Payal Mohapatra

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I research **robust and efficient machine learning (ML) methods for time-series data** under practical constraints like missingness and distribution shifts for audio, healthcare and human-centric applications.

Skills

Deep Learning: Transformers (`HuBERT, Wav2vec, Informer`), Large Language Models (`Llama2, Llama3`), Time-series Interpretability (`Captum`), Self-Supervised Learning (`SimSiam`), Domain Generalization, Multi-modal Learning

Modalities: Audio, Speech, Surface Electromyography (sEMG), Contact Microphone, Vision, Photoplethysmography (PPG), remote PPG from facial videos, Electrocardiogram (ECG), Electroencephalogram (EEG), Inertial Measurement Units (IMUs)

Programming Languages: Python (Pytorch, Scipy, Pandas, Tensorflow), C++, Shell, Perl, Verilog, System Verilog, Universal Verification Methodology(UVM)

Tools: LabVIEW, Matlab, Spice Simulation & PCB Design, Xilinx Vivado, Khadas VIM3, Jetson TX2

Misc.: Signal Processing, Human-subjects research (experience with Institutional Review Board processes and study protocol design), Multidisciplinary and cross-organizational collaboration

Education

Northwestern University — **Evanston, USA**
Ph.D. in Computer Engineering — *Sept 2021 – Early 2026 (Expected)*
Robust and Efficient Machine Learning for Time Series
Advisor: Dr. Qi Zhu | GPA: 3.96/4.0

Indian Institute of Technology Madras — **Chennai, India**
M.S. (by Research) in Electrical Engineering — *2015 – Nov 2017*
Algorithms and Systems for Wearable Health Monitors
Advisor: Dr. Mohanasankar Sivaprakasam | GPA: 9.31/10.0

Madras Institute of Technology, Anna University — **Chennai, India**
B.E. in Electronics and Instrumentation — *2011 – June 2015*
GPA: 9.36/10.0

Selected Experience

Mitsubishi Electric Research Lab (MERL) — **Boston, USA**
Part-time Student Researcher / Research Scientist Intern — *June 2025 – Dec 2025*
Vital Signs Estimation from Video Using Computer Vision and AI
Host: Tim K. Marks | Collaborators: Suhas Lohit, Hassan Mansour
System-level analysis for remote PPG-based blood pressure estimation using custom vision hardware, including data collection and preprocessing, facial ROI selection, time-series extraction, and machine learning. Supporting analysis of ongoing large-scale data collection.

Meta Reality Labs — **Redmond, USA**
Part-time Student Researcher / Research Scientist Intern — *June 2024 – Dec 2024*
Behavior-driven Localization of Conversation-relevant Acoustic Zones Using Smartglasses
Host: Morteza Khaleghimeybodi | Collaborators: Ali Aroudi, Calvin Murdock, Buye Xu, Anjali Menon
Formulated and developed an efficient sequential deep learning framework with hierarchical sensor fusion to predict acoustic zones of interest using IMUs.
Impact: Contributed to a patent filing and authored a technical manuscript (under submission).

Meta Reality Labs — **Redmond, USA**
Part-time Student Researcher / Research Scientist Intern — *June 2023 – Dec 2023*
Non-Verbal, Discreet Communication Methods for Smartglasses
Host: Morteza Khaleghimeybodi | Collaborators: Ali Aroudi, Anurag Kumar
Designed and executed a data collection protocol with 21 subjects. Developed a lightweight end-to-end Audio Event Detection (AED) system to recognize teeth-click gestures via nosepad-embedded accelerometers.
Impact: Deployed the AED system on smartglasses hardware; demonstrated at the internal Meta symposium (positive feedback from 50+ participants) and authored a technical white paper.

Northwestern University **Evanston, USA**
Graduate Research Assistant *Sept 2021 – Current*

- Developed ML frameworks for heterogeneous multimodal-sensing applications.
- Advanced speech-recognition technologies for minority and atypical users (ranging from disfluent to unvoiced EMG-based speech) in collaboration with Worcester Polytechnic Institute and Amazon Lab126.
- Led wearable systems research for operator's fatigue and safety monitoring in manufacturing factory floors in collaboration with Boeing, John Deere, MxD, and University at Buffalo.
- **Impact:** First-authored 10 publications at top-tier venues (NeurIPS, ACL, Interspeech, ICASSP, TMLR, PNAS Nexus). Led three factory-floor demonstrations at Boeing and John Deere, featured in 5+ news outlets. Mentored 8+ students and contributed to 4 grant proposals.

