

Pragya Sharma

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Education

Cornell University

PHD, ELECTRICAL AND COMPUTER ENGINEERING (GPA: 4.06)

RF Sensor Systems for Assisted Living (Prof. Edwin C. Kan)

Ithaca, NY 14853, USA

August 2015 - December 2020

Indian Institute of Technology (IIT), Kharagpur

BACHELORS IN TECHNOLOGY, ELECTRICAL ENGINEERING (GPA: 9.34/10)

Kharagpur, WB 721302, India

2011 - 2015

Experience

Biofourmis

DATA SCIENTIST

Boston, MA

Mar 2021 - Oct 2023

- Worked on sleep apnea detection using DL model with input SpO2 and PR signals from wearable sensor, demonstrating 0.90 AUROC and 0.59 PRAUC on test dataset for 30s epoch based apnea detection (**IEEE 2022**). AHI \geq 15/hr apnea severity classification achieved 0.88-1.00 AUROC and 0.87-1.00 PRAUC on multiple public test datasets.
- Improved performance of RR estimation algorithm using wearable sensors. **Patent** submitted Oct 2023.
- Derived respiratory feature-set from pulse oximeter and IMU-sensor derived respiratory waveforms. Supported planning and protocol development for a clinical study collecting chronic respiratory patient vitals and ePROs.
- Supported RPM business by refining SpO2 alerts, performing alert trend visualizations and developing methodologies for alert precision and sensitivity analysis towards any adverse patient event.

Cornell University

PHD RESEARCHER

Ithaca, NY

Aug 2015 - Dec 2020

Respiratory Pattern Monitoring with Wearable RF Sensor

- Developed a wearable near-field RF sensor prototype tuned for abnormal respiratory pattern monitoring. Designed and implemented a testing protocol to perform human study (**N = 30**) involving simulation of breathing disorders and attentiveness using Mackworth clock test.
- Developed signal processing algorithms to extract respiratory rate with accuracy **94.8%** (RMSE: 2.9 BPM) and respiratory volume with accuracy **77.5%** (RMSE: 0.11 L) for wide RR range of 2-40 BrPM in normal and irregular breathing patterns. (**NPJ 2020**)
- Developed user attention detection model using both respiratory and heartbeat characteristics measured from the RF sensor. (**Sensors 2022**)
- Designed a semi-supervised support-vector machine (SVM) outlier-classification algorithm to detect motion artifacts with an accuracy of **91%**.
- Designed and implemented a bed-integrated sensor for sleep apnea detection in collaboration with Cornell Weill medical sleep center. The sensor was invisible to the user with improved antenna design and placement to measure patient chest motion. (**IEEE EMBC 2018**)

Indoor Occupant Counting and 3D Imaging using Ambient RF Signals

- Used passive RFID tag backscattered signal for un-tagged occupant counting in a room using a ML-CNN model with high accuracy of **93%** for up to five subjects in different positions and postures. (**IEEE Sensors 2021**)
- Performed high resolution 3D occupant imaging using novel sparsity-based OMP and FISTA reconstruction algorithms, by setting up RF signal model as a linear inverse problem, giving improved performance than traditional matched-filtering and Capon's method. (**IEEE Sensors 2021**)

Cornell University

TEACHING ASSISTANT

Ithaca, NY

2018, 2016

- *Scientific and Numerical Computation*: Performed grading and assisted students with course fundamentals, Python/JAVA coding, and GIT. (Spring 2018)
- *Radio Frequency Systems*: Assisted lab-plan development and helped students with lab sessions. (Fall 2016)

Maxim Integrated

INTERN

Dallas, TX

Summer 2017

- Simulated an NFC reader in Python and demonstrated intelligent digital data demodulation with a neural network using Keras library, which achieved a test error of **1%** under optimal conditions and **11%** with low coupling efficiency and high noise.
- Implemented an online trainable real-time setup with experimental data from the reader, resulting in a low test error of **< 2%**.

Technical Skills

DS Tools: Python (Scikit-Learn, Keras, Pandas, PyTorch, TensorFlow), MATLAB, Git, AWS Athena.

RF Tools: CST Microwave Studio, LabVIEW.