ARINDAM JATI

CONTACT INFORMATION

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RESEARCH INTERESTS

Machine Learning & Deep Learning: Deep Representation Learning, Unsupervised and Self-supervised Learning, Hierarchical Representations, Multi-task Learning

Adversarial Attacks: Adversarial Attack on Deep Neural Nets, Defense Strategies

Speech & Audio Processing: Speech Recognition, Speaker Recognition, Speaker Diarization, Audio Event Detection, Acoustic Scene Classification

Multimodal Signal Processing: Human Behavioral Signal Processing, Affective Computing

Search & Retrieval: Hashing, Quantization, Deep Hashing

Natural Language Processing

EDUCATION

University of Southern California (USC), Los Angeles, CA, USA 2015 - present
PhD candidate in *Ming Hsieh Department of Electrical and Computer Engineering*
Current GPA: 3.91/4.0
Lab: SAIL, Advisor: Prof. Shrikanth Narayanan
Past lab: SCUBA, Advisor: Prof. Panayiotis Georgiou

University of Southern California (USC), Los Angeles, CA, USA 2015 - 2017
Master of Science (MS) in Electrical Engineering
GPA: 3.91/4.0

Jadavpur University, Kolkata, India 2009 - 2013
Bachelor of Engineering (BE) in Electronics and Telecommunication Engineering
GPA: 9.43/10.0

WORK EXPERIENCE

Microsoft Research, Redmond, WA, USA
Research Intern in *Audio and Acoustics Research Group* May, 2019 to July, 2019
Manager: Dr. Ivan Tashev, Mentor: Dr. Dimitra Emmanouilidou

Sony Interactive Entertainment America LLC, San Mateo, CA, USA
AI Intern June, 2018 to Aug, 2018
Manager: Dr. Ruxin Chen, Mentor: Dr. Naveen Kumar

Polaris Networks, Kolkata, India
Software Engineer - II July, 2014 to June, 2015
Software Engineer - I July, 2013 to June, 2014

School of Medical Science and Technology, IIT Kharagpur, India
Intern at *Biostatistics and Medical Informatics Laboratory* Dec, 2011 to Jan, 2012
Advisor: Prof. Chandan Chakraborty

Department of Electronics and Telecommunication Engineering
Jadavpur University, India 2009 to 2013
Advisor: Prof. Amit Konar

Teaching Experience

Teaching Assistant (TA)
USC EE 599: Deep Learning — Spring 2019

Teaching Assistant (TA)
USC EE 599: Deep Learning Lab for Speech Processing — Fall 2018

Teaching Assistant (TA)
USC EE 559: Mathematical Pattern Recognition — Spring 2018

Teaching Assistant (TA)
USC EE 483: Digital Signal Processing — Fall 2017

Major Projects

- **[Ongoing] Adversarial attacks on deep neural nets and defense strategies**: With a focus on speaker recognition systems.
  Program: DARPA GARD *Relevant publications:* Adversarial Speaker ID
- **[Ongoing] Acoustic scene characterization:** Detecting dynamically varying background acoustic scenes from wearable audio badges in workplace setting.
  Program: IARPA MOSAIC
- **[Ongoing] Robust speaker recognition:** Speaker recognition in noisy and far-field environment, disentanglement of nuisance factors from speaker embeddings.
  Relevant publications: Multi-task DNN-TVM, UAI
- **[Past] Audio event identification and quantization:** Machine learning to identify audio events in the environments, and finding suitable quantized representations for efficient retrieval.
  Relevant publications: Hierarchical audio events, Deep audio hashing
- **[Past] Unsupervised learning of speaker characteristics:** Training deep neural networks that can learn speaker-specific characteristics from unlabeled multi-speaker audio streams, and its application on speaker recognition and diarization.
  Relevant publications: Speaker2Vec, NPC, NPC-RNN
- **[Past] Behavioral signal processing:** Exploration of multi-modal cues from speech and physiology for characterizing affective states and traits of humans.
  Relevant publications: Stressful conversations, Depression detection

Publications (Google Scholar)

1. **Arindam Jati**, Chin-Cheng Hsu, Monisankha Pal, Raghuveer Peri, Wael AbdAlmageed, Shrikanth Narayanan, *"Adversarial Attack and Defense Strategies for Deep Speaker Recognition Systems"*, Under review in Elsevier Computer Speech and Language. arXiv preprint
2. **Arindam Jati**, Amrutha Nadarajan, Raghuveer Peri, Karel Mundnich, Tiantian Feng, Benjamin Girault, and Shrikanth Narayanan, *"Temporal Dynamics of Workplace Acoustic Scenes: Egocentric Analysis and Prediction"*, Under review in IEEE/ACM Transactions on Audio, Speech, and Language Processing.
3. **Arindam Jati**, and Dimitra Emmanouilidou, *"Supervised Deep Hashing for Efficient Audio Event Retrieval"*, In ICASSP 2020. PDF
4. Raghuveer Peri, Haoqi Li, Krishna Somandepalli, **Arindam Jati**, and Shrikanth Narayanan, *"An empirical analysis of information encoded in disentangled neural speaker representation"*, in Odyssey: The Speaker and Language Recognition Workshop, 2020. PDF
5. **Arindam Jati**, Amrutha Nadarajan, Karel Mundnich, and Shrikanth Narayanan, *"Characterizing dynamically varying acoustic scenes from egocentric audio recordings in workplace setting"*. arXiv preprint

