

Conan Y. Zhao

PH.D. STUDENT

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in zhaoc16

Education

Georgia Institute of Technology

Atlanta, GA

QBioS Ph.D

Aug 2019 - present

- Primary advisor: Dr. Sam P. Brown
- Secondary advisor: Dr. Joshua S. Weitz

Washington and Lee University

Lexington, VA

BS PHYSICS; BA MATH

Sept. 2012 - May 2016

- Questbridge Scholar
- Johnson Scholar (Merit-based full ride)
- Cumulative GPA: 3.81/4.0 (*Phi Beta Kappa, magna cum laude*)

Research Experience

Georgia Tech - Graduate Research Assistant

Atlanta, GA

ADVISOR: DR. JOSHUA WEITZ, PROFESSOR OF BIOLOGY

Mar. 2020 - Present

Developed an MCMC pipeline to fit a COVID-19 shield immunity model to US regional data. Estimated the impact of social distancing orders on New York, Washington Puget Sound, and South Florida outbreaks.

ADVISOR: DR. SAM BROWN, ASSISTANT PROFESSOR OF BIOLOGY

Nov. 2016 - Present

Developed a machine learning pipeline to identify and correlate lung microbiome structure with biomarkers in Cystic Fibrosis patients. Coded agent-based and mathematical models to study stability of alternate equilibria in small bacterial communities. Ran MIC and spent-culture assays to fit Lotka-Volterra models and predict antibiotic effects on community dynamics.

ADVISOR: DR. MAY D. WANG, PROFESSOR OF BIOMEDICAL ENGINEERING

Jan. 2020 - Aug. 2020

Developed a weakly supervised learning pipeline to classify heart rejection from digital histopathology. Implemented patch-level quality control and feature ranking, improving upon previous classification results. Designed pathologist-interpretable output visualizations for clinical decision support.

Washington and Lee University - Research Assistant

Lexington, VA

ADVISOR: DR. J. KYLE FRIEND, ASSISTANT PROFESSOR OF BIOCHEMISTRY

Jan. 2015 - May 2016

Explored modulation of mRNA stability via ribosome collisions during translation. Prepared in vitro translation assays and ran RT-qPCRs. Analyzed large datasets of transcriptome stability and ribosome traffic in R. Augmented a Monte Carlo model of yeast ribosome translation dynamics in C++. Presented results at the biennial Washington and Lee Science, Society and the Arts conference.

ADVISOR: DR. SIMON LEVY, PROFESSOR OF COMPUTER SCIENCE

May - Aug. 2015

Awarded \$4000 to develop a Python-based quadcopter simulation for trialing flight pathing protocols. Combined PID control and computer vision to develop a visually guided drone landing protocol in GPS-denied environments. Presented results at the inaugural DRONEFEST 2015 conference at Colgate University

ADVISORS: DR. IRINA MAZILU, PROFESSOR OF PHYSICS · DR. DAN MAZILU, ASSOCIATE PROFESSOR OF PHYSICS

May - Aug. 2013

Awarded \$3800 to study silica nanoparticle deposition on particular surface geometries for developing thin film lenses. Formulated a mathematical model of ionic monolayer self-assembly. Developed a Monte Carlo cooperative adsorption model in C++ to validate theoretical and experimental results. Presented results at 2014 American Physical Society March Meeting.

Massachusetts Institute of Technology - MIT Summer Research Student

Boston, MA

ADVISORS: DR. JEFF GORE, ASSOCIATE PROFESSOR OF PHYSICS · DR. J. BARRET DERIS, POSTDOC

Jun. - Aug. 2014

Accepted to 10-week paid practical training program to study antibiotic resistance fixation. Analyzed trends between mutant fixation probabilities and bacterial growth rates in sub-optimal antibiotic conditions. Performed microbial antibiotic assays using 96-well plates and analyzed hi-throughput platereader data using R. Communicated results to technical experts and other students at end-of-program poster session.

Papers & Presentations

Publications

1. Kraay, A.N.M, Nelson, K.N., **Zhao, C.Y.**, Weitz, J.S., & Lopman, B.A. (2020) "Modeling serological testing to inform relaxation of social distancing for COVID-19 control." *in review*.
2. **Zhao, C.Y.**, Hao, Y., Wang, Y., Varga, J.J., Stecenko, A.A., Goldberg, J.B., & Brown, S.P. (2020) "Microbiome data enhances predictive models of lung function in people with cystic fibrosis." *in press*, Journal of Infectious Diseases.
3. Weitz, J.S., Beckett, S.J., Coenen, A.R., Demory, D., Dominguez-Mirazo, M., Dushoff, J., Leung, C.Y., Li, G., Măgălie, A., Park, S.W., Rodriguez-Gonzalez, R., Shivam, S. & **Zhao, C.Y.** (2020) "Modeling shield immunity to reduce COVID-19 epidemic spread." Nature Medicine. <https://doi.org/10.1038/s41591-020-0895-3>
4. Giuste, F., Venkatesan, M., **Zhao, C.**, Tong, L., Zhu, Y., Desphande, S.R., Wang, M.D.. (2020) "Automated Classification of Acute Rejection from Endomyocardial Biopsies." *Proceedings of the 11th ACMBCB*

