Desh Raj

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Education

The Johns Hopkins University — Baltimore, US
Ph.D. in Computer Science — 2018–2023 (anticipated)

- Advisors: Sanjeev Khudanpur, Dan Povey
- Research interests: Multi-talker speech recognition and speaker diarization

Indian Institute of Technology Guwahati — Guwahati, India
B.Tech. in Computer Science and Engineering, GPA: 9.35/10 — 2013–2017

Work Experience

Meta AI — Menlo Park, US
Research Intern, AI Speech (Manager: Ozlem Kalinli) — May 2022 –August 2022

- Designed and implemented **target-speaker ASR** models to improve transducer performance in background speech and noise; obtained 19.6% relative WER reduction
- Work published at **IEEE ICASSP 2023**

Microsoft Corporation — Redmond, US (remote)
Research Intern, AI Cognitive Services (Manager: Jinyu Li) — May 2021 –August 2021

- Extended Streaming Unmixing and Recognition Transducer (SURT) model for **long-form meeting** transcription, obtaining >20% WER reduction using dual-path encoders
- Work published at **IEEE ICASSP 2022**

Samsung Research — Bengaluru, India
Research Engineer in Advanced Technology Lab (ATL) — June 2017 –June 2018

Awards

- Selected for **ICASSP Rising Stars in Signal Processing** at IEEE ICASSP 2023 — 2023
- **Outstanding reviewer:** InterSpeech 2023
- Recipient of the JHU+Amazon **AI2AI fellowship** for 2022-23 — 2022
- JHU nominee for Microsoft Research Fellowship and Apple Scholars in AI/ML — 2021
- **ISCA Travel Grant** (registration + membership + travel funds) for attending InterSpeech — 2021
- Member of Hitachi-JHU team which placed **top 2** in the DIHARD-3 challenge — 2020
- Member of JHU team which placed **top 2** in the CHiME-6 challenge track 2 (diarization + ASR) — 2020

Teaching

- **Teaching Assistant** at Johns Hopkins University — Fall 2021
  Information Theory (520.447/647)
- **Teaching Assistant** at Johns Hopkins University — Fall 2020
  Introduction to Human Language Technology (601.467/667)

Mentorship & Professional Services

- **Reviewer**: ICML (2023), NeurIPS (2022, 2023), ICLR (2022), ICASSP (2022, 2023), InterSpeech (2023), SLT (2021, 2022), Elsevier (CSL, SpeCom), IEEE TASLP
- **Organizer**: CHiME-7 DASR Challenge, InterSpeech 2023 tutorial on next-gen Kaldi
- **Student Volunteer**: SLT (2022)
- CLSP Graduate Admissions Committee: 2021, 2022, 2023
- CLSP Student Recruitment Committee: 2019, 2020

Skills

- **ML/DL Toolkits:** PyTorch, Scikit-learn
- **ASR Frameworks:** Kaldi, ESPNet, Lhotse, k2
- **Other:** Audacity, Git

Languages

- **Programming:** Python, C++, Bash
- **Natural:** English, Hindi, French (beginner)
  - **TOEFL:** 119/120

Publications

[1] Z. Huang, **D. Raj**, P. Garcia, and S. Khudanpur, "Adapting self-supervised models to multi-talker speech recognition using speaker embeddings", in *IEEE ICASSP*, 2023.

[2] **D. Raj**, J. Jia, J. Mahadeokar, C. Wu, N. Moritz, X. Zhang, and O. Kalinli, "Anchored Speech Recognition with Neural Transducers", in *IEEE ICASSP*, 2023.

[3] **D. Raj**, D. Povey, and S. Khudanpur, "GPU-accelerated Guided Source Separation for Meeting Transcription", in *InterSpeech*, 2023.

[4] **D. Raj**, D. Povey, and S. Khudanpur, "SURT 2.0: Advances in Transducer-based Multi-talker Speech Recognition", *ArXiv*, 2023.

