Parker S. Ruth

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Education

Stanford University, Stanford, CA 2021 – 2026
PhD Student, Computer Science Department

University of Washington, Seattle, WA 2016 – 2021
BS in Bioengineering, BS in Computer Engineering
College Honors; *summa cum laude* GPA 3.96
Thesis: *Design Principles for Mobile and Wearable Health Technologies*
Advisor: Dr. Shwetak N. Patel

Personal Statement

I love working with talented, diverse teams on challenging problems that make a difference. In my academic research, I design sensors, circuits, and signal processing algorithms for biomedical applications. My prior work includes prototyping **mobile health systems** to measure medical vital signs and risk factors, building **wearable sensors** to perform continuous physiological sensing, and designing tools to support **population health** and assay automation. I am currently developing algorithms for cardiovascular and neuromuscular sensing. I am fortunate to work closely with collaborators across computer science, statistics, bioengineering, and medicine.

Publications and Talks

Peer Reviewed Publications

[1] Jason S. Hoffman, Matthew Hirano, Nuttada Panpradist, Joseph Breda, **Parker S. Ruth**, Yuanyi Xu, Jonathan Lester, Bichlien H. Nguyen, Luis Ceze, and Shwetak N. Patel. Passively sensing SARS-CoV-2 RNA in public transit buses. *Science of The Total Environment*, 821:152790, May 2022

[2] Justin D. Vrana, Nuttada Panpradist, Nikki Higa, Daisy Ko, **Parker S. Ruth**, Ruth Kanthula, James J. Lai, Yaoyu Yang, Samar R. Sakr, Bhavna Chohan, Michael H. Chung, Lisa M. Frenkel, Barry R. Lutz, Eric Klavins, and Ingrid A. Beck. Implementation of an interactive mobile application to pilot a rapid assay to detect HIV drug resistance mutations in Kenya. *PLOS Global Public Health*, 2(2):e0000185, February 2022

[3] Jackson J. Wallner, Ingrid A. Beck, Nuttada Panpradist, **Parker S. Ruth**, Humberto Valenzuela-Ponce, Maribel Soto-Nava, Santiago Ávila-Ríos, Barry R. Lutz, and Lisa M. Frenkel. Rapid Near Point-of-Care Assay for HLA-B*57:01 Genotype Associated with Severe Hypersensitivity Reaction to Abacavir. *AIDS Research and Human Retroviruses*, 37(12):930–935, December 2021

[4] Nuttada Panpradist, Qin Wang, **Parker S. Ruth**, Jack H. Kotnik, Amy K. Oreskovic, Abraham Miller, Samuel W. A. Stewart, Justin Vrana, Peter D. Han, Ingrid A. Beck, Lea M. Starita, Lisa M. Frenkel, and Barry R. Lutz. Simpler and faster Covid-19 testing: Strategies to streamline SARS-CoV-2 molecular assays. *EBioMedicine*, 64:103236, February 2021

[5] **Parker S. Ruth**, Jerry Cao, Millicent Li, Jacob E. Sunshine, Edward J. Wang, and Shwetak N. Patel. Multi-Channel Facial Photoplethysmography Sensing. In *42nd Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC)*, pages 4179–4182, July 2020

[6] Nuttada Panpradist, Ingrid A. Beck, **Parker S. Ruth**, Santiago Ávila-Ríos, Claudia García-Morales, Maribel Soto-Nava, Daniela Tapia-Trejo, Margarita Matías-Florentino, Hector E. Paz-Juarez, Silvia del Arenal-Sanchez, Gustavo Reyes-Terán, Barry R. Lutz, and Lisa M. Frenkel. Near point-of-care, point-mutation test to detect drug resistance in HIV-1: A validation study in a Mexican cohort. *AIDS*, 34(9):1331–1338, July 2020

