PAYAL MOHAPATRA

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ACADEMIC BACKGROUND

		Relevant Coursework	Score
PhD Computer Engineering CGPA : 4/4	**Northwestern University** Evanston, 2021-*ongoing*	Machine Learning : Foundation, Algorithm and Application	4/4
		Deep Learning from Scratch	4/4
		Mobile Health and Wireless Computing	4/4
M.S (*by research*) Electrical Engineering, Specialization in Instrumentation CGPA : 9.31/10	**Indian Institute of Technology Madras** Chennai, August 2018	Probability and Statistics	9/10
		DSP Architectures and Embedded Systems	9/10
		Mapping Signal Processing Algorithms to DSP Architectures	9/10
B.E Electronics and Instrumentation (E&I) CGPA : 9.36/10	**Madras Institute of Technology, Anna University** Chennai, May 2015	Linear Algebra and Numerical Methods	9/10
		Digital Signal Processing	10/10

RESEARCH

Evaluate human fatigue in a shop floor setting

- Data preparation of multi-variate time series data (biophysical signals and inertial motion unit signals) collected from wearables on users.
- Use intermittent self-reported scores as target labels.
- Formulation I : Use handcrafted features with machine learning models to conduct pattern recognition and report multiclass fatigue prediction.
- Formulation II : Use time series modelling approach with pre-processed sensor data to make predictions without interpolating the intermittent self-reported labels.
- Formulation III : Explore the use self-supervised learning techniques to identify fatigue.

Detecting Speech Disfluencies in a Data Constrained Setting

- Use preprocessing techniques to address for data distillation and class imbalance combined with task-independent contextual representation.
- Demonstrate the efficacy of this technique with benchmark datasets using quarter of data size.

Development of wrist based wearable device to measure heart rate under conditions of physical activity and HRV at stationary instants (July 2015 – November 2017)

- Development and design of custom optical sensor board for optimum signal quality with varying skin-complexions of subjects.
- Data acquisition and real-time analysis with LabVIEW based GUI and post-processing using MATLAB.
- Algorithm using statistical signal processing techniques to reduce the effects of motion artifacts for wrist wearables to extract heart rate.
- Development of study protocols and system (sensor + algorithm) validation on collected datasets.
- Research published in an IEEE journal and presented at two IEEE conferences.

PROFESSIONAL EXPERIENCE

Analog Devices Inc. (ADI), Bangalore

Design Verification Engineer, November 2017 – November 2020

Experienced with multiple blocks in mixed signal System on Chip (SoCs):

- **Audio Noise Cancellation in headphones**: Conducted end-to-end verification and developed reference models for a custom DSP used for biquad operations, audio peripherals like ADCs, DACs & Asynchronous Sample rate converters. (*March 2020-Current*)
- **Deterministic Ethernet**: Extensively worked on time sensitive networking protocols. **|** Developed reference models for two of the five supported features adhering to IEEE 802.1AS (time synchronization), IEEE 802.1qbv (Scheduled Traffic). **|** Verification strategy used a non-traditional approach to meet the aggressive project timeline **|** Selected for presentation in global intra-company conference 2020. (*Taped Out, Feb 2020)*
- **Ultrasound Fingerprint sensing**: Developed an algorithm application to detect a touch by the SoC and demonstrated in a workshop booth at ADI. **|** Developed an error injection mechanism to verify and sign off the calibration algorithm used by transmitters and receivers in the signal datapath. **|** Developed a synthetic aperture algorithm for beamforming. (*Taped out, Dec 2018*)
- **Formal Verification:** Developed mathematical theorems to describe system behavior without explicit modeling to prove/disprove properties with all possible stimuli.

Teaching Assistant, IIT Madras, Electrical Department

2016-2017

- Teaching Assistant for following courses in IITM:
  - **Principles of Measurement** (Dr. Boby George) – Jan-May 2016
  - **Measurements and Instrumentation** (Dr. V.Jagadeesh) – Jul-Nov 2016
  - **Analog and Digital Circuits** (Dr. Shanti Bhattacharya) – Jan-May 2017

PROJECTS

IOT Based Virtual Physiotherapy with Biofeedback (August 2016- June 2017) – Funded project as part of Anveshan (A design challenge for engineering students in India by ADI) 2016-17. Shouldered the responsibility of developing biofeedback system (identified relevant markers, developed an EMG/PPG based feedback of wellness) using ADI components.

Driver Monitoring System (September 2018 – April 2019) – Global Early Employment Challenge by ADI. Evaluates teams on the entrepreneurial aspects of the presentation. Participated as a team of 4. Was responsible for conducting market study and strategic plan for the product, developed an algorithm to detect drowsiness of the driver to demonstrate as a proof-of-concept.

Secure Machine-To-Machine Communication Using Cryptography and Blockchain (March 2019 – December 2019) – Ideation pitch as part of Block Chain Innovation Challenge hosted globally by ADI in 2019. Led the project as a team of two. Familiarized oneself with the existing security solutions by ADI, interacted with the software and IoT teams, and finally presented a blockchain focused trusted solution's architecture. Selected as the India winners and top 5 global finalists.

PUBLICATIONS

Mohapatra, P, Preejith, SP & Sivaprakasam, M. (2017). A novel sensor for wrist based optical heart rate monitor, IEEE Conference I2MTC.

Mohapatra, P, Preejith, SP & Sivaprakasam, M. (2018). A Yellow–Orange Wavelength-Based Short-Term Heart Rate Variability Measurement Scheme for Wrist-Based Wearables, IEEE Transactions on Instrumentation and Measurement.

Mohapatra, P, Preejith, SP & Sivaprakasam, M. (2018). Short-term HRV using acceleration PPG under severe ambient settings using in-house developed wearable, IEEE WinTechCon.

Mohapatra, P & Ravula,M. (2020). A Low Maintenance Overhead Verification Strategy for Ethernet Switch, ADI Global Technical Conference.

AWARDS AND ACHIEVEMENTS

Design Automation Conference Young Fellowship (DAC YF) Grant, 2021
DAC YF best research video award, 2021
Spot Award in ADI acknowledging the contribution in the ethernet project, 2019
Global finalists and site (Bangalore) winners of Blockchain Innovation Challenge 2019, ADI.
Best Paper in all tracks in IEEE Conference WinTechCon, 2018.
Winner of Anveshan Design Challenge, 2017
Awarded research assistantship fellowship by Govt. of India during 2015-2017.

TECHNICAL SKILLS & ADDITIONAL COURSE WORK

- System Verilog, UVM, C, C++, SystemC, MATLAB,
- Python (Pytorch, sklearn, pandas, librosa)
- FPGA systems
- Spice simulation & PCB design tools
- LabVIEW
- Shell Programming, Perl scripting, MS Office and Latex

Machine Learning (Coursera, Instructor: Andrew Ng, Stanford University)

Algorithm Specialisation (Coursera, Instructor: Tim Roughgarden, Stanford University)

NON-TECHNICAL ENGAGEMENTS

- Member of National Service Scheme (NSS) (*2011-12*).
- Editor of technical ADI Newsletter (*2017-2021*).
- Contributor in community outreach programs by ADI – teaching school students as a part of CSR club (*2018-19*).
- Active member of Young Professional Network (YPN) within ADI (*2017-current*).