Arvind Pillai

PhD Student · Machine Learning + Health Sensing

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Research Summary

Leveraging expertise in AI, ubiquitous sensing, and healthcare, I develop GENERALIZABLE HEALTH PREDICTION algorithms using data from LONGITUDINAL STUDIES utilizing everyday sensors. Building on these insights, I focus on advancing MULTI-MODAL HEALTH FOUNDATION MODELS and creating AI-DRIVEN HEALTH AGENTS that support clinicians in delivering personalized, data-informed care. My research has resulted in publications in top-tier conferences, publicly available datasets and models, and coverage in popular media.

Education

Dartmouth College — *Hanover, NH*
PhD Computer Science — *2021 - present*
Advisor: Prof. Andrew Campbell

UT Dallas — *Richardson, TX*
MS Computer Science — *2017 - 2019*

VIT University — *Vellore, India*
BTech Computer Science & Engineering — *2013-2017*

Research Experience

PhD Researcher — *Hanover, NH*
Dartmouth College — *Sept. 2021 - present*
Advisor: Prof. Andrew Campbell

Student Researcher — *Cambridge, MA*
Google — *June 2025 - Sept. 2025*
Mentors: Drs. Paolo Di Achille, Ming-Zher Poh

Research Intern — *Cambridge, UK*
Nokia Bell Labs — *June 2024 - Sept. 2024*
Mentors: Drs. Dimitris Spathis, Mohammed Malekzadeh

AI Graduate Scientist — *Waltham, MA*
AstraZeneca — *Sept. 2019 - July 2021*
Mentors: Drs. Glynn Dennis, Mishal Patel, Bino John

Publications

A Note on Publication Venues: My research lies in the intersection of Machine Learning and Human-Computer Interaction, where top-tier conferences are pivotal for disseminating key findings. Among these conferences, ACM UbiComp/IMWUT, ICLR, and ACM CHI Conference are flagship venues.

Refereed Conference Proceedings

C12. **Arvind Pillai**, Dimitris Spathis, Subigya Nepal, Amanda C Collins, Daniel M Mackin, Michael V Heinz, Tess Z Griffin, Nicholas C Jacobson, Andrew Campbell. Time2Lang: Bridging Time-Series Foundation Models and Large Language Models for Health Sensing Beyond Prompting. *Conference on Health, Inference, and Learning* (**CHIL'25**).

C11. **Arvind Pillai**, Dimitris Spathis, Fahim Kawsar, Mohammad Malekzadeh. PaPaGei: Open Foundation Models for Optical Physiological Signals. *International Conference on Learning Representations* (**ICLR'25**).
🏆 **Best Paper Award** @ NeurIPS TSALM Workshop (1 out of 93).

C10. Subigya Nepal, **Arvind Pillai**, William Campbell, Talie Massachi, Michael V Heinz, Ashmita Kunwar, Eunsol Soul Choi, Orson Xu, Joanna Kuc, Jeremy Huckins, Jason Holden, Sarah M Preum, Colin Depp, Nicholas Jacobson, Mary Czerwinski, Eric Granholm, Andrew T Campbell. MindScape Study: Integrating LLM and Behavioral Sensing for Personalized AI-Driven Journaling Experiences. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(IMWUT/UbiComp'25).**

C9. Subigya Nepal, Wenjun Liu, **Arvind Pillai**, Weichen Wang, Vlado Vojdanovski, Jeremy F Huckins, Courtney Rogers, Meghan L Meyer, Andrew T Campbell. Capturing the College Experience: A Four-Year Mobile Sensing Study of Mental Health, Resilience and Behavior of College Students during the Pandemic. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(IMWUT/UbiComp'24)** 🏆 **Distinguished Paper Award**.