[7] Nuttada Panpradist, Ingrid A. Beck, Justin Vrana, Nikki Higa, David McIntyre, **Parker S. Ruth**, Isaac So, Enos C. Kline, Ross Milne, Ruth Kanthula, Annie Wong-On-Wing, Jonathan Lim, Daisy Ko, Theresa Rossouw, Ute D. Feucht, Michael Chung, Gonzague Jourdain, Nicole Ngo-Giang-Huong, Laddawan Laomanit, Jaime Soria, James Lai, Eric E. Klavins, Lisa M. Frenkel, and Barry R. Lutz. OLA-Simple: a software-guided HIV-1 drug resistance test for low-resource laboratories. *EBioMedicine*, 50:34–44, December 2019

Pre-Prints

[8] **Parker S. Ruth** and Herbert M. Sauro. A commentary on the linearity and time-invariance of ODE-based systems. *arXiv*, December 2019

Conference Posters

[9] **Parker S. Ruth**, Constance de Monts, Scott Uhlrich, Julie Muccini, Paxton Ataide, Antoine Falisse, John Day, Scott Delp, and Tina Duong. Digital Movement Biomarkers for Neuromuscular Diseases from Smartphone Videos. In *Myotonic Dystrophy Foundation Annual Conference*, September 2023

[10] Nuttada Panpradist, Ingrid A. Beck, **Parker S. Ruth**, Santiago Avila-Rios, Claudia García-Morales, Maribel Soto-Nava, Daniela Tapia-Trejo, Margarita Matias-Florentino, Hector E. Paz-Juarez, Silvia del Arenal-Sanchez, Gustavo Reyes-Teran, Barry R. Lutz, and Lisa M. Frenkel. Development and evaluation of a low-cost drug resistance test "OLA-Simple" for non-nucleoside-based ART for Mexico's HIV population. In *International AIDS Society Conference on HIV Science*, July 2019

[11] Nuttada Panpradist, Ingrid A. Beck, Justin Vrana, Nikki Higa, David McIntyre, **Parker S. Ruth**, Isaac So, Enos Kline, Ross Milne, Ruth Kanthula, Annie Wong-On-Wing, Jonathan Lim, Daisy Ko, Theresa Rossouw, Ute Feucht, Michael Chung, Gonzague Jourdain, Nicole Ngo-Giang-Huong, Laddawan Laomanit, Jaime Soria, James Lai, Eric Klavins, Lisa M. Frenkel, and Barry R. Lutz. OLA Simple: a software-guided assay that novices can perform to genotype HIV DNA and RNA subtypes A, B, C, D and E for detection of drug resistance. In *International Workshop on HIV Drug Resistance and Treatment Strategies*, October 2018

Invited Talks

[T-1] **Scalable Kinematic Analysis Using Smartphone Videos: Towards Movement Biomarkers for Neuromuscular Diseases** September 2023
MR3 Network 2023 Scientific Retreat

[T-2] **Multi-Channel Facial Photoplethysmography Sensing** July 2020
42nd Annual International Conferences of the IEEE Engineering in Medicine and Biology Society (EMBC)

[T-3] **Multi-Channel Facial Photoplethysmography Sensing** May 2020
Undergraduate Research Symposium, Seattle, WA

[T-4] **OsteoApp: Towards Ubiquitous Osteoporosis Screening** May 2019
Undergraduate Research Symposium, Seattle, WA

[T-5] **Seismo: Blood Pressure Monitoring using Built-in Smartphone Sensors** November 2018
Allen School Industry Affiliates Research Day, Seattle, WA

[T-6] **A Ubiquitous Screening Technology for Sleep Apnea** May 2018
Undergraduate Research Symposium, Seattle, WA

Awards and Honors

National Awards and Honors

Hertz Fellowship Finalist	2022
Tau Beta Pi Fellowship	2021
National Science Foundation Graduate Fellowship	2021
CRA Outstanding Undergraduate Researcher Award Finalist	2021
Barry Goldwater Scholarship	2020
CRA Outstanding Undergraduate Researcher Award Finalist	2020
Davidson Fellows Scholarship Honorable Mention	2016
National Merit Scholarship	2016

