Pranav Deshpande | Curriculum Vitae

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"Strength is Life, Weakness is Death!" - Swami Vivekananda

Education

Indian Institute of Technology — **Bhubaneswar**

Masters of Technology, CGPA – 8.3 — *2013–2015*

Electronics and Communication

University of Mumbai — **Mumbai**

Bachelor of Engineering, Percentage – 66.39 — *2006–2010*

Electronics Engineering

Skills

Domain

Signals: Digital Signal Analysis and Processing (Motion Sensors, Biomedical and Audio Signal Processing, Basic Image Processing), Sensor Fusion (IMU)

Filtering: Digital filter design (IIR, FIR), Filter Banks, Adaptive Filtering

Data Science: Feature Extraction, Basics of Machine Learning, Soft and Evolutionary Computing

Tools

MATLAB: Code conversion (Coder), Simulation and Scripting with Toolboxes: Signal Processing, DSP System, Statistics and Machine Learning, etc.

Python: Basic of NumPy, SciPy, pandas, matplotlib, OpenCV, scikit-learn, Keras, TensorFlow

C/C++: Basic coding with openCV and DSP libraries

Hardware: Basics of STM32F407 Discovery Board, Arduino UNO, Raspberry Pi 3 etc.

Others: Basics of Shell Scripting, GNU Make, SQLite, Jenkins, Git, LaTeX, scrum practices, Ubuntu and Microsoft Windows.

Professional Experience

Industrial

Tektronix India Pvt. Ltd. **Bengaluru**
Software Engineer *Sept 2021–Present*
Serving as a Signal Processing Algorithm Developer for PCIe team.

Brigosha Technologies Pvt. Ltd. **Bengaluru**
Associate Research Engineer *Sept 2017–Sept2021*
Serving as an Algorithm Developer at client location, i.e. `Robert Bosch Engineering and Business Solutions Pvt. Ltd. (RBEI), Coimbatore.`

KEY RESULT AREA: Algorithm development for Sensor Fusion Library

- Provided innovative algorithm solution for
  - 9DoF based heading angle error reduction under slowly varying magnetic field. (Approved by RBEI IP department to file a **patent**.)
  - Temperature compensated gyroscope bias estimation.(Submitted to RBEI IP Dept.)
  - FlipCam and FastFlash gestures detection with only accelerometer sensor. (Approved by RBEI IP department to file a **patent**.)
  - Laptop Gesture and state detection with only accelerometer sensor. (Approved by RBEI IP department to file a **patent**.)
- **Developed automated MATLAB framework to convert trained keras CNN model into c code convertible MATLAB code.**
- **Designed signal pre-processing modules**, viz. offset removal and noise filtering for accelerometer, gyroscope and pressure sensors. Specified signal and noise characteristics for different applications, viz. cars, drones and robots.
- Done fine tuning of **sensor fusion algorithms** such as Kalman filters, Mahony filters.
- Wrote Python script for fitting a curve to gyroscope bias vs. temperature characteristics using **Linear Regression**.
- **Designed Kalman Filter state model** for online estimation of temperature coefficient of gyroscope sensor offsets (TCO).
- Developed harsh acceleration and sudden braking detection algorithm for driving quality assessment.
- Designed and executed POC for Laptop device state detection, viz. on table, on lap, in bag etc..
- Wrote scikit-learn based Python scripts for motion activity and event classification.
- Wrote software in MATLAB and Python scripts to develop simulators for Motion Sensor Library. Also implemented C codes for same.
- Trained CNN for hand gesture detection for video conferencing application
- Developed PoC for facial landmark based speech detection from video stream.

Atreya Innovations Pvt. Ltd. **Pune**

Research Scientist *Nov 2016– Aug 2017*

Had an experience of **10 months**. Primarily worked on the development of multi-modal signal analysis framework, i.e. Naadi (the Radial Artery Pulse), Voice and Image of the subject, for Naadi and other Parikshas (Pulse based Diagnosis in Ayurveda). For this, we interacted with a team of Ayurvedic Doctors. The main tasks include data collection (, i.e. Pulse signals, Face and tongue images, voice) at medical camps and analyzing them by feature extraction and machine learning algorithms.

KEY RESULT AREA: Multi-modal signal based Health Analysis: Machine Learning Approach

- Done literature survey on multi-modal signal analysis (, viz. radial artery pulse signals (*Naadi*), voice samples, face and tongue images) for health (*Prakruti*) diagnosis.
- Provided technical specifications and rules for data quality for creating database with voice and image samples.
- Implemented MATLAB software for signal conditioning and pre-processing modules for voice and pulse signals data.
- Implemented MATLAB software for voice activity detection algorithm.
- Wrote Python script for extracting voice specific features, viz. MFCC, time and frequency domain features.
- Wrote MATLAB scripts for time domain, frequency domain and geometric feature extraction for pulse rate variability analysis.
- Wrote Python scripts for different supervised and unsupervised machine learning algorithms with scikit-learn library for data classification using multi-modal signal features.
- Set up regression model to establish relation between of Ayurvedic definitions and voice and pulse specific features.
- Guided two intern M.Sc. projects related with pulse parameter and rate variability with machine learning approach.

Academic Research

Indian Institute of Technology **Bhubaneswar**

Research Scholar *2013–2016*

Had around **03 years** of research experience while working as a M. Tech. scholar and Ph.D. scholar at IIT Bhubaneswar. Published one conference and two journals. Explored areas like stochastic signal modeling, speech and biomedical signal processing and analysis, Image processing.

Teaching

Teaching Assistant and Lecturer *2010–2016*

Had around **05 years** teaching experience and taught subjects like signal processing, microprocessors and analog circuit design.

Extra Certifications

1: **TensorFlow in Practice Specialization** by Laurence Moroney, deeplearning.ai, on Coursera, (https://www.coursera.org/account/accomplishments/specialization/certificate/DRE9N5W8K3GV)

2: **Deep Learning Specialization** by Andrew Ng, deeplearning.ai, on Coursera, (https://www.coursera.org/account/accomplishments/specialization/certificate/K3AVXND549SD)

3: **Machine Learning** by Andrew Ng, Stanford University on Coursera, (https://www.coursera.org/account/accomplishments/verify/JBRXBMHC86RY)

Publications

International Journals

1: **Pranav S. Deshpande** and M. S. Manikandan, "Effective Glottal Instant Detection and Electroglottographic Parameter Extraction for Automated Voice Pathology Assessment", *IEEE J. Biomed. Health Inform.,* vol.PP, no.99, pp.1-1, Jan 2017.

2: **Pranav S. Deshpande** and M. S. Manikandan, "Glottal Opening Instants Detection from Speech Signals Using Variational Mode Decomposition", *IEEE Trans. Instrum. Meas.,* (To be submitted), 2018.

3: M. S. Manikandan, B. Ramkumar, **Pranav S. Deshpande**, T. Choudhary, "Robust Detection of Premature Ventricular Contractions Using Sparse Signal Decomposition and Temporal Features", *IET Healthcare Technology Letters,* vol.2, no.6, pp.141-148, Nov 2015.

International Conference

1: **Pranav S. Deshpande** and M. S. Manikandan, "Improving Accuracy of Glottal Closure Instant Detection Methods in Nonstationary Noise", in *Proc. IEEE Int. Conf. on Signal Processing and Integrated Networks (SPIN-2015)*, Feb. 2015

Masters Thesis

Title: *Glottal Instant Detection from Speech & EGG Signals*

Supervisor: Dr. M. Sabarimalai Manikandan (Asst. Prof.), SES, IIT Bhubaneswar

Description: In this thesis, we attempt to develop an unified framework using variational mode decomposition (VMD) and autocorrelation feature based post-processing techniques for automatically detecting glottal closure instants (GCIs) and glottal opening instants (GOIs) from speech and EGG signals including both voiced speech and non-speech portions. The major objective of this thesis is to develop an unified VMD based filtering framework for extracting the glottal waveform feature signal meanwhile suppressing the background noises. In this work, we investigated a set of autocorrelation features for designing a post-processing technique to improve overall accuracy by reducing the number of false positives during non-speech portions without significantly reducing identification rate during voiced segment of EGG and speech signals.

Extras and Achievements

Academic

2013: Secured **All India Rank 800** with score 649 in GATE 2013.

Leadership and Management

2014-2015: Worked as M.Tech. Electrical **Student's Representative at Career Development Cell** of IIT Bhubaneswar.

2014-2015: Worked as a **Mess Wing Counselor** at IIT Bubaneswar Boys' Hostel; Madanpur.

2008-2010: Worked as **Field Officer, Assistant Coordinator and Coordinator** for the Publicity Comity of national level competition *Brainwaves*.

2008: Worked as **Field Officer** for Orchestra Comity of cultural gathering *Utopia*.

Music and Literature

2017: Authored an article on Marathi News Portal Smart Maharashtra (http://smartmaharashtra.online/aai/).

2013: Worked as **Assistant Music Director** for the Music Album *Na Jaanu Kaisa Ishq Hai* in the

year 2013 (https://www.youtube.com/watch?v=oBRXNt58pvE).

2005: Got **First Class** in Pune Bharat Gayan Samaj's first year classical Singing exam in the year 2005.

Interests

- Surya Namaskar
- Singing and composing songs, Poetry Writing
- Playing Guitar and Harmonium
- Cooking, Swimming

Languages

Marathi: Mother-tongue *Conversationally fluent*

English: Fluent *Medium of education after* 10^{th} *std. class*

References

1. Dr. M. Sabarimalai Manikandan

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