C8. **Arvind Pillai***, Subigya Nepal*, Weichen Wang, Tess Griffin, Amanda C Collins, Michael Heinz, Damien Lekkas, Shayan Mirjafari, Matthew Nemesure, George Price, Nicholas Jacobson, Andrew Campbell. (*co-primary) MoodCapture: Depression Detection using In-the-Wild Smartphone Images. *Proceedings of the CHI Conference on Human Factors in Computing Systems* **(CHI'24).**

C7. Subigya Nepal, **Arvind Pillai**, William Campbell, Talie Massachi, Eunsol Soul Choi, Xuhai Xu, Joanna Kuc, Jeremy F Huckins, Jason Holden, Colin Depp, Nicholas Jacobson, Mary P Czerwinski, Eric Granholm, Andrew Campbell. Contextual AI Journaling: Integrating LLM and Time Series Behavioral Sensing Technology to Promote Self-Reflection and Well-being using the MindScape App. *Proceedings of the CHI Conference on Human Factors in Computing Systems Extended Abstracts* **(CHI EA'24).**

C6. **Arvind Pillai**, Subigya Kumar Nepal, Weichen Wang, Matthew Nemesure, Michael Heinz, George Price, Damien Lekkas, Amanda C Collins, Tess Griffin, Benjamin Buck, Sarah Masud Preum, Trevor Cohen, Nicholas C Jacobson, Dror Ben-Zeev, Andrew Campbell. Investigating Generalizability of Speech-based Suicidal Ideation Detection Using Mobile Phones. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(IMWUT/UbiComp'24)**.

C5. **Arvind Pillai**, Subigya Nepal, Andrew Campbell. Rare Life Event Detection via Mobile Sensing Using Multi-Task Learning. *Conference on Health, Inference, and Learning* (**CHIL'23**).

C4. Weichen Wang, Subigya Nepal, Jeremy F Huckins, Lessley Hernandez, Vlado Vojdanovski, Dante Mack, Jane Plomp, **Arvind Pillai**, Mikio Obuchi, Alex daSilva, Eilis Murphy, Elin Hedlund, Courtney Rogers, Meghan Meyer, Andrew Campbell. First-Gen Lens: Assessing Mental Health of First-Generation Students across Their First Year at College Using Mobile Sensing. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* **(IMWUT/UbiComp'23)**.

C3. **Arvind Pillai**, Kamen Bliznashki, Emmette Hutchison, Chanchal Kumar, Benjamin Challis, Mishal Patel. Machine Learning Enabled Non-invasive Diagnosis of Nonalcoholic Fatty Liver Disease and Assessment of Abdominal Fat from MRI Data *NeurIPS workshop on Machine Learning for Health* **(ML4H'20)**.

C2. **Arvind Pillai**, Halsey Lea, Faisal Khan, Glynn Dennis. Personalized Step Counting Using Wearable Sensors: A Domain Adapted LSTM Network Approach *ECML workshop on Pharmaceutical Machine Learning* **(PharML'20)**.

C1. Hafez Manoochehri, **Arvind Pillai**, Mehrdad Nourani. Graph Convolutional Networks for Predicting Drug-Protein Interactions. *IEEE International Conference on Bioinformatics and Biomedicine* **(BIBM'19)**.

Refereed Journal Proceedings

J8. Damien Lekkas, Amanda C Collins, Michael V Heinz, Tess Z Griffin, **Arvind Pillai**, Subigya K Nepal, Daniel M Mackin, Andrew T Campbell, Nicholas C Jacobson. Acute suicidal ideation in context: highlighting sentiment-based markers through the diary entries of a clinically depressed sample. ***BMC Psychiatry***. 2025. [Impact Factor = 3.6] .

J7. Michael R Gallagher, Amanda C Collins, Damien Lekkas, Matthew D Nemesure, Tess Z Griffin, George D Price, Michael V Heinz, **Arvind Pillai**, Subigya Nepal, Daniel M Mackin, Andrew T Campbell, E Samuel Winer, Nicholas C Jacobson. AAnhedonia in flux: Understanding the associations of emotion regulation and anxiety with anhedonia dynamics in a sample with major depressive disorder. ***Journal of Affective Disorders***. 2025. [Impact Factor = 4.9] .

J6. Emily A Kline, Damien Lekkas, Anastasia Bryan, Matthew D Nemesure, Tess Z Griffin, Amanda C Collins, George D Price, Michael V Heinz, Subigya Nepal, **Arvind Pillai**, Andrew T Campbell, Nicholas C Jacobson. The role of borderline personality disorder traits in predicting longitudinal variability of major depressive symptoms among a sample of depressed adults. ***Journal of Affective Disorders***. 2024. [Impact Factor = 4.9] .

J5. Amanda C Collins, Damien Lekkas, Cara A Struble, Brianna M Trudeau, Abi D Jewett, Tess Z Griffin, Matthew D Nemesure, George D Price, Michael V Heinz, Subigya Nepal, **Arvind Pillai**, Daniel M Mackin, Andrew T Campbell, Alan J Budney, Nicholas C Jacobson. From Mood to Use: Using Ecological Momentary Assessments to Examine How Anhedonia and Depressed Mood Impact Cannabis Use in a Depressed Sample. ***Psychiatry research***. 2024. [Impact Factor = 3.9] .

J4. Subigya Nepal*, **Arvind Pillai***, Emma M Parrish, Jason Holden, Colin Depp, Andrew T Campbell, Eric L Granholm. (*co-primary) Social Isolation and Serious Mental Illness: The Role of Context-Aware Mobile Interventions. ***IEEE Pervasive Computing***. 2024. [Impact Factor = 1.8] .

J3. Matthew D Nemesure, Amanda C Collins, George D Price, Tess Z Griffin, **Arvind Pillai**, Subigya Nepal, Michael V Heinz, Damien Lekkas, Andrew T Campbell, Nicholas C Jacobson. Depressive symptoms as a heterogeneous and constantly evolving dynamical system: Idiographic depressive symptom networks of rapid symptom changes among persons with major depressive disorder. ***Journal of Psychopathology and Clinical Science***. 2024. [Impact Factor = 3.9] .

J2. Long Luu, **Arvind Pillai**, Halsey Lea, Ruben Buendia, Faisal M Khan, Glynn Dennis. Accurate Step Count with Generalized and Personalized Deep Learning on Accelerometer Data. ***Sensors***. 2022. [Impact Factor = 3.5] .

J1. **Arvind Pillai**, Rajkumar Soundrapandiyan, Swapnil Satapathy, Suresh Chandra Satapathy, Ki-Hyun Jung, Rajakumar Krishnan. Local Diagonal Extrema Number Pattern: A New Feature Descriptor for Face Recognition. ***Future Generation Computer Systems***. 2018. [Impact Factor = 6.1]

PRE-PRINTS, UNDER REVIEW, & IN PREPARATION

P2. Wenxuan Xu*, **Arvind Pillai***, Tess Griffin, Amanda C Collins, Michael Heinz, Damien Lekkas, Shayan Mirjafari, Matthew Nemesure, George Price, Nicholas Jacobson, Andrew Campbell. (*co-primary) LENS: LLM-Enabled Narrative Synthesis for Mental Health by Aligning Multimodal Sensing with Language Models. ***Under Review***. 2025.

P1. **Arvind Pillai**, Subigya Nepal, Jason Holden, Colin Depp, Eric Granholm and Andrew T Campbell. Evaluating Responders to Social Interaction Therapy Using Audio-Location Mobile Sensing. ***Under Review***. 2025.

Awards, Fellowships, & Grants

2025	**Distinguished Paper Award**, ACM UbiComp
2024	**Best Paper Award**, NeurIPS workshop on Time Series in the Age of Large Models
2024	**Guarini Travel Award**, Dartmouth College
2023	**Best Poster Award**, Center for Technology and Behavioral Health at Dartmouth College
2021	**Guarini Graduate Fellowship**, Dartmouth College

Publicly Available Models, Tools, & Datasets

PaPaGei ◯ (★134). The first open-source foundation model for Photoplethysmography bio-signals. Released with publication C11 in ICLR'25.