Oral Presentations

1. **Zhao, C.**, Wang, Y.F., Varga, J.J., Brown, S.P. (2019) "Using Dimensionality Reduction to Identify Key Species in Polymicrobial Disease: CF Lung Microbiome as a Case Study." Presenting at *ASM Microbe*
2. Farrell, J., **Zhao, C.**, Brown, S.P. (2019) "Antibiotic-Driven Competitive Release in a Synthetic CF Microbiome Community." Presented at *CF-AIR Research Seminar*.
3. **Zhao, C.**, Brown, S.P. (2019) "Using Machine Learning to Identify Emerging CF Pathogens." Presented at *CF-AIR Research Seminar*.
4. **Zhao, C.** (2018) "Musical Diversity at Tech." Presented at *Georgia Tech Diversity and Inclusion Poster Expo*.
5. Hao, Y.Q., **Zhao, C.**, Brown, S.P. (2017) "CF Microbiome Management." Presented at *CF-AIR Trainee chalk talks*.
6. Jones, R., Singer, A., **Zhao, C.**, Levy, S. (2015) "Drones @ W&L: A Visual Based Landing Algorithm." Presented at *DRONEFEST at Colgate University*.
7. Yang, X., **Zhao, C.**, Mazilu, I. (2015) "Modeling Long-term Behavior of Stock Market Prices Using Differential Equations." Abstract Accepted at *APS March Meeting*.
8. **Zhao, C.**, Yang, X., Mazilu, I. (2015) "A Master Equation Approach to Modeling Short-term Behaviors of the Stock Market." Presented at *APS March Meeting*.

Community Involvement

GT Grad Groups

Atlanta, GA

GROUP LEADER

2020 - present

- Taught a small class of first-year MS and PhD students, welcoming them to the Georgia Tech community.
- Led weekly check-ins and small-group discussions on the keys to success in graduate school.
- Arranged safe, socially-distant social events to foster community building and improve student mental health.

GT Graduate Student Government Association

Atlanta, GA

SENATOR, DEPT OF BIOLOGY • EVENTS COMMITTEE OUTREACH CHAIR

2020 - present

- Refocused event planning to ensure adherence to safe health guidelines established by our department experts.
- (Senate) Advocated for international student mental health and inclusion in campus reopening focus groups.
- (Events) Organized and ran virtual game night to welcome incoming graduate students to our community.

GT International Ambassadors

Atlanta, GA

GRADUATE OUTREACH CHAIR (2020-PRESENT)

2019 - present

- Initiated the Graduate Email Campaign, providing information on graduate life at GT for incoming international grad students.
- Coordinated campus outreach projects targeted at graduate international students.

Children's Healthcare of Atlanta

Atlanta, GA

CF SCHOLAR (INAUGURAL COHORT)

2019 - present

- Presented Grand Rounds case study on microbiome therapies and the gut-lung axis in CF.
- Shadowed CF clinicians to better understand patient needs and potential research areas.

Georgia Tech Diversity and Inclusion Initiative

Atlanta, GA

2018 DI FELLOW

2017 - 2018

- Awarded \$1000 to develop a podcast series promoting the diversity of the music culture in the Georgia Tech community
- Organized group communications platforms and meetings with other fellows to aid in each other's ongoing projects.
- Member of the decision committee selecting the 2019 Fellows and projects.
- Published a reflection on the GT DI website and presented a reflection piece at the end-of-year conference.

Pianist

SOLOIST • ACCOMPANIST • PRODUCER

1999 - Present

- **Georgia Tech PianoForte Club** Organized a virtual recital to replace our outreach concerts at the Lutheran Towers retirement home and Winship Cancer Institute
- **Winship Cancer Institute** Created a welcoming atmosphere through a selection of classical and contemporary pieces.
- **Cocktail Pianist** Performed a repertoire of classical favorites, improvisations, and Jazz-style interpretations of modern pop songs at Haywood's Restaurant in Lexington, VA.
- **EDM Producer** Producer and lead keyboardist for the Washington and Lee Electronic Music Ensemble. Learned Ableton to produce EDM covers and performed concerts at numerous local venues.
- **Soloist** Performed at various musical events on and off-campus, including a recital of Debussy and Gerswhin at the Kendall retirement home and a performance of the Yellow River Butterfly Lovers Concerti as an opening acts for Washington and Lee's Lunar New Year Celebrations. Received the WLU Music Department Piano Award for best senior recital.

Skills & Interests

Computer **R** • \LaTeX • Python • Matlab

Language **English** • Spanish • Mandarin

Interests **Computational medicine** • Science outreach • Antimicrobial Resistance • Microbiome Dynamics

Research

Classical Piano • Electronic Music Production • Racquetball • Dim Sum

Misc.