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, Halıcıoğlu 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 physiologically meaningful features and a simple machine-learning architecture to achieve SOTA 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, *et al.*, "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, *et al.*, "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, *et al.*, "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, *et al.*, "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:IeDj51kmoExoLq3N8J4YwbMguVTk21qhieKipTSFYetCbutiWik2Rn02pECdEeXukSf8m90.

[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, *et al.*, "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, *et al.*, "Utilizing wearable device data for syndromic surveillance: A fever detection approach," *In Press: 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

Theodore Herfurth Award for Comprehensive Undergraduate Excellence 2020

- 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

Joshua Plantz Honorary Scholarship 2019

- $3,000 honorary scholarship

Nominated for Goldwater Scholarship 2019

- One of four students nominated by UW-Madison for Goldwater Scholarship

Vilas Merit Scholar 2018 – 2019

Dean's List 2016 – 2020

- 8 of 8 semesters

Full Ride Athletic Scholarship 2016 – 2018

- Full tuition and stipend scholarship (∼$60,000/year) awarded to recruited varsity athletes

Extracurricular Activities

Bioengineering Graduate Society (BEGS) May 2022 – May 2023
President *La Jolla, CA*

- Led a 300+ person organization, coordinated meetings between the executive board, planned events, developed budget, and facilitated interactions between sub-committees and esteemed faculty

UW-Varsity Football June 2016 – August 2018
Student-Athlete *Madison, WI*

- 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

Benjamin Smarr, Assistant Professor
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