College Experience Study Dataset ↗. The most extensive longitudinal mobile sensing study to date, leveraging continuous passive and automatic sensing data from the smartphones of over 200 Dartmouth students across five years (2017 – 2022). It encompasses mobile sensing data, self-reported momentary assessments, longer form surveys and periodic brain imaging data. Released with publication C8 in IMWUT/UbiComp'24.

Presentations

Spring 2025. *Time2Lang: Bridging Time-Series Foundation Models and Large Language Models for Health Sensing Beyond Prompting*. CHIL 2025, Berkeley, CA.

Fall 2024. *Investigating Generalizability of Speech-based Suicidal Ideation Detection*. ACM UbiComp 2024, Melbourne, AU.

Spring 2024. *MoodCapture: Depression Detection Using In-the-Wild Smartphone Images*. ACM CHI 2024, Honolulu, HI.

Fall 2024. *PaPaGei: Open Foundation Models for Optical Physiological Sensing*. Digital Health Summit, Dartmouth College, Hanover, NH.

Fall 2023. *Generalizability in Mental Health: A Spotlight On Speech-Based Suicidal Ideation Detection*. Alan Turing Institute - Data Science for Mental Health.

Fall 2022. *Towards detecting suicidal ideation in individuals experiencing mental health symptoms using audio diaries from mobile mobiles*. VIT University, India.

Media Coverage

2024	**Mobile app predicts depression by reading your expression**, The Times UK 🔗
2024	**New app can detect depression before symptoms show simply by looking at your face when you unlock your phone**, The Sun 🔗
2024	**Phone App Uses AI to Detect Depression From Facial Cues**, Dartmouth News 🔗
2024	**From Ideas to Impact: Symposium on Digital Therapeutics**, Dartmouth News 🔗

Mentoring

2025-2026	**Jaden Moon**, Undergraduate Presidential Scholar, Dartmouth College
2025-2026	**Wenxuan Xu** 🔗, MS Thesis, Dartmouth College
2025	**Aiwei Zhang** 🔗, Undergraduate Thesis, Dartmouth College

Academic Service

PEER REVIEW

ICLR (2026)
ACM CHI (2025, 2026[†])
ACM IMWUT/UbiComp (2023, 2024, 2025[†])
ACM HEALTH (2024, 2025)
MLHC (2025)
ISWC (2025)
ML4H (2021, 2023)
([†]Outstanding Reviewer Recognition)

TECHNICAL PROGRAM COMMITTEE

2025	**EvalComp Workshop**, UbiComp	*Espoo, FI*
2024	**FairComp Workshop**, UbiComp	*Melbourne, AU*

VOLUNTEERING

2025	**CHIL**, Junior Roundtable Leader	*Berkeley, CA*
2024	**ACM CHI**, Student Volunteer	*Honolulu, HI*

Teaching Experience

Spr 2025	**CS1 - Intro. to Programming and Computation**, Head TA
Spr 2024	**CS1 - Intro. to Programming and Computation**, Head TA
Spr 2023	**CS1 - Intro. to Programming and Computation**, Head TA
Spr 2022	**CS1 - Intro. to Programming and Computation**, Head TA
Fall 2021	**CS1 - Intro. to Programming and Computation**, Head TA

Miscellaneous

RESEARCH INTERESTS

Time Series, Deep Learning, Domain Adaptation, Audio, Healthcare, Ubiquitous Computing, HCI, Multi-modal Modelling, Robustness, Generalization, AI, Statistical Modelling, Health foundation models, Multi-agent systems

PROGRAMMING & FRAMEWORKS

Languages: Python (Proficient), Java (Familiar), C/C++ (Familiar).
Frameworks/Libraries: JAX, Flax, PyTorch, Keras, NumPy, Scikit-learn, SciPy, Librosa

LANGUAGE

English, Tamil (Native)

References

Prof. Andrew T Campbell
Alfred Bradley 1915 Third Century Professor of Computer Science
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Prof. Nicholas Jacobson
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Dr. Dimitris Spathis
Senior Research Scientist
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Visiting Researcher, University of Cambridge
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Prof. Colin Depp
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