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 have advanced multi-modal health foundation models and now focus on 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. ***In Preparation***. 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 (★109). 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)
ML4H (2021, 2023)
MLHC (2025)
ISWC (2025)
([†] 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
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Prof. Nicholas Jacobson
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Senior Research Scientist
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