6. Raghuveer Peri, Monisankha Pal, **Arindam Jati**, Krishna Somandepalli, and Shrikanth Narayanan, *"Robust speaker recognition using unsupervised adversarial invariance"*, In ICASSP 2020. PDF
7. **Arindam Jati**, Raghuveer Peri, Monisankha Pal, Tae Jin Park, Naveen Kumar, Ruchir Travadi, Panayiotis Georgiou, and Shrikanth Narayanan, *"Multi-task Discriminative Training of Hybrid DNN-TVM Model for Speaker Verification with Noisy and Far-Field Speech"*, In Interspeech 2019. PDF
8. Krishna Somandepalli, Naveen Kumar, **Arindam Jati**, Panayiotis Georgiou and Shrikanth Narayanan, *"Multiview Shared Subspace Learning across Speakers and Speech Commands"*, In Interspeech 2019. PDF
9. **Arindam Jati**, Naveen Kumar, Ruxin Chen, and Panayiotis Georgiou, *"Hierarchy-Aware Loss Function on a Tree Structured Label Space for Audio Event Detection"*, In ICASSP 2019. PDF
10. **Arindam Jati** and Panayiotis Georgiou, *"An unsupervised neural prediction framework for learning speaker embeddings using recurrent neural networks"*, In Interspeech, 2018. PDF
11. **Arindam Jati** and Panayiotis Georgiou, *"Neural Predictive Coding using Convolutional Neural Networks towards Unsupervised Learning of Speaker Characteristics"*, in IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 27, no. 10, pp. 1577-1589, Oct. 2019. doi: 10.1109/TASLP.2019.2921890, 2018. arXiv PDF
12. **Arindam Jati**, Paula G. Williams, Brian Baucom and Panayiotis Georgiou, *"Towards Predicting Physiology from Speech During Stressful Conversations: Heart Rate and Respiratory Sinus Arrhythmia"*, In ICASSP, 2018. PDF
13. **Arindam Jati** and Panayiotis Georgiou, *"Speaker2Vec: Unsupervised Learning and Adaptation of a Speaker Manifold using Deep Neural Networks with an Evaluation on Speaker Segmentation"*, Proceedings of Interspeech, 2017. PDF
14. Md Nasir, **Arindam Jati**, Prashanth Gurunath Shivakumar, Sandeep Nallan Chakravarthula, and Panayiotis Georgiou, *"Multimodal and Multiresolution Depression Detection from Speech and Facial Landmark Features"*, Proceedings of the 6th ACM International Workshop on Audio/Visual Emotion Challenge (AVEC). ACM, 2016. PDF

Talks

1. *"Supervised Deep Hashing for Efficient Audio Retrieval "*, at Microsoft Research, Redmond, WA, USA. (YouTube link)

Codes

1. Adversarial attack and defense strategies for deep speaker recognition systems: `https://github.com/usc-sail/gard-adversarial-speaker-id`

Patents Filed

1. **Arindam Jati**, Naveen Kumar, Ruxin Chen, *"Sound Categorization System"*, US Patent filed, 2018. US20200104319A1
2. Justice Adams, **Arindam Jati**, Sudha Krishnamurthy, Masanori Omote, Jian Zheng, Naveen Kumar, Min-Heng Chen, Ashish Singh, *"Action description for on-demand accessibility"*, US Patent filed, 2018. US20200129860A1
3. Sudha Krishnamurthy, Justice Adams, **Arindam Jati**, Masanori Omote, Jian Zheng, "*Scene annotation using machine learning"*, US Patent filed, 2018. US20200134316A1
4. Ashish Singh, Justice Adams, **Arindam Jati**, Masanori Omote, *"Color accommodation for on-demand accessibility"*, US Patent filed, 2018. US20200135052A1
5. Naveen Kumar, Justice Adams, **Arindam Jati**, Masanori Omote, *"Textual annotation of acoustic effects"*, US Patent filed, 2018. US20200137463A1

6. Sudha Krishnamurthy, Ashish Singh, Naveen Kumar, Justice Adams, **Arindam Jati**, Masanori Omote, *"Graphical style modification for video games using machine learning"*, US Patent filed, 2018. US20200134929A1

Relevant Graduate Courses

Digital signal Processing	Pattern recognition	Algorithms
Probability	Machine learning	Affective computing
Random processes	Natural language processing	Wavelets and graph signal processing

Course Projects

- Wavelets and graph signal processing: Sparse Representation of Deep Neural Network Embeddings for Speaker Identification
- Affective Computing: End-To-End Speech Negotiations with Affective Speech Rollout
- Pattern Recognition: Predicting Readmission of Diabetic Patients from Medical Records
- Machine Learning: Santander Customer Satisfaction Classication
- Natural language processing: Automatic Solver for Mad Gab - A Language Game

