

# Sanika Phatak

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## EDUCATION

### JOHNS HOPKINS UNIVERSITY, Baltimore, MD

- MS in Biomedical Engineering (Machine Learning and Neuroscience) – Expected May 2021 | GPA: 3.93 / 4.0
- Teaching Assistant – Statistical Analysis and Business Analytics

### BIRLA INSTITUTE OF TECHNOLOGY & SCIENCES (BITS), Pilani, India:

- MS Biological Sciences (Computational) - Aug 2017
- BE in Electronics & Instrumentation – Aug 2017

**SKILLS: Coding Languages:** Python – TensorFlow, Keras, PyTorch; OpenCV; MATLAB; C++; C#. **Technology:** Machine Learning; Deep Learning; Computer Vision, Signal Processing; Image Processing; Probabilistic Modeling; Algorithms; Data Structures; GitHub

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## RESEARCH EXPERIENCE

### Machine Learning Assistant | Center for Imaging Science, Johns Hopkins University

Sept 2019 – present

**Models:** semi-supervised learning; GMM; kernel PCA; Blob detection; segmentation; Visual Bag of Words; histogram matching

- **Masters Thesis:** Designed segmentation, detection, localization of volumetric neurons and engineered visual bag of words for morphological classification of 3D neurons from mouse brain scans

## PROJECTS

**Models:** LDA, QDA, Random Forest; SVM; KNN; Convolutional and Recurrent Neural Networks

- Built tools for feature extraction and classification of volumetric brain data for "BrainLit" python package
  - Modeled Alzheimer prediction from BIOCARD data leveraging PCA based dimensionality reduction
  - Analyzed class activation of Inception/Xception models trained to locate calcium deposits in chest CT scans
  - Built a prototype COVID-19 exposure risk app trained with Multi-Layer Perceptron (MLP) on weather, population density, wind speed, coupled with GPS coordinates as features
  - Decoded listener attention to different audio stimuli with CNN and RNN models on EEG data
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## WORK EXPERIENCE

### Software Development Engineer (L5, L6) | Intel Technologies, India

Aug 2017 – May 2019

**Models:** SVM; Neural Networks; QDA; PCA; LSTM; RNN; Wavelet Transform; Band Power

#### Brain Computer Interface

- Enhanced open-source ML framework, built K-fold cross validation feature to optimize training time by 8X with 90% accuracy on SVM
- Developed dynamic selection of EEG electrodes to lower the no. of active electrodes (14 to 2) in emotion detection with 94% accuracy
- Conceptualized and executed neural network-based concentration level detection from EEG data for BCI gaming applications

#### Virtual Coach in Computer Game (Patent filed)

Spearheaded LSTM-based strategy recommendation system to coach "PUBG" in real-time, trained on player telemetry data

#### Multimodal Sensing for Emotion Recognition

- Implemented multi-modal sensing (ECG; video; audio) for emotion recognition as a plugin for streaming apps with 90% accuracy
- Incorporated heart-rate variability sensing in a gaming system with webcam as a contact-less PPG sensor

### Machine Learning Research Intern | Intel Technologies, India

Jan 2017 – Jun 2017

- Integrated EEG-based mental commands from user as a feature to attack the opponent in a prototype game
- Accomplished head position correction to avoid VR-sickness with continuous learning neural network

### Engineering Research Intern | Intel Labs, India

Jul 2016 – Dec 2016

Optimized power usage of cuff-less blood pressure device by down-sampling 10X with local polynomial regression to curve fit ECG/PPG signal peaks (**Patent Published**)

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## PATENTS & PUBLICATIONS

[1] **U.S. Patent 20180303353:** "Optical heart rate sensor with reduced power", *Published* - Oct 25, 2018

[2] Bijan Varjavand, Matt Figdore, Ryan Lu, **S. Phatak**, et al. Brainlit: Automated data handling, processing, visualization, and classification software for brain images. *ASEE, Mid-Atlantic Conf. Poster*, 2020.

[3] Sreenidhi Koti and **S. Phatak**. Adaptive power and performance optimizations of brain control interface for real time applications. *Intel SWPC*, 2018.