AMRUTA PAI

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Scholar

EDUCATION

Rice University *January 2019 - Expected December 2022*
Ph.D. in Electrical and Computer Engineering.
Advised by Dr. Ashutosh Sabharwal
Key Coursework: Human Sensing and Data Analysis, Statistical Machine Learning, Natural Language Processing, Learning From Sensor Data.

Rice University *August 2016 - December 2018*
Master of Science in Electrical and Computer Engineering. GPA: 3.7/4
Thesis: HRVCam: Measuring Heart Rate Variability With A Camera
Advised by Dr. Ashutosh Sabharwal and Dr. Ashok Veeraraghavan
Key Coursework: Statistical Signal Processing, Optimization in Data Science, Random Processes, Information Theory

IIT (ISM) Dhanbad *July 2012 - May 2016*
Bachelor of Technology in Electronics and Communication Engineering. GPA: 3.7/4
Key Coursework: Signals and Systems, Digital Signal Processing, Analog Devices

RESEARCH EXPERIENCE

Scalable Health Lab - Rice University, Houston, TX
Ph.D. candidate (January 2019 - Present)
Advised by Dr. Ashutosh Sabharwal

- Developing machine learning models to capture interactions between **diet, physical activity, hunger-satiety and continuous glucose levels** of individuals.
- Statistical analysis of **ethnic and personality differences** in **dietary behaviors, diet monitoring app use and perceptions**.
- Applying data science tools on food diary data to develop**computational measures** of individuals' diet.
- Designed **study protocol** in collaboration with Sansum Diabetes Research Institute to capture data using wearable sensors and diet logging app in an underserved population. Lead the **IRB application process**.

Scalable Health Lab - Rice University, Houston, TX
MS candidate (January 2017 - December 2018)
Advised by Dr. Ashutosh Sabharwal and Dr. Ashok Veeraraghavan

- Devised a physiology inspired novel algorithm **"CameraHRV"** and motion robust estimator **"HRVCam"** to measure **Heart Rate Variability** using a camera by non-contact Photoplethysmography.
- Engineered a camera based data-collection device for **blood perfusion measurements** that will be used in clinical trials for understanding the efficacy of diabetic foot ulcer treatments.

Machine Intelligence Sensing, Apple Inc, Cupertino, CA
Machine Learning Research Intern (June 2020 - August 2020)
Advised by Dr. Erdrin Azemi, Dr. Matthias R. Hohmann and, Dr. Joseph Yitan Cheng

- Developed **multi-modal machine learning** algorithms for time series biosignals.
- Created a **novel algorithmic framework** for robust biosignal modality fusion.
- Non-provisional patent application submitted.

AI Research, Apple Inc, Cupertino, CA
Machine Learning Research Intern (May 2019 - August 2019)
Advised by Dr. Siddharth Khullar and Dr. Nicholas Apostoloff

- Developed **deep neural networks** for dense time-series physiological signals tackling **inter and intra-subject** variability for cardiovascular health.
- Created an algorithmic framework that incorporated domain knowledge to quantify **interpretability** of the deep neural network.
- Patent application filed: US Patent App. 16/945,695.

Centre of Optics and Photonics - Laval University, Quebec, Canada
Mitacs Signal Processing Research Intern (May 2015 - August 2015)
Advised by Dr. Leslie Rusch

- Developed simulations that demonstrated nonlinearity effect of the Mach Zehnder Modulator on the Bit Error Rate.
- Designed a digital pre-distortion filter to compensate for the Mach Zehnder Modulator's nonlinearity, providing a flexible and higher modulation index.

SKILLS

Software	Python, Keras, Pytorch, MATLAB, Simulink, OpenCV
Tools	Adobe Illustrator, LaTeX

PUBLICATIONS

- **Pai A**, Sabharwal A, "Computation of Recurrence in Food Choices as a Measure of Habitual Consumption", Under Review in Frontiers in Nutrition, Nutrition Epidemiology.
- **Pai A**, Veeraraghavan A, Sabharwal A, "HRVCam: robust camera-based measurement of heart rate variability", Journal Biomedical Optics 26(2) 022707 (10 February 2021).
- Curtis A, **Pai A**, Cao J, Moukaddam N and Sabharwal A,"Healthsense: Software-defined Mobile-based Clinical Trials" in ACM MobiCom (2019) (**Best Community Paper**).
- **Pai A**, Veeraraghavan A, Sabharwal A,"CameraHRV: Robust measurement of heart rate variability using a camera" in SPIE BIOS Symposium 2018, San Francisco, California.
- Nagamatsu G, Nowara E.M, **Pai A,**, Veeraraghavan A, and Kawasaki H, "PPG3D: Does 3D head tracking improve camera-based PPG estimation?" in 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2020.
- Liu G, Hunt PJ, **Pai A**, Schneider SC, Sabharwal A, Moukaddam NJ, Goodman WK, Storch EA., "Biobehavioral Sensing for Objective Evaluation of OCD Patients", Oxford University Press (In Press).

- Lin J, Wang L, Lyu M, **Pai A**, Zhang X, LaRochelle S, Rusch L, "Demonstration and evaluation of an optimized RFS comb for terabit flexible optical networks" in IEEE/OSA Journal of Optical Communications and Networking, vol. 9, no. 9, pp. 739-746 (2017).

PATENTS

- S Khullar, NE Apostoloff, **A Pai**, "Interpretable neural networks for cuffless blood pressure estimation", US Patent App. 16/945,695.

HONORS

- **2020 PATHS-UP Seed Fund Awards**, $5000 funding to lead a research project on "Acceptability of MHealth Technology for Diet Tracking Among Underserved Hispanic/Latino Populations". Lead principal investigator in a Multi-institute collaboration across four universities.
- **Rice University ECE Best First Year Research Award**. In top three students selected out of 33 students.
- **Rice ECE Department Graduate Fellowship** 2016.
- **Goa Scholar Scheme Scholarship of $20,000**. One of the 20 students selected out of 71 shortlisted applicants.
- **Institute Gold Medal** for securing the highest GPA in the class of BTECH ECE 2016 (83 students).
- **Mitacs Research Training Award**, 2015.
- Awarded **Science Talent Search Scholarship** 2012, by State Council of Educational Research and Training, Government of Goa.

PROFESSIONAL ORGANIZATION & ACTIVITIES

- Graduate student representative **Panelist** in Post Pandemic Opportunities in Underserved Populations, PATHS-UP IPAB meeting, Fall 2021.
- **Vice President Culture of Inclusion** ((Student Leadership Council), NSF ERC PATHS-UP (October 2018 - Present).
- **Secretary (Student Leadership Council)**, NSF ERC PATHS-UP (October 2017 - October 2018).
- **Overall Class Representative** of Class 2016, IIT(ISM) Dhanbad (July 2015 - July 2016).

MENTORING ACTIVITIES

- Mentored two **undergraduate students** in the **PATHS-UP Research Experience for Undergraduates Program (REU)**
- **Teaching Assistant** for Rice University undergraduate course ELEC 241, Fundamentals of Electrical Engineering, (Fall 2019).
- Mentored six **high school teachers** in the **PATHS-UP Research Experience for Teachers Program (RET)** (May 2018 - July 2018).
- Mentored three **Rice undergraduates**— as part of the **Vertically Integrated Projects(VIP)** at Rice Wearable Lab (Jan 2019 - May 2019).
- Mentored a Japanese undergraduate student as part of the **Tomadachi Stem Program** at Rice University (March 2019).