

# 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

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<b>Stanford University</b> , Stanford, CA PhD Student, Computer Science Department	2021 – 2027
<b>University of Washington</b> , Seattle, WA BS in Bioengineering, BS in Computer Engineering College Honors; <i>summa cum laude</i> GPA 3.96	2016 – 2021

## Publications and Talks

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### Peer Reviewed Publications

- [1] **Parker S. Ruth**, Scott D. Uhlrich, Constance de Monts, Antoine Falisse, Julie Muccini, Sydney Covitz, Shelby Vogt-Domke, John Day, Tina Duong, and Scott L. Delp. Video-Based Biomechanical Analysis Captures Disease-Specific Movement Signatures of Different Neuromuscular Diseases. *NEJM AI*, 2(9):Aloa2401137, August 2025
- [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

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| [T-1] <b>Towards Smartphone Video-Based Biomarkers of Human Movement</b><br>University of Washington Ubiquitous Computing Seminar                                      | 3/2025  |
| [T-2] <b>Towards Smartphone Video-Based Biomarkers of Human Movement</b><br>University of California San Diego Design Lab Meeting                                      | 2/2025  |
| [T-3] <b>Scalable Kinematic Analysis Using Smartphone Videos:<br/>Towards Movement Biomarkers for Neuromuscular Diseases</b><br>MR3 Network 2023 Scientific Retreat    | 9/2023  |
| [T-4] <b>Multi-Channel Facial Photoplethysmography Sensing</b><br>42nd Annual International Conferences of the IEEE Engineering in Medicine and Biology Society (EMBC) | 7/2020  |
| [T-5] <b>Multi-Channel Facial Photoplethysmography Sensing</b><br>Undergraduate Research Symposium, Seattle, WA  | 5/2020  |
| [T-6] <b>OsteoApp: Towards Ubiquitous Osteoporosis Screening</b><br>Undergraduate Research Symposium, Seattle, WA  | 5/2019  |
| [T-7] <b>Seismo: Blood Pressure Monitoring using Built-in Smartphone Sensors</b><br>Allen School Industry Affiliates Research Day, Seattle, WA                         | 11/2018 |
| [T-8] <b>A Ubiquitous Screening Technology for Sleep Apnea</b><br>Undergraduate Research Symposium, Seattle, WA  | 5/2018  |

## Teaching Experience

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<b>Course Assistant, CS 347 Human-Computer Interaction: Foundations and Frontiers</b>	1/2024 – 3/2024
<ul style="list-style-type: none"> <li>• Led weekly discussion sections on seminal literature in human-computer interaction</li> <li>• Wrote quizzes and grade reading reflection assignments</li> <li>• Lectured on Human-Computer Interaction and Health</li> <li>• Course evaluation teaching effectiveness 4.81 / 5.00</li> </ul>	
<b>Instructor, CSE 590U Ubiquitous Computing Graduate Seminar</b>	9/2019 – 6/2020
<ul style="list-style-type: none"> <li>• Led weekly discussion section with guest presenters and paper critique</li> <li>• Topics included interaction techniques, wearables, novel sensing, and pervasive computing</li> </ul>	
<b>Co-instructor, BIOEN 217 MATLAB Fundamentals For Bioengineers</b>	9/2019 – 12/2019
<ul style="list-style-type: none"> <li>• Co-instructed seminar introducing programming in MATLAB with biomedically relevant examples</li> <li>• Prepared and delivered lectures, graded coding assignments, and supported course development</li> </ul>	
<b>Author, Biosignal Processing Course Text</b>	8/2018 – 9/2020
<ul style="list-style-type: none"> <li>• Wrote 140-page course text for Signals and Sensors for Bioengineers course</li> <li>• Covers signal acquisition, Fourier analysis, digital and analog filters, and linear systems</li> <li>• More information available at <a href="http://parkersruth.com/biosignal-processing">parkersruth.com/biosignal-processing</a></li> </ul>	

## Service

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<b>Mentorship</b>	
• Lily O'Brien (Stanford University)	6/2025 – Present
• Chloe Zhong (Stanford University)	3/2025 – Present
• Milly Wong (Stanford University)	3/2025 – Present
• Nathalie Moreno (Stanford University)	10/2024 – Present
• Tommy DeBenedetti (Stanford University)	6/2024 – Present
• Ron Polonsky (Stanford University)	3/2025 – 6/2025
• Eli Waldman (Stanford University)	3/2025 – 6/2025
• Amanda Phan (Stanford University)	1/2025 – 6/2025
• Morayo Adeyemi (Howard University)	6/2024 – 9/2024
• Jordan Rodriguez (University of Arizona)	6/2024 – 9/2024
• Ege Turan (Stanford University)	10/2023 – 12/2023
• Alexandra Collins (Stanford University)	6/2023 – 9/2023
• Hamad Musa (Stanford University)	6/2023 – 9/2023
<b>Stanford Dean's Graduate Student Advisory Council</b>	9/2024 – 6/2025
<ul style="list-style-type: none"> <li>• Lead initiative to implement individual development plans across School of Engineering</li> <li>• Create first School of Engineering student experience feedback survey</li> <li>• Foster inter-department social connections through event funding</li> </ul>	
<b>UW Bioengineering Department Curriculum Committee</b>	9/2018 – 6/2020
<ul style="list-style-type: none"> <li>• Selected to represent undergraduate cohort on department curriculum committee</li> <li>• Discuss improvements to department curriculum and student programs</li> <li>• Collect student feedback and propose solutions to improve the academic experience</li> <li>• Represented BioE and CSE programs during ABET accreditation site visit</li> </ul>	
<b>Reviewing</b>	
• Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies	3/2025
• ACM CHI conference on Human Factors in Computing Systems, late-breaking work	2/2024

**Volunteering and Outreach**

• Demonstrator, Stanford School of Engineering Centennial Showcase	5/2025
• Workshop Mentor, OpenSim+ Advanced Workshop, Neuromuscular Biomechanics Lab	3/2025
• Workshop Facilitator, Co-design for Healthcare and Assistive Technology	3/2025
• Volunteer, Stanford Computer Science Application Support Program	12/2024
• Workshop Facilitator, LINXS Computer Science Outreach Research Program	7/2024
• 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

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**Grants & Fellowships**

NIH F31 Predoctoral Fellowship, \$148,000	2025
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	2020, 2021
Barry Goldwater Scholarship	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
Annual Dean's List	2017 – 2020
Husky 100 Award	2020
Mary Gates Research Scholarship	2018, 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 Leadership Scholarship	2018
Mary Gates Achievement Scholarship	2017

## Employment

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<b>Venture Associate, Alsop Louie Partners</b>	6/2021 – Present
<b>Campus Associate, Alsop Louie Partners</b>	6/2020 – 6/2021
<ul style="list-style-type: none"> <li>• Prospect potential venture capital investments in biotechnology and personalized medicine</li> <li>• Advise on emerging trends and disruptive technologies</li> </ul>	