University of Washington Awards and Honors

Paul G. Allen School Outstanding Senior Award	2021
Paul G. Allen School Best Senior Thesis Award	2021
College of Engineering Dean's Medal for Academic Excellence	2021
Husky 100 Award	2020
Mary Gates Research Scholarship	2020
Levinson Emerging Scholars Award	2019
Microsoft Endowment Scholarship	2019
Patricia G. Lynch and Theodora & Eugene Russell Memorial Scholarship	2019
Tau Beta Pi Engineering Honors Society	2018
Washington Research Foundation Fellowship	2018
Mary Gates Research Scholarship	2018
Mary Gates Leadership Scholarship	2018
Mary Gates Achievement Scholarship	2017

Teaching Experience

Course Instruction

Instructor, CSE 590U Ubiquitous Computing Graduate Seminar 9/2019 – 6/2020

- Led weekly discussion section with guest presenters and paper critique
- Topics included interaction techniques, wearables, novel sensing, and pervasive computing

Co-instructor, BIOEN 217 MATLAB Fundamentals For Bioengineers 9/2019 – 12/2019

- Co-instructed seminar introducing programming in MATLAB with biomedically relevant examples
- Prepared and delivered lectures, graded coding assignments, and supported course development

Curriculum Development

Biosignal Processing Textbook 8/2018 – 9/2020

- Wrote 140-page course textbook for Signals and Sensors for Bioengineers course
- Covers signal acquisition, Fourier analysis, digital and analog filters, and linear systems
- More information available at parkersruth.com/biosignal-processing

Python for Chemists Worksheets 11/2019 – 2/2020

- Made worksheets to accompany assignments for Honors Chemistry course
- Wrote Jupyter notebooks introducing scientific computing with NumPy, SciPy, and Pandas
- Topics include curve fitting, reaction kinetics, and wavefunction visualization

Service

Mentoring and Tutoring

- Mentor, Stanford CURIS Computer Science Undergraduate Research Experience 10/2023 – Present
- Mentor, Stanford CURIS Computer Science Undergraduate Research Experience 06/2023 – 9/2023
- Mentor, BioExplore Research Mentorship Program 12/2020 – 6/2021
- Mentor, Lavin Entrepreneurship Program 6/2020 – 6/2021
- Tutor, Bioengineering Study Center 4/2019 – 6/2019
- Mentor, ACM New Student Welcome 9/2017, 9/2018

Volunteering and Outreach

- Reviewer, Stanford Computer Science PhD Admissions Committee 12/2022
- Moderator, Bioengineering Capstone Symposium 5/2021
- Computer Science Student Advisory Council Research Panelist 5/2020
- Poster presenter, Allen School Annual Industry Affiliates Research Day 11/2018, 11/2019
- Presenter, Allen School CS4Teachers outreach event 7/2019
- Entrepreneurship Panelist, Allen School Admitted Students Preview Day 4/2019
- Volunteer, UW Engineering Discovery Days 4/2018, 4/2019

Leadership

Bioengineering Department Curriculum Committee 9/2018 – 6/2020

- Selected to represent undergraduate cohort on department curriculum committee
- Discuss improvements to department curriculum and student programs
- Collect student feedback and propose solutions to improve the academic experience
- Represented BioE and CSE programs during ABET accreditation site visit

BioExplore Founder/Lead 6/2017 – 8/2018

- Fostered community of students excited about research in bioengineering-related fields
- Organized presentations, panels, and lab tours for students in biosciences

Bioengineering Journal Club Founder/Lead 12/2016 – 5/2017

- Organized biweekly bioengineering journal club meetings
- Coordinated guest presentations and paper discussions

Employment

Venture Associate, Alsop Louie Partners 6/2021 – Present

Campus Associate, Alsop Louie Partners 6/2020 – 6/2021

- Prospect potential venture capital investments in biotechnology and personalized medicine
- Advise on emerging trends and disruptive technologies