in Nanotechnology Engineering, Honours, with distinction, on the Dean's Honour List
Advisor: Dr. Nasser M. Abukhdeir

SKILLS

Computational: Python, Jupyter Notebooks, Kotlin, Docker, Kubernetes, Linux, Git, CI/CD, Java, SQL, Redis, AWS (S3, EKS, Lambda, Cognito, EC2, VPC/networking), devops.

Laboratory: RNA design, genetic circuit design, cell culturing, molecular cloning (PCR, plasmid design/synthesis, electrophoresis gels), flow cytometry, CRISPR, lateral flow assays, laser cutting, 3D printing.

RECENT EXPERIENCE

Pierce Lab (PhD/postdoc), California Institute of Technology, Pasadena, USA. 2015 – present

Advisor: Dr. Niles A. Pierce

- Record of 4 papers (3 first/co-first, 1 in prep), 2 provisional patent apps, teaching, and mentorship.
- Received CEMI Pilot Grant, California Institute of Technology, 2019

NUPACK.org

- Re-architected and rewrote NUPACK web app with a team of scientists and software engineers.
- Alleviated high user demand using a dynamically scalable hybrid-cloud on AWS and on-premises.
- NUPACK enables researchers to analyze and design nucleic acid structures, devices, and systems. In the first 3 months post-launch, the NUPACK web app has executed 200k+ jobs from 2400+ users.
- Wrote control plane, RESTful API, networking, and workload orchestration, composition, and scaling code using Kotlin, Python, Git, CI/CD, PostgreSQL, AWS, Redis, Docker, and Kubernetes.
- Built custom 1k+ core on-premises Kubernetes cluster. Made all purchasing and software decisions.
- Mentored team member, in science and software engineering, through group and 1-on-1 meetings.
- Communicated new advances in NUPACK via conference presentation and published article.

Orthogonal Synthetic Genetic CRISPR Circuits

- Participated in large-scale collaborative 6-year DARPA-funded biological controls research program.
- Designed, implemented, and analyzed synthetic genetic feedback circuits in bacteria using CRISPR and conditional guide RNAs (cgRNAs). Analyzed data using Python and Jupyter notebooks.
- Demonstrated scaling of genetic circuits by exploiting cgRNA programmability and orthogonality.
- Filed patent application for cgRNA technology as an inventor.
- Presented findings at DARPA research conferences and biotechnology events.

Lateral Flow Detection of SARS-CoV-2

- Conceptualized and created SARS-CoV-2 RNA assay that does not require antibody screening.
- Decreased time required to create rapid antigen tests for novel RNA viruses from months to days.
- Introduced self-taught new techniques in assay construction (3D printing/laser cutting) to the lab.
- Mentored undergraduate and graduate researchers in lateral flow assay manufacturing techniques.
- Filed patent application for HCR-based lateral flow technology as an inventor.
- Presented findings in published peer-reviewed article and biotechnology events. This work and its published article were the subject of a Caltech press release.

TEACHING AND LEADERSHIP

Undergraduate Research Mentor, California Institute of Technology, Pasadena, USA, June – Sept. 2019

Student: Yuhang Xie, University of Cambridge

Project: “Programmable Conditional Guide RNAs for CRISPR/Cas9 Transcriptional Activation”

- Led the search, hire, and onboard processes. Supervised and mentored student’s daily activity.
- Student obtained and presented positive findings at the undergraduate research symposium.

Teaching Assistant, ChE/BE 163, California Institute of Technology, Pasadena, USA, 2017 – 2019

- Held recitation, helped students with assigned work, and graded/provided feedback for students.
- Rated 5/5 by the class in Caltech’s official teaching feedback survey (~50% voting turnout).

PAPERS (* indicates co-first authorship)

Huang, J., Murray, R. M., Pierce, N. A. Using Conditional Guide RNAs for Scalable Closed-Loop Feedback Circuits. Manuscript in prep.

Fornace, M. E.*, **Huang, J.***, Newman, C. T.*, Porubsky, N. J., Pierce, M. B., Pierce, N. A. NUPACK: Analysis and Design of Nucleic Acid Structures, Devices, and Systems. ChemRxiv (2022).

Schulte, S. J.*, **Huang, J.***, Pierce, N. A. HCR Lateral Flow Assay for Amplified Instrument-Free At-Home SARS-CoV-2 Testing. ACS Infectious Disease, in press (2023).

Hanewich-Hollatz, M. H., Chen, Z., Hochrein, L. M., **Huang, J.** & Pierce, N. A. Conditional Guide RNAs: Programmable Conditional Regulation of CRISPR/Cas Function in Bacterial and Mammalian Cells via Dynamic RNA Nanotechnology. ACS Central Science **5**, 1241–1249 (2019).

Yameen, B., Vilos, C., Choi, W. I., Whyte, A., **Huang, J.**, Pollit, L. & Farokhzad, O. C. Drug Delivery Nanocarriers from a Fully Degradable PEG-Conjugated Polyester with a Reduction-Responsive Backbone. Chemistry - A European Journal **21**, 11325–11329 (2015).

PRIOR EXPERIENCE

Farokhzad Lab, Harvard Medical School, Boston, USA. Jan. – Aug. 2014

Advisor: Dr. Omid C. Farokhzad

- Synthesized and tested drug delivery nanoparticles with a fully degradable redox-sensitive backbone.
- Demonstrated effectiveness of nanoparticles in intracellular drug delivery in mammalian cancer cells.
- Published findings in peer-reviewed journal.

Wodak Lab, The Hospital for Sick Children, Toronto, Canada. Sep. 2012 – Dec. 2013

Advisor: Dr. Shoshana J. Wodak

- Hypothesized and measured significance of protein-complex binding sites to DNA and likelihood of co-binding using a protein-protein interaction networks and ChIP-Seq data.
- Created a tool to filter and visualize protein and theoretical protein-complex binding sites from the Encyclopedia of DNA Elements.
- Presented tools and findings in research seminars and poster sessions at the University of Toronto.

Research Assistant, Canadian Ice Service, Environment Canada, Ottawa, Canada, Jan. – Apr. 2012

Implemented and evaluated various statistical models found in literature for ice concentration prediction.

Web Developer, School of Computer Science, University of Waterloo, Waterloo, Canada, May – Aug. 2011

Completed full stack web applications for inventory management and subscription tracking using MVC frameworks, PHP, jQuery, and SQL. These applications have now been deployed for over a decade.