Tarek Hamid

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RESEARCH INTERESTS

Digital Health, Wearables, Biomedical Signal Processing, Machine Learning and Data Science for Health, Medical Cyber-Physical Systems, Ubiquitous and Mobile Computing

EDUCATION

University of Virginia, Charlottesville, VA *Present*
PhD in Electrical and Computer Engineering
Dissertation: *Multi-Wavelength PPG Algorithms for Wearable Non-Invasive Physiological Monitoring*
Advisor: Prof. Amanda Watson

University of Pennsylvania, Philadelphia, PA *Aug 2023*
M.S. in Computer Science

Johns Hopkins University, Baltimore, MD *Dec 2019*
M.S. in Biomedical Engineering

The College of New Jersey, Ewing, NJ *May 2017*
B.S. in Biomedical Engineering

PUBLICATIONS

1. *A Multi-Wavelength Optical Sensing Framework for Calibration-Free Wearable Blood Pressure Monitoring*
   Tarek Hamid, Patricia Flores, Jane Byun, Xi Chen, Haoran Zhang, Kyle Quinn, Amanda Watson
   International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2025.

2. *Raproto: An Open-Source Platform for Rapid Prototyping with Wearable Devices.*
   Tarek Hamid, Kimberly Helm, Hyonyoung Choi, Jean Park, Claire Kendell, Stephanie Cummings, Steve Messe, Stefanie Modri, Insup Lee, Amanda Watson, James Weimer
   Proc. IEEE-EMBS Int. Conf. on Body Sensor Networks (IEEE BSN), 2024.

3. *Wearable Sensing for Measuring Skin-tone, Melanin, and Erythema.*
   Tarek Hamid, Anush Lingamoorthy, Kyle Quinn, and Amanda Watson
   Proc. IEEE-EMBS Int. Conf. on Body Sensor Networks (IEEE BSN), 2024.

4. *Using Decision Tree Classifier to Increase Screening Test Sensitivity for the Prediction of ACL Retear.*
   Tanishik Govil, **Tarek Hamid**, Kimberly Helm, Elliot Greenberg, Kevin Landrum, J. Todd R. Lawrence, Theodore J. Ganley, Amanda Watson
   UBICOMP'24: Adjunct Proceedings of the 2024 ACM International Joint Conference on Pervasive and Ubiquitous Computing, Melbourne, VIC, Australia 2024

5. *SpectraVue - An Interactive Web Application Enabling Rapid Data Visualization and Analysis for Wearable Spectroscopy Research.*
   Tarek Hamid, Insup Lee, Amanda Watson
   UBICOMP'23: Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing, Cancun, Mexico 2023

6. *Alleviation of Arthritic Symptoms through Thermal Therapy.*
   Tarek Hamid, Steven Ayala, Aakash Trivedi, Avi Shah
   In Proceedings of the 2017 Northeast Biomedical Engineering Conference (NEBEC). Newark, NJ: IEEE.

7. *(Submitted) Characterization and Feasibility of Wearable Spectroscopic Tracking of Nutrition Biomarkers*
   Tarek Hamid, Elizabeth Courtney, Patricia Flores, Jane Byun, Afsaneh Doryab, Sibylle Kranz, Amanda Watson
   IEEE Pervasive Computing Special Issue on Biosensing.

8. *(Submitted) DermaGlow: Objective Quantification of Melanin, Erythema and Skin-tone Using Wearable Optical Spectroscopy*
   Tarek Hamid, Anush Lingamoorthy, Kyle Quinn, Amanda Watson
   Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.

9. *(Submitted) GlucoLux: Noninvasive Glucose Monitoring Using a Portable Spectroscopy Device*
   Anush Lingamoorthy, Abhishek Murtha, **Tarek Hamid**, Kyle Quinn, Nagarajan Kandasamy, Amanda Watson
   Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.

INDUSTRY EXPERIENCE

VivoSense Present
Algorithm Engineer *Remote*

Developed an end-to-end data pipeline for processing and delivering accelerometer data in phase 2/3 clinical trials for small to large-scale pharmaceutical clients. Migrated legacy C# algorithms, including step count and cadence, to a modern Python data science stack. Implemented and productionalized a new activity fragmentation algorithm for clinical analysis.

Sotera Digital Health Jul 2022 - Dec 2023
Biomedical Algorithm Engineer *Remote*

Designed and implemented signal processing and data science algorithms in Python for a next-gen hospital wearable, extracting vital signs such as heart rate, SpO2, and blood pressure from ECG, PPG, and SCG sensor data. Led data collection and analysis for clinical trials, authored research protocols and reports, and ported algorithms to C for offline device use. Developed APIs in Python and Plotly Dash applications to expose simulated device data to partners and hospitals.

Freelance Consultant, Digital Health Jan 2022 - Dec 2023
Data Scientist *Remote*

Developed algorithms to analyze gait variability for an early-stage start-up, informing the impact of a neurostimulation device on potential users with ALS and Parkinson's. Built an end-to-end data processing platform to extract gait events from accelerometer data and characterize long-term data variability for device assessment.

JPMorgan Chase Jun 2020 – July 2022
Software Engineer *New York, NY*

Developed algorithms and internal customer-facing applications to report on the stability of new code changes to the Chase Consumer application. Utilized Java, Python, TypeScript, and Angular to track automated test pass rates, coverage, and software quality.

Department of Defense Oct 2019 – June 2020
Electrical Engineer *Picatinny Arsenal, NJ*

Designed custom hardware and software solutions for military vehicles using Python and Altium, contributing to defense technology advancements.

Johnson Johnson Jan 2018 – Oct 2019
Scientist *Skillman, NJ*

Led R&D lifecycle management activities for Class I and II medical devices in the North American region, ensuring regulatory compliance and product performance.

HONORS AND AWARDS

UVA Precision Health Initiative Grant *Feb 2025*
Award of $4,000 to cover travel expenses to present at ICASSP'25 in Hyderabad, India.

Second Runner-up for Best Paper Award *Oct 2024*
Presented Raproto: An Open-Source Platform for Rapid Prototyping with Wearable Devices at IEEE Body Sensor Networks.

PROFESSIONAL SERVICE AND AFFILIATIONS

Journal and Conference Reviews

1. *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)* *2025*
2. *IEEE Engineering in Medicine and Biology Society (EMBC)* *2024, 2025*
3. *Elsevier Smart Health* *2024*

Professional Affiliations

1. *IEEE EMBS: Technical Community on Wearable Biomedical Sensors and Systems (WBSS)*
2. *IEEE*
3. *ACM*