Parker S. Ruth

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My research lies in the intersection of computing, engineering, and medicine. I'm currently designing sensors and algorithms to measure digital biomarkers of neuromuscular and cardiovascular health. I am fortunate to work closely with mentors and collaborators in computer science, statistics, bioengineering, and medicine.

Education

Stanford University, Stanford, CA 2021 – 2027
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

Publications and Talks

Pre-Prints

[1] **Parker S. Ruth***, Uhlrich, Scott D.*, Constance de Monts, Antoine Falisse, Sydney Covitz, Shelby Vogt-Domke, Julie Muccini, John Day, Tina Duong, and Scott Delp. Video-based biomechanical analysis captures disease-specific movement signatures of different neuromuscular diseases, September 2024
* Contributed equally

Peer Reviewed Publications

[2] Alvin Cao, Ken Christofferson, **Parker S. Ruth**, Naveed Rabbani, Yuanchun Shi, Alex Mariakakis, Yuntao Wang, and Shwetak Patel. EarSteth: Cardiac Auscultation Audio Reconstruction Using Earbuds. In *2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, pages 1–4, July 2024

[3] Scott D. Uhlrich, **Parker S. Ruth**, Constance de Monts, Antoine Falisse, Julie Muccini, Paxton Ataide, John Day, Tina Duong, and Scott L. Delp. Towards Video-Based Movement Biomarkers for Neuromuscular Diseases. In *Converging Clinical and Engineering Research on Neurorehabilitation V*, pages 501–504, Cham, December 2024. Springer Nature Switzerland

[4] 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

[5] 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

[6] 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

[7] 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

[8] **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

[9] 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

[10] 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

Conference Posters and Abstracts

[11] **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

[12] 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

[13] 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] **Towards Smartphone Video-Based Biomarkers of Human Movement** 03/2025
University of Washington Ubiquitous Computing Seminar

[T-2] **Towards Smartphone Video-Based Biomarkers of Human Movement** 02/2025
University of California San Diego Design Lab Meeting

[T-3] **Scalable Kinematic Analysis Using Smartphone Videos: Towards Movement Biomarkers for Neuromuscular Diseases** 09/2023
MR3 Network 2023 Scientific Retreat

[T-4] **Multi-Channel Facial Photoplethysmography Sensing** 07/2020
42nd Annual International Conferences of the IEEE Engineering in Medicine and Biology Society (EMBC)

[T-5] **Multi-Channel Facial Photoplethysmography Sensing** 05/2020
Undergraduate Research Symposium, Seattle, WA

[T-6] **OsteoApp: Towards Ubiquitous Osteoporosis Screening** 05/2019
Undergraduate Research Symposium, Seattle, WA

[T-7] **Seismo: Blood Pressure Monitoring using Built-in Smartphone Sensors** 11/2018
Allen School Industry Affiliates Research Day, Seattle, WA

[T-8] **A Ubiquitous Screening Technology for Sleep Apnea** 05/2018
Undergraduate Research Symposium, Seattle, WA

Teaching Experience

Course Assistant, CS 347 Human-Computer Interaction: Foundations and Frontiers 1/2024 – 3/2024
- Led weekly discussion sections on seminal literature in human-computer interaction
- Wrote quizzes and grade reading reflection assignments
- Lectured on Human-Computer Interaction and Health

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

Author, Biosignal Processing Course Text 8/2018 – 9/2020
- Wrote 140-page course text 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

Service

Mentorship
- **Amanda Phan** (Stanford University) 1/2025 – Present
- **Nathalie Moreno** (Stanford University) 10/2024 – Present
- **Tommy DeBenedetti** (Stanford University) 06/2024 – 09/2024
- **Morayo Adeyemi** (Howard University) 06/2024 – 09/2024
- **Jordan Rodriguez** (University of Arizona) 06/2024 – 09/2024
- **Ege Turan** (Stanford University) 10/2023 – 12/2023
- **Alexandra Collins** (Stanford University) 06/2023 – 09/2023
- **Hamad Musa** (Stanford University) 06/2023 – 09/2023

Stanford Dean's Graduate Student Advisory Council 9/2024 – Present
- Lead initiative to implement individual development plans across School of Engineering
- Create first School of Engineering student experience feedback survey
- Foster inter-department social connections through event funding

UW 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

Revewing
- Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 03/2025
- ACM CHI conference on Human Factors in Computing Systems, late-breaking work 02/2024

Volunteering and Outreach
- Workshop Mentor, OpenSim+ Advanced Workshop, Neuromuscular Biomechanics Lab 03/2025
- Workshop Facilitator, Co-design for Healthcare and Assistive Technology 03/2025
- Volunteer, Stanford Computer Science Application Support Program 12/2024
- Workshop Facilitator, LINXS Computer Science Outreach Research Program 07/2024
- Reviewer, Stanford Computer Science PhD Admissions Committee 12/2022, 12/2023

- Volunteer, Stanford Computer Science Application Support Program 12/2023
- Poster presenter, UW Computer Science Industry Affiliates Research Day 11/2018, 11/2019
- Presenter, UW Computer Science CS4Teachers outreach event 7/2019
- Volunteer, UW Engineering Discovery Days 4/2018, 4/2019

Awards and Honors

Grants & Fellowships

Wu Tsai Human Performance Alliance Seed Grant, $200,000 2024
Tau Beta Pi Fellowship, $10,000 2021
National Science Foundation Graduate Research Fellowship, $138,000 2021

National Awards and Honors

Hertz Fellowship Finalist 2022
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

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