Skills

Programming: Python, C/C++, Bash, MATLAB
Machine learning tools: Pytorch, Keras, Tensorflow, Scikit-learn
Machine learning on clusters: Amazon AWS, Microsoft Azure, USC HPCC
Speech and NLP tools: KALDI Speech recognition toolkit, OpenSMILE, OpenFST
Other tools: SPSS, Git, LaTeX
OS: Unix, Windows

Journal/ Conference Reviewer

- IEEE/ACM Transactions on Audio, Speech, and Language Processing
- IEEE Signal Processing Letters
- IEEE Access
- 20th ACM International Conference on Multimodal Interaction (ICMI 2018)
- EURASIP Journal on Audio, Speech, and Music Processing
- Springer Signal, Image and Video Processing

Major Awards

- Honorable mention for Best Teaching Assistant (TA) award, 2019 at USC.
- Honorable mention (3^{rd} place) in Summer 2018 Hackathon at Sony Interactive Entertainment America LLC.
- Received ISCA travel grant award for students and young scientists for Interspeech 2017 conference.
- Received Annenberg PhD Fellowship at USC.

Other Publications (Undergrad)

1. **Arindam Jati**, Garima Singh, Subhranil Koley, Amit Konar, A. K. Ray, Chandan Chakraborty, *"A novel segmentation approach for noisy medical images using Intuitionistic fuzzy divergence with neighbourhood-based membership function"*, Journal of Microscopy, Wiley, 2014.
2. Anwesha Khasnobish, **Arindam Jat**i, Garima Singh, Amit Konar and D. N. Tibarewala, *"Object-shape recognition by tactile image analysis using support vector machine"*, International Journal of Pattern Recognition and Artificial Intelligence, World Scientific, 2014.
3. **Arindam Jati**, Garima Singh, Rashmi Mukherjee, Madhumala Ghosh, Amit Konar, Chandan Chakraborty, Atulya K. Nagar, *"Automatic leukocyte nucleus segmentation by intuitionistic fuzzy divergence based thresholding"*, Micron, Elsevier, 2014.
4. Anwesha Khasnobish, Garima Singh, **Arindam Jati**, Amit Konar & D. N. Tibarewala, *"Object-shape recognition and 3D reconstruction from tactile sensor images"*, Medical & Biological Engineering & Computing, Springer, 2014.
5. Anwesha Khasnobish, **Arindam Jati**, Garima Singh, Saugat Bhattacharyya, Amit Konar, D. N. Tibarewala, Eunjin Kim, Atulya K. Nagar, *"Object-shape recognition from tactile images using a feed-forward neural network"*, The International Joint Conference on Neural Networks (IJCNN), IEEE, 2012.
6. **Arindam Jati**, Garima Singh, Pratyusha Rakshit, Amit Konar, Eunjin Kim, Atulya K. Nagar, *"A hybridisation of Improved Harmony Search and Bacterial Foraging for multirobot motion planning"*, IEEE Congress on Evolutionary Computation 2012: 1-8.
7. Anwesha Khasnobish, Saugat Bhattacharyya, Garima Singh, **Arindam Jati**, Amit Konar, D. N. Tibarewala, R. Janarthanan, *"The Role of Empirical Mode Decomposition on Emotion Classification Using Stimulated EEG Signals"*, International Conference on Advances in Computing and Information Technology (ACITY), 2012.
8. Garima Singh, **Arindam Jati**, Anwesha Khasnobish, Saugat Bhattacharyya, Amit Konar, D. N. Tibarewala and Atulya Nagar, *"Object Shape Recognition from Tactile Images Using Regional Descriptors"*, Fourth World Congress on Nature and Biologically Inspired Computing (NaBIC), IEEE, 2012.
9. Garima Singh, **Arindam Jati**, Anwesha Khasnobish, Saugat Bhattacharyya, Amit Konar, D. N. Tibarewala and R. Janarthanan, *"Negative emotion recognition from stimulated EEG signals"*, International Conference on Computing Communication & Networking Technologies (ICCCNT), IEEE, 2012.
10. Garima Singh, **Arindam Jati**, Anwesha Khasnobish, Saugat Bhattacharyya, Amit Konar, D. N Tibarewala, R Janarthanan, *"A Comparative Analysis of Emotion Recognition from Stimulated EEG Signals"*, Second International Conference on Soft Computing for Problem Solving (SocProS), December, 2012.
11. Garima Singh, Anwesha Khasnobish , **Arindam Jati**, Saugat Bhattacharyya, Amit Konar, D. N. Tibarewala and R. Janarthanan, *"Object-shape classification and reconstruction from tactile images using image gradient"*, International Conference on Emerging Applications of Information Technology (EAIT), 2012.
12. Anisha Halder, **Arindam Jati**, Garima Singh, Amit Konar, Aruna Chakraborty, Ramadoss Janarthanan. *"Facial Action Point Based Emotion Recognition by Principal Component Analysis"*, The International Conference on Soft Computing for Problem Solving (SocProS), 2011.