

# Sushanta K. Pani

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## SUMMARY

- 12+ years of experience in designing and building **Machine Learning focused Artificial Intelligence systems**: Text-to-Speech (TTS), Automatic Speech Recognition (ASR), Speaker Recognition, Natural Language Processing (NLP), and Computer Vision (CV).

## EDUCATION

- Master of Science (by Research)** in Computer Science, **Michigan State University**, USA 2019 - 2021
  - Thesis: "Coreference Resolution for Downstream NLP Tasks" (April 2021), CeDiD: 21NMTAVZS0IE
- Diploma in Advanced Software Technology**, CDAC, India 2010 - 2011
- Bachelor of Technology**, Information Technology, Biju Patnaik University of Technology, India 2006 - 2010

## EXPERIENCE

- Research Assistant**, Michigan State University, USA June 2021 - November 2022
  - Work on voice biometrics using **machine learning** algorithms at iPRoBE Lab
  - Compared state-of-the-art speaker embedding algorithms used in speaker recognition and verification tasks
  - Devised a novel voice morphing process to generate fake voices samples of target speakers
  - Demonstrated the vulnerability of text-independent speaker recognition systems to morph attack
  - Applied speaker diarization in ASR systems to generate reader-friendly transcripts of medical conversation
  - Mentored graduate students to apply Deep Learning algorithms in speech and biometrics projects
  - Advisor: Prof. Arun Ross
  - Skills: Programming and Coding using Python, PyTorch, Biometrics, Speech Processing, Text-to-Speech, GPU, CUDA, Git, **Machine Learning**, Deep Learning
- Graduate Teaching Assistant**, Michigan State University, USA May 2019 - May 2020
  - Trained and evaluated transformer-based language models on the OntoNotes dataset for coreference resolution
  - Fine-tuned GPT reading comprehension and text classification models for Winograd and COPA challenges
  - Analyzed training and optimization of deep learning model in a distributed framework
  - Designed a CNN architecture to detect and classify food items from RGB images
  - Analyzed three loss functions in a ResNet-based architecture for face recognition task on CASIA-WebFace
  - Extended **CMU's** Festvox and Flite open-source code to support **Hear2Read's** Flite TTS engine
  - Assisted three courses: Operating Systems, Computer Systems, and Mobile Application Development
  - Skills: Programming and Coding using Python, PyTorch, Natural Language Processing, Large Language Model (LLM), BERT, GPU, CUDA, Git, **Machine Learning**, Deep Learning
- Senior Machine Learning Engineer (PE II)**, CDAC, India October 2015 - December 2018
  - Participated in the design, implementation, and deployment of ML models and algorithms for TTS and ASR
  - Applied voice conversion on synthesized speech samples and reported an **improvement in naturalness by 0.45 (MOS)**
  - Transcribed caller response in IVRS-based customer service systems using speech recognition algorithms
  - Developed polyglot and multilingual TTS systems for Indian languages and English
  - Worked on voice conversion over synthesized speech and speaker adaptation in parametric TTS systems
  - Supervised a team for annotation of telephonic speech data transcription for ASR projects
  - Mentored a group to build Odia language TTS systems and achieved a Mean Opinion Score (MOS) of **3.5/5.0**

- Educated colleagues and stakeholders to understand the critical concepts of ML for TTS and ASR
- Recruited and trained machine learning interns and supervised their assigned projects
- Coordinated deployment of Indic TTS system at IIT Bhubaneswar
- Organized workshops for the visually impaired persons to use CDAC's Indic language assistive speech technology products
- Skills: Programming and Coding using Python, C, C++, Keras, Shell, Speech Processing, Voice Conversion, Natural Language Processing, NLTK, Machine Learning, Deep Learning

**Machine Learning Engineer (PE I), CDAC, India**

May 2012 - October 2015

- Member of the TTS consortium that developed a common framework for speech synthesis of **13 South Asian languages**
- Gathered **100 hours** of ML training speech dataset in Indian English and two **low-resource languages** (Marathi & Odia)
- Applied ML algorithms such as CART and HMM to develop Text-to-Speech (TTS) synthesis systems
- Analyzed phonemes and mapped them to the Indian Language Speech sound Label set (ILSL)
- Built a pronunciation dictionary of **100k words** with letters and phones using ILSL
- Automated annotation process and achieved a **90%** reduction in time consumed for the manual method to generate time-aligned phonetic speech transcription
- Developed an Android application to speak SMS in 7 Indian languages and Indian English
- Integrated TTS systems with assistive technology screen readers: NVDA and ORCA
- Ported CMU's flite compiled Indic TTS with Android devices
- Analyzed the performance of Android applications for offloading compute-intensive modules to cloud servers
- Skills: Programming and Coding using Python, C, C++, Perl, Android, Keras, Shell, Speech Processing, Natural Language Processing, NLTK, Machine Learning, Probability and Statistics

**Associate Software Engineer, Keshima Technologies, India**

August 2011 - May 2012

- Designed, developed, and tested mobile applications for healthcare and navigation tasks using Android

**SKILLS**

- Programming Languages: Python, Shell, C, C++, MATLAB, Perl, Java, Android
- Deep Learning Frameworks and Tools: TensorFlow, PyTorch, Keras, GPU, CUDA
- **Machine Learning Tools:** NumPy, Scikit-Learn, Pandas
- Familiar with: Mathematical concepts used in ML, Probability, Statistics, Data Structure and Algorithms
- Speech Technology Tools: Kaldi, Wav2vec 2, SpeechBrain, Espnet, Tacotron 2, S3PRL
- Audio and Speech Analysis Tools: Praat, Audacity, Wavesurfer
- NLP Language Models: BERT, GPT, Large Language Model (LLM)
- Spoken Languages: English, Hindi, Odia (native), Bengali, Marathi, Sanskrit

**PUBLICATION**

- Padmaja Joshi, Sushant Pani, et al. "**Understanding the Challenges in Mobile Computation Offloading to Cloud through Experimentation**", MOBILESoft-2015
- Hema Murthy, Sushanta K Pani, et al. "**Seamless Integration of Common Framework Indian Language TTSES in various applications**", OCOCOSDA-2013