Analog Devices Inc. **Bangalore, India**
Senior Design Engineer | Design Verification Engineer *Nov 2017 – Sept 2021*
Digital Design and Formal Verification for ASICs
Digital design and formal verification for subsystems in Application-specific Integrated Circuits (ASICs) for audio noise cancellation, industrial Ethernet switches, and ultrasound fingerprint sensing applications.
Impact: Contributed to two successful chip tapeouts; demonstrated post-silicon ultrasound fingerprint touch detection on a System-on-Chip (SoC) at a company-wide workshop; presented the verification strategy for IEEE 802.1AS timing protocol for industrial Ethernet at Analog Devices' global intra-company conference (GTC'2020)

Indian Institute of Technology Madras **Chennai, India**
Graduate Research Assistant *2015 – 2017*
Algorithms and Systems for Wearable Health Monitors

- Developed a custom optical sensor board for optimal signal quality in users with varying skin tones and validated it for pulse-rate variability and heart-rate estimation across 20 subjects
- Developed a normalized least-mean-squared adaptive filtering-based motion-artifact rejection algorithm for real-time heart-rate estimation
- **Impact:** Authored three technical manuscripts (1 journal and 2 conferences including a best paper award at IEEE WinTechCon'18); demonstrated the overall system at the Healthcare Innovation Centre (HTIC), IITM Research Park

Selected Recognition and Awards

2025: Invited Speaker at the Emerging Technology Track, IEEE Realtime Communications WOrkshop, Chicago.

2025: RCTP-Q Science Communication Workshop, Northwestern University.

2024: EECS Rising Stars, Massachusetts Institute of Technology.

2023: Top performer in the ACM Multimedia 2023 Computational Paralinguistics Challenge (ComParE).

2023: Top performer in e-Prevention: Person Identification and Relapse Detection from Continuous Recordings of Biosignals Challenge in ICASSP'23.

2022: 1000 USD travel grant for MobiSys'22.

2022: CRA-WP Career Mentoring Workshop

2021: Best research video award Design Automation Conference Young Fellowship (DAC YF).

2018: Best Paper IEEE WinTechCon Conference.

2017: Winner of Make-in-India Anveshan Design Challenge, Analog Devices Incorporation.

2015-2017: Research Fellowship by Government of India (top 2%).

2011-2015: National Merit Scholarship by Government of India.

Publications

In Conference Proceedings

2025: Lixu Wang, Bingqi Shang, Yi Li, **Mohapatra, Payal**, Wei Dong, Xiao Wang, and Qi Zhu. Split adaptation for pre-trained vision transformers. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025.

2025: **Mohapatra, Payal**, Yueyuan Sui, Akash Pandey, Stephen Xia, and Qi Zhu. Maestro: Adaptive sparse attention and robust learning for multimodal dynamic time series. In *NeurIPS*, 2025. **(Spotlight, top 3.1%)**.

2025: **Mohapatra*, Payal**, Akash Pandey*, Xiaoyuan Zhang*, and Qi Zhu. Can llms understand unvoiced speech? exploring emg-to-text conversion with llms. In *Proceedings of the 63rd Annual Meeting of the Association for Computational Linguistics (ACL): Main Conference*, 2025.

2025: Akash Pandey*, **Mohapatra*, Payal**, Wei Chen, Qi Zhu, and Sinan Keten. Timesliver: Interpretable time-series classification using symbolic-linear representation. In *Under review*, 2025.

2024: **Mohapatra*, Payal**, Shamika Likhite*, Subrata Biswas, Bashima Islam, and Qi Zhu. Missingness-resilient video-enhanced multimodal disfluency detection. In *Interspeech 2024*, 2024.

2023: **Mohapatra*, Payal**, Akash Pandey*, Yueyuan Sui*, and Qi Zhu. Effect of attention and self-supervised speech embeddings on non-semantic speech tasks. In *Proceedings of the 31st ACM International Conference on Multimedia*, MM '23, 2023. **(Top performer, ComParE challenge)**.

2023: **Mohapatra*, Payal**, Akash Pandey*, Sinan Keten, Wei Chen, and Qi Zhu. Person identification with wearable sensing using missing feature encoding and multi-stage modality fusion. In *ICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2023. **(3rd Place, Signal Processing Grand Challenge)**.

2023: **Mohapatra, Payal**, Bashima Islam, Md Tamzeed Islam, Ruochen Jiao, and Qi Zhu. Efficient stuttering event detection using siamese networks. In *ICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2023.

2022: **Mohapatra, Payal**, Akash Pandey, Bashima Islam, and Qi Zhu. Speech disfluency detection with contextual representation and data distillation. In *Proceedings of the 1st ACM International Workshop on Intelligent Acoustic Systems and Applications*, 2022.

2017: **Mohapatra, Payal**, SP Preejith, and Mohanasankar Sivaprakasam. A novel sensor for wrist based optical heart rate monitor. In *2017 IEEE international instrumentation and measurement technology conference (I2MTC)*. IEEE, 2017.

Journal Articles

2025: **Mohapatra, Payal**, Lixu Wang, and Qi Zhu. Phase-driven domain generalizable learning for nonstationary time series. *Transactions on Machine Learning Research*, 2025. | Time Series for Health (TS4H) Workshop, NeurIPS 2025.

2025: **Mohapatra, Payal**, Calvin Murdock, Ishwarya Ananthbhola, Ali Aroudi, Anjali Menon, Buye Xu, and Morteza Khaleghimeybodi. Towards localizing conversation partners using head motion. *Under review*, 2025.

2024: **Mohapatra*, Payal**, Vasudev Aravind*, Marisa Bisram, Young-Joong Lee, Hyoyoung Jeong, Katherine Jinkins, Richard Gardner, Jill Streamer, Brent Bowers, Lora Cavuoto, Anthony Banks, Shuai Xu, John Rogers, Jian Cao, Qi Zhu, and Ping Guo. Wearable network for multilevel physical fatigue prediction in manufacturing workers. *PNAS Nexus*, volume 3, 2024.

2018: **Mohapatra, Payal**, Preejith Sreeletha Premkumar, and Mohanasankar Sivaprakasam. A yellow–orange wavelength-based short-term heart rate variability measurement scheme for wrist-based wearables. *IEEE Transactions on Instrumentation and Measurement*. IEEE, 2018.

Patent

Systems and Methods for Identifying Zones of Audio Interest via Motion Sensors
Filed: Jan 2025. *Provisional Patent Application* No. 63/746,543. Assignee: Meta Platforms, Inc.
Inventors: **Payal Mohapatra**, Morteza Khaleghimeybodi, Ali Aroudi, Anjali Menon, Calvin Murdock, Buye Xu

Preprint Articles

2024: **Mohapatra, Payal**, Ali Aroudi, Anurag Kumar, and Morteza Khaleghimeybodi. Non-verbal hands-free control for smart glasses using teeth clicks. *arXiv preprint arXiv:2408.11346*, 2024.

Teaching Assistantship

Winter 2017: EE5400: Analog and Digital Circuits — IIT Madras

Fall 2016: EE5401: Measurements and Instrumentation — IIT Madras

Winter 2016: EE3006: Principles of Measurement — IIT Madras

Grant Writing Experience

Contributed to proposal writing and preliminary technical analyses for the following grants.

2025: Meta – Motor Learning Neuromotor Ethics, PI: Qi Zhu, Stephen Xia, Maia Jacobs

2025: Amazon Research Award – Think Big, PI: Qi Zhu, Ping Guo

2025: Samsung Research America – Digital Health, PI: Qi Zhu, Ping Guo

Professional Services

2025: Technical Program Committee for International Workshop on Intelligent Acoustic Systems and Applications

Reviewer

2025 IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems **2025**: IEEE Transactions on Circuits and Systems for Artificial Intelligence

2025: IEEE Transactions on Circuits and Systems for Artificial Intelligence

2025: IEEE Transactions on Automation Science and Engineering (TASE)

2025: IEEE International Workshop on Machine Learning for Signal Processing

2025: Workshop on Foundation Models for Structured Data (FMSD) at ICML'26

2025: Workshop on Time Series in the Age of Large Models (TSALM) at Neurips'25

2024, 2025: Annual Conference on Neural Information Processing Systems (Neurips)

2024, 2025: Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)

2025, 2024: IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

2024: International Conference on Learning Representations (ICLR)

2024: IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

2024: Asia and South Pacific Design Automation Conference (ASP-DAC) (secondary reviewer)

2023: IEEE Internet of Things Journal

2023: International Conference on Embedded Software (EMSOFT) (secondary reviewer)

2023: ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS) (secondary reviewer)

2022: International Conference on Networking, Systems and Security (NSys) (secondary reviewer)

2023: Why Does Math Work. . . If It's Not Real?, Cambridge University Press

Mentoring

2025: Haodong Yang, Xiaoyuan Zhang, Talia-Ben Naim, Bingqi Shang (MS, Computer Engineering), Mark Zhang (MS, Mechanical Engineering), Brooks Hu (Undergraduate, Computer Engineering)

2024: Yueyuan Sui, Shamika Likhite, Kiva Joseph (MS, Computer Engineering)

2023: Jonathan Li Chen, Ben Forbes, Justin Lau (Undergraduate, Mechanical Engineering; mentored for a sensor-data-based injury detection project as part of MECH ENG 395: Industry 4.0 Manufacturing course)

2022: Devashri Naik, Jinjin Cai, Shangke Liu (MS, Computer Engineering)