Bipasha Sen

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Research Interests

Implicit Neural Representations, Computer Vision to power Robotics Applications

Education

International Institute of Information Technology, Hyderabad Aug 2021 - Present
Masters by Research (Center for Visual Information Technology, Robotics Research Center) 10.0/10.0

- **Selected Courses**:
  CS7.503 Mobile Robotics (Depth)
  MA8.401 Topics in Applied Optimization (Depth)
  CS7.504 - Fairness, Privacy and Ethics in AI

K.C.College of Engineering, University of Mumbai Jul 2012 - Jun 2016
B.E. in Computer Engineering 8.13/10.0, Distinction

- **Best Outgoing Student award by the Dean** - Based on overall achievements out of 620 students
- Thesis: Reinforced and Collaborative Music Recommendation

Research Experience

International Institute of Information Technology - Hyderabad
Research Fellow - Robotics Research Center Nov 2021 - Present
[advised by **Prof. Madhav Krishna** and **Prof. Srinath Sridhar**]

- Leading a team of 4 undergraduate researchers and solving table-top rearrangement and planning challenges such as 6D object pose estimation, rotation invariant shape-completion, manipulating objects on tables with restricted regions.
- 3^{rd} in ICRA 2022's OCRTOC competition: end-to-end table-top rearrangement and planning competition.

Research Fellow - Center for Visual Information Technology Feb 2021 - Present
[advised by **Prof. CV Jawahar** and **Prof. Vinay Namboodiri**]

- Working on diverse topics such as few-shot domain adaption (BMVC 2022), video-to-video face-swapping (Under Review), user-study for lipreading training platforms (Under Review), and representation space for video-based generative tasks using hypernetworks and implicit neural representations (Under Review).
- Direct collaborations with hard-of-hearing and hard-of-speaking individuals:
  (1) Built a lipreading system for an ALS patient who is unable to speak and only communicates using lipreading. (2) Spoke to many hard-of-hearing individuals to understand the challenges faced when trying to learn lipreading. Built and statistically tested a viable solution to automatically generate large-scale lipreading platforms meeting their requirements.

Microsoft Research & Development Jul 2016 - Feb 2021
Data Scientist 2 - MSAI (Microsoft's Search and Assisted Intelligence) - Outlook Platform

- Lead a team of 2 data scientists and 1 data science intern to work on Outlook's document recommendation pipeline.
  - **Inline Suggested Attachments**
    - Built a high-precision classification model for suggesting of potential document as attachments to a half-composed email. Correct suggestions generated by our pipeline reduced the number of clicks to attach a file by 25%.
  - **Meeting Insights Relevance**
    - Built a high-recall classification model for the recommendation of relevant email and documents to meetings with a 34% improvement over the existing pipeline.
    - Used Graph Neural Networks to generate embedding (cached); Using simple linear models (to meet the extremely low-latency requirements of 200ms) on the embedding plus 150 handcrafted features for ranking and classification.
    - Meeting Insights power recommendations for more than 100+ million users per month.
- Worked on several other diverse topics such as (1) Named entity recognition in emails, (2) Detecting trips and loops in hotel/cab/train/airplane through 3^{rd}-party booking emails, (3) Bing Instant Answers experience for Game of Thrones (GOT) season 7, (4) News recommendation, (5) Natural language photo retrieval, and (6) Meeting Summarization on Teams.

International Institute of Information Technology - Hyderabad Oct 2019 - Jul 2020
Visiting Researcher - Speech and Vision lab, LTRC
[advised by **Prof. Anil Kumar Vuppala**]

- Built a multilingual acoustic model for low resource Indian Languages: Gujarati, Tamil, and Telugu (SLT 2021).

Microsoft Research & Development Dec 2015 - Feb 2016
Data Scientist - Intern (Search Technology Center India)

- **Conversational Shopping Assistant Bot**
  - Built a conversational bot tasked for proactively engaging the users and assisting them in placing an order.
  - *Project demoed to David Ku (former CVP and CTO of Microsoft AI+R).*

Peer-Reviewed Publications and Patents

Towards MOOCs for Lip Reading: Using Synthetic Talking Heads to Train Humans in Lipreading at Scale
Aditya Agarwal*, **Bipasha Sen***, Rudrabha Mukhopadhyay, Vinay Namboodiri, C V Jawahar
Under Review

FaceOff: A video-to-video face swapping system
Aditya Agarwal*, **Bipasha Sen***, Rudrabha Mukhopadhyay, Vinay Namboodiri, C V Jawahar
Under Review

INR-V: A continuous representation space for videos
Bipasha Sen*, Aditya Agarwal*, Vinay Namboodiri, C V Jawahar
Under Review

Approaches and Challenges in Robotic Perception for Table-top Rearrangement and Planning, [paper]
Aditya Agarwal*, **Bipasha Sen***, Shankara Narayanan*, Vishal Mandadi*, Brojeshwar Bhowmick, K Madhava Krishna
Arxiv, 2022

Personalized One-Shot Lipreading for an ALS Patient, [paper]
Bipasha Sen*, Aditya Agarwal*, Rudrabha Mukhopadhyay, Vinay Namboodiri, C V Jawahar
British Machine Vision Conference (BMVC), 2021

SYSTEM AND METHOD FOR TRAINING USERS TO LIP READ
Aditya Agarwal*, **Bipasha Sen***, Rudrabha Mukhopadhyay, Vinay Namboodiri, C V Jawahar
Provisional US Patent

Reed: An Approach Towards Quickly Bootstrapping Multilingual Acoustic Models, [paper]
Bipasha Sen*, Aditya Agarwal*, Mirishkar Sai Ganesh, Anil Kumar Vuppala
Spoken Language Technology (SLT 2021)

An Approach Towards Action Recognition using Part Based Hierarchical Fusion, [paper]
Aditya Agarwal*, **Bipasha Sen***
International Symposium on Visual Computing (ISVC 2020)

AiGraph for Meeting Insights Relevance, [short-paper]
Bipasha Sen, Prakash Pandey, Rajeev Gupta, Vipin Vangala
Microsoft Machine Learning Data Sciences Conference Synapse (MLADS Synapse 2020)

Past projects

Reinforced and Collaborative Music Recommendation 2016
Undergraduate Thesis

- Developed an agent that recommended music from the song-library on the mobile phone. The agent continuously learned and evolved based on collaborative (users with similar behavioral patterns) feedback.

Anterior Segment Imaging (MIT Media Lab's REDX Camp) (poster) 2015

- REDX is an interdisciplinary platform to enable collaboration between world-renowned medical professionals and engineers to build solutions for society's most pressing healthcare challenges.
- In collaboration with India's leading Eye-Institute, LVPI, developed a low-cost, solid-state device with no moving parts, as a replacement for heavy and bulky Ophthalmic Slit Lamp. It captured and reconstructed a 3D visual model of a patient's cornea (the anterior segment of the eye) reflecting the abnormalities in the cornea.

TheBhaad: Cloud-Based Group-Oriented file-sharing network (video) 2014

- Single-handedly developed a fully-fledged cloud-based file-sharing network with windows like user-interface specifically designed for undergraduate students and professors. Features: Secure folder/file upload and storage, Groups, Search, Contacts, Groups (Classrooms), Personalized Document Alignment, Discussion Forum.

Awards and Achievements

- 3^{rd} in ICRA 2022 Open Cloud Robot Table Organization Challenge — May 2022
- Spot award for 'Innovation and Impact' