

Patrick Kasl

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EDUCATION

University of California–San Diego

Expected: Spring 2024

Doctor of Philosophy in Bioengineering (GPA: 3.97 / 4.00)

University of Wisconsin–Madison

May 2020

Bachelor of Science in Biomedical Engineering (GPA: 3.97 / 4.00)

RESEARCH EXPERIENCE

Smarr Lab, Halicioğlu Data Science Institute

March 2021 – Present

Fever Onset Detection Using Wearable Device Data

La Jolla, CA

- Developed and characterized a fever detection classifier using wearable device data
- Utilized physiological meaningful features and a simple machine-learning architecture to achieve S.O.T.A. illness detection performance
- Characterized decision boundaries using dimensionality reduction and explainability using feature importance

A Cross-study Analysis of Wearable Datasets and the Generalizability of Acute Illness Monitoring Models

- Conducted the *first* generalizability study of large, longitudinal wearable device datasets and acute illness detection models
- Quantified tradeoffs at the intersection of model: complexity, explainability, and generalizability

Metrics from Wearable Devices as Candidate Predictors of Antibody Response Following Vaccination against COVID-19

- Led data engineering, visualization, and statistical analysis resulting in a co-first author publication

Thomson Lab, Morgridge Institute for Research

August 2018 – May 2020

Tissue Engineering an Implantable Blood Vessel Graft

Madison, WI

- Developed and fabricated microfluidic culture devices for holding grafts during iPSC maturation
- Programmed peristaltic pump to create flow profiles that apply physiological shear and flow values to maturing grafts
- Implemented custom MATLAB script to analyze the accuracy of flow profiles
- Generated and analyzed bulk RNA sequencing data for characterizing undesired side populations arising in endothelial differentiation

Goessling Lab, Harvard Stem Cell Institute

June 2019 – August 2019

Hepatocellular Responses to Chronic Non-Alcoholic Fatty Liver Disease

Boston, MA

- Characterized NAFLD hepatocytes using immunofluorescence staining in histological sections, proposing and implementing background reduction techniques for imaging of low contrast IHC fluorescence markers
- Profiled NAFLD livers using a novel single-cell RNA sequencing technique (Seq-Well)
- Analyzed sequencing data and determined candidate genetic markers for pre-cancerous cell type

PROFESSIONAL EXPERIENCE

Aptima

June 2023 – Present

Research Engineer Intern

Woburn, MA

- Prototyped real-time gait instability algorithm using wearable accelerometry in Python and implemented in Dart, leading to continuation of funding of project under small business grant
- Tested implementation of real-time IoT system based on InfluxDB, RabbitMQ, and FastAPI, packaged in Docker
- Developed new methods for real-time sensor data visualization for IoT system
- Implemented memory caching into backend architecture, enabling users to dynamically adjust algorithm alert thresholds

General Electric

March 2020 – August 2020

Validation & Verification Co-op

Madison, WI

- Identified hardware issues in a COVID-19 emergency ventilator, leading to a manufacturing design change in 50,000 ventilators
- Developed & performed tests to determine the accuracy and repeatability of tidal volume delivered during ventilation

PUBLICATIONS

- [1] A. E. Mason*, **P. Kasl***, W. Hartogensis, J. L. Natale, S. Dilchert, S. Dasgupta, S. Purawat, A. Chowdhary, C. Anglo, D. Veasna, L. S. Pandya, L. M. Fox, K. Y. Puldon, J. G. Prather, A. Gupta, I. Altintas, B. L. Smarr, and F. M. Hecht, “Metrics from Wearable Devices as Candidate Predictors of Antibody Response Following Vaccination against COVID-19: Data from the Second TemPredict Study,” *Vaccines*, vol. 10, no. 2, p. 264, 2 Feb. 2022, ISSN: 2076-393X. DOI: 10.3390/vaccines10020264. [Online]. Available: <https://www.mdpi.com/2076-393X/10/2/264>.
- [2] A. E. Mason, **P. Kasl**, S. Soltani, A. Green, W. Hartogensis, S. Dilchert, A. Chowdhary, L. S. Pandya, C. J. Siwik, S. L. Foster, M. Nyer, C. A. Lowry, C. L. Raison, F. M. Hecht, and B. L. Smarr, “Elevated body temperature is associated with depressive symptoms: Results from the TemPredict Study,” *Scientific Reports*, vol. 14, no. 1, p. 1884, 1 Feb. 5, 2024, ISSN: 2045-2322. DOI: 10.1038/s41598-024-51567-w. [Online]. Available: <https://www.nature.com/articles/s41598-024-51567-w>.
- [3] L. K. Bruce, **P. Kasl**, S. Soltani, V. K. Viswanath, W. Hartogensis, S. Dilchert, F. M. Hecht, A. Chowdhary, C. Anglo, L. Pandya, S. Dasgupta, I. Altintas, A. Gupta, A. E. Mason, and B. L. Smarr, “Variability of temperature measurements recorded by a wearable device by biological sex,” *Biology of Sex Differences*, vol. 14, no. 1, p. 76, Nov. 1, 2023, ISSN: 2042-6410. DOI: 10.1186/s13293-023-00558-z. [Online]. Available: <https://doi.org/10.1186/s13293-023-00558-z>.
- [4] S. Purawat, S. Dasgupta, J. Song, S. Davis, K. T. Claypool, S. Chandra, A. Mason, V. Viswanath, A. Klein, **P. Kasl**, Y. Wen, B. Smarr, A. Gupta, and I. Altintas, “TemPredict: A Big Data Analytical Platform for Scalable Exploration and Monitoring of Personalized Multimodal Data for COVID-19,” in *2021 IEEE International Conference on Big Data (Big Data)*, Dec. 2021, pp. 4411–4420. DOI: 10.1109/BigData52589.2021.9671441. [Online]. Available: https://ieeexplore.ieee.org/abstract/document/9671441?casa_token=2XUVONFGZHoAAAAA:leDj51kmoExoLq3N8J4YwbMguVTk21qhieKipTSFYetCbutiWik2Rn02pECdEeXukSf8m90.
- [5] H. Kletzien, S. M. Wang, **P. Kasl**, and N. P. Connor, “Lingual Muscle Plasticity with Age and Exercise.,” *Dysphagia*, vol. 34, no. 3, pp. 463–464, May 22, 2022, ISSN: 0179051X. [Online]. Available: <https://go.gale.com/ps/i.do?p=HRCA&sw=w&issn=0179051X&v=2.1&it=r&id=GALE%7CA743677361&sid=googleScholar&linkaccess=abs>.

UNDER REVIEW

- [1] **P. Kasl**, S. Soltani, L. K. Bruce, V. K. Viswanath, W. Hartogensis, A. Gupta, I. Altintas, S. Dilchert, F. M. Hecht, A. E. Mason, and B. L. Smarr, “A Cross-study Analysis of Wearable Datasets and the Generalizability of Acute Illness Monitoring Models,” *Under Review: Conference on Health, Inference, and Learning*, Feb. 16, 2024.
- [2] **P. Kasl**, L. K. Bruce, W. Hartogensis, S. Dasgupta, L. S. Pandya, S. Dilchert, F. M. Hecht, A. Gupta, I. Altintas, A. E. Mason, and B. L. Smarr, “Utilizing wearable device data for syndromic surveillance: A fever detection approach,” *Under Review: Sensors*, Jan. 30, 2024.

CONFERENCE PRESENTATIONS

- 1. **Kasl P.**, Brandl A., Liu B. Cardiotoxicity Drug Assay. Presented at the 2018 SCRMC Fall Conference, September 21, 2018, Madison, Wisconsin.
- 2. **Kasl P.**, Walesky C., Goessling W. Hepatocellular Responses to Non-Alcoholic Fatty Liver Disease. Presented at the HIP Conference, August 16, 2019, Cambridge, Massachusetts.
- 3. Kletzien H., Wang S., **Kasl P.**, Connor NP. Lingual Muscle Plasticity with Age and Exercise. Presented at the 2018 meeting of the Japanese Society of Dysphagia Rehabilitation and the 2018 Japanese-Korean Joint Swallowing Conference. September 7-9, 2018, Sendai, Japan.

AWARDS & HONORS

<i>Theodore Herfurth Award for Comprehensive Undergraduate Excellence</i>	2020
<ul style="list-style-type: none">• 1 of 2 seniors in a graduating class of 7,671; awarded to students who made the most effective use of time in their undergraduate studies	
<i>Joshua Plantz Honorary Scholarship</i>	2019
<ul style="list-style-type: none">• \$3,000 honorary scholarship	
<i>Nominated for Goldwater Scholarship</i>	2019
<ul style="list-style-type: none">• One of four students nominated by UW-Madison for Goldwater Scholarship	
<i>Vilas Merit Scholar</i>	2018 – 2019
<i>Dean's List</i>	2016 – 2020
<ul style="list-style-type: none">• 8 of 8 semesters	
<i>Full Ride Athletic Scholarship</i>	2016 – 2018
<ul style="list-style-type: none">• Full tuition and stipend scholarship (~\$60,000/year) awarded to recruited varsity athletes	

EXTRACURRICULAR ACTIVITIES

Bioengineering Graduate Society (BEGS)	May 2022 – May 2023
<i>President</i>	<i>La Jolla, CA</i>
<ul style="list-style-type: none">• Led a 300+ person organization, coordinated meetings between the executive board, planned events, developed budget, facilitated interactions between sub-committees and esteemed faculty	
UW-Varsity Football	June 2016 – August 2018
<i>Student-Athlete</i>	<i>Madison, WI</i>
<ul style="list-style-type: none">• Dedicated up to 60 hours a week, year-round developing skills including time management, teamwork, ability to take criticism, and performance under pressure	

TECHNICAL SKILLS

General Python development: Pandas, Numpy, Multiprocessing
Data visualization: Matplotlib, Seaborn, Plotly, Bokeh
Machine learning and algorithm development: Sklearn, PyTorch, PyTorch Lightning
Statistical analysis: SciPy, Statsmodels, custom statistical functions as needed
Familiarity (most to least): SQL, \LaTeX , Docker, AWS, Dart, R, HTML/CSS/JavaScript, InfluxDB, RabbitMQ, memcached, FastAPI, React

REFERENCES

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