

# Arvind Pillai

PHD STUDENT · MACHINE LEARNING + HEALTH SENSING

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## Research Summary

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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

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### Dartmouth College

PHD COMPUTER SCIENCE

Advisor: Prof. Andrew Campbell

Hanover, NH

2021 - present

### UT Dallas

MS COMPUTER SCIENCE

Richardson, TX

2017 - 2019

### VIT University

BTECH COMPUTER SCIENCE & ENGINEERING

Vellore, India

2013-2017

## Research Experience

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### PhD Researcher

DARTMOUTH COLLEGE

Advisor: Prof. Andrew Campbell

Hanover, NH

Sept. 2021 - present

### Student Researcher

GOOGLE

Mentors: Drs. Paolo Di Achille, Ming-Zher Poh

Cambridge, MA

June 2025 - Sept. 2025

### Research Intern

NOKIA BELL LABS

Mentors: Drs. Dimitris Spathis, Mohammed Malekzadeh

Cambridge, UK

June 2024 - Sept. 2024

### AI Graduate Scientist

ASTRAZENECA

Mentors: Drs. Glynn Dennis, Mishal Patel, Bino John

Waltham, MA

Sept. 2019 - July 2021

## Publications

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A Note on Publication Venues: My research lies in the intersection of Machine Learning, Healthcare, 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. \* indicates equal contribution.

### REFEREED CONFERENCE PROCEEDINGS

C14. **Arvind Pillai\***, Wenxuan Xu\*, 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. *Proceedings of the 64th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers) (ACL'26 Main)*.

- C13. Yuliang Chen, **Arvind Pillai**, Yu Wu, Tess Z Griffin, Lisa Marsch, Michael V Heinz, Nicholas C Jacobson, Andrew Campbell. Learning Transferable Sensor Models via Language-Informed Pretraining. *1st ICLR Workshop on Time Series in the Age of Large Models (TSALM @ ICLR'26)*.
- 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

- J11. Elizabeth W Lampe, Amanda C Collins, Ahhyun Lee, Nicholas Enbar-Salo, Tess Z Griffin, **Arvind Pillai**, Michael V Heinz, Damien Lekkas, Matthew D Nemesure, Daniel M Mackin, Subigya Nepal, Andrew T Campbell, Nicholas C Jacobson. Interindividual Differences in Digital Phenotypes of Major Depressive Disorder: A Passive Sensing Study Using Smartphone and Wearable Sensor Data. *Behaviour Research and Therapy*. 2026. [Impact Factor = 4.5].
- J10. Anna M Langener, Dawson Haddox, Daniel M Mackin, George D Price, Damien Lekkas, Amanda C Collins, Tess Z Griffin, Michael V Heinz, Matthew D Nemesure, Subigya Nepal, **Arvind Pillai**, Andrew T Campbell, Nicholas C Jacobson. Passive

data do not improve prediction or detection of alcohol consumption beyond temporal patterns in major depression: A 90-day cross-validated study. *Addictive Behaviors*. 2026. [Impact Factor = 3.6].

- J9. Dawson Haddox, Daniel M Mackin, Tess Z Griffin, Michael V Heinz, Matthew D Nemesure, Amanda C Collins, George D Price, Damien Lekkas, **Arvind Pillai**, Subigya Nepal, Andrew T Campbell, Nicholas C Jacobson. Psychometric properties and validity of a Mobile Patient Health Questionnaire-9 (MPHQ-9) for ecological momentary assessment in depressed adults. *Psychological assessment*. 2025. [Impact Factor = 3.3].
- 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. Anhedonia 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 Soundrapandiyam, 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

- 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

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- 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

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**PaPaGei** (★141). 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

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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

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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

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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

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### PEER REVIEW

ICLR (2026)

ACM CHI (2025, 2026<sup>†</sup>)

ACM IMWUT/UbiComp (2023, 2024, 2025<sup>†</sup>)

ACM MobileHCI (2026)

ACM HEALTH (2024, 2025)

MLHC (2025)

ISWC (2025)

ML4H (2021, 2023)

(<sup>†</sup>Outstanding Reviewer Recognition)

### TECHNICAL PROGRAM COMMITTEE

2025 **EvalComp Workshop**, UbiComp

2024 **FairComp Workshop**, UbiComp

*Espoo, FI*

*Melbourne, AU*

### VOLUNTEERING

2025 **CHIL**, Junior Roundtable Leader

2024 **ACM CHI**, Student Volunteer

*Berkeley, CA*

*Honolulu, HI*

## Teaching Experience

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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

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### 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

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### **Prof. Andrew T Campbell**

Alfred Bradley 1915 Third Century Professor of Computer Science  
Dartmouth College, Hanover, NH  
✉ [andrew.t.campbell@dartmouth.edu](mailto:andrew.t.campbell@dartmouth.edu)

### **Prof. Nicholas Jacobson**

Associate Professor in Biomedical Data Science, Psychiatry, and Computer Science  
Dartmouth College, Hanover, NH  
✉ [nicholas.c.jacobson@dartmouth.edu](mailto:nicholas.c.jacobson@dartmouth.edu)

### **Dr. Dimitris Spathis**

Senior Research Scientist  
Google, London, UK  
Visiting Researcher, University of Cambridge  
✉ [spathis@google.com](mailto:spathis@google.com)

### **Prof. Colin Depp**

Professor of Psychiatry and Clinical Staff Psychologist at VA Hospital  
UC San Diego  
✉ [cdepp@ucsd.edu](mailto:cdepp@ucsd.edu)