[5] G. Morrone, S. Cornell, **D. Raj**, L. Serafini, E. Zovato, A. Brutti, and S. Squartini, "Low-Latency Speech Separation Guided Diarization for Telephone Conversations", in *IEEE SLT*, 2022.

[6] **D. Raj**, L. Lu, Z. Chen, Y. Gaur, and J. Li, "Continuous Streaming Multi-talker ASR with Dual-path Transducers", in *IEEE ICASSP*, 2022.

[7] M. Wiesner, **D. Raj**, and S. Khudanpur, "Injecting Text and Cross-lingual supervision in few-shot learning from self-supervised models", in *IEEE ICASSP*, 2022.

[8] M. He, **D. Raj**, Z. Huang, J. Du, Z. Chen, and S. Watanabe, "Target-Speaker Voice Activity Detection with Improved i-Vector Estimation for Unknown Number of Speaker", in *InterSpeech*, 2021.

[9] **D. Raj**, P. Denisov, Z. Chen, H. Erdogan, Z. Huang, M. He, S. Watanabe, J. Du, T. Yoshioka, Y. Luo, N. Kanda, J. Li, S. Wisdom, and J. R. Hershey, "Integration of speech separation, diarization, and recognition for multi-speaker meetings: system description, comparison, and analysis", in *IEEE SLT*, 2021.

[10] **D. Raj**, P. Garcia, Z. Huang, S. Watanabe, D. Povey, A. Stolcke, and S. Khudanpur, "DOVER-Lap: A method for combining overlap-aware diarization outputs", in *IEEE SLT*, 2021.

[11] **D. Raj**, Z. Huang, and S. Khudanpur, "Multi-class spectral clustering with overlaps for speaker diarization", in *IEEE SLT*, 2021.

[12] **D. Raj** and S. Khudanpur, "Reformulating DOVER-Lap Label Mapping as a Graph Partitioning Problem", in *InterSpeech*, 2021.

[13] Z.-Q. Wang, H. Erdogan, S. Wisdom, K. Wilson, **D. Raj**, S. Watanabe, Z. Chen, and J. R. Hershey, "Sequential multi-frame neural beamforming for speech separation and enhancement", in *IEEE SLT*, 2021.

[14] M. Wiesner, M. Sarma, A. Arora, **D. Raj**, D. Gao, R. Huang, S. Preet, M. Johnson, Z. Iqbal, N. K. Goel, J. Trmal, L. P. G. Perera, and S. Khudanpur, "Training Hybrid Models on Noisy Transliterated Transcripts for Code-Switched Speech Recognition", in *InterSpeech*, 2021.

[15] K. Žmolíková, M. Delcroix, **D. Raj**, S. Watanabe, and J. H. Cernocký, "Auxiliary Loss Function for Target Speech Extraction and Recognition with Weak Supervision Based on Speaker Characteristics", in *InterSpeech*, 2021.

[16] A. Arora, **D. Raj**, A. S. Subramanian, K. Li, B. Ben-Yair, M. Maciejewski, P. Zelasko, P. Garcia, S. Watanabe, and S. Khudanpur, "The JHU Multi-Microphone Multi-Speaker ASR System for the CHiME-6 Challenge", in *CHiME-6 Workshop at IEEE ICASSP*, 2020.

[17] **D. Raj**, J. Villalba, D. Povey, and S. Khudanpur, "Frustratingly Easy Noise-aware Training of Acoustic Models", *ArXiv*, 2020.

[18] **D. Raj**, D. Snyder, D. Povey, and S. Khudanpur, "Probing the Information Encoded in X-Vectors", in *IEEE ASRU*, 2019.

[19] **D. Raj**, S. K. Sahu, and A. Anand, "Learning local and global contexts using a convolutional recurrent network model for relation classification in biomedical text", in *CoNLL*, 2017.

See Google Scholar for a complete list of publications (650+ citations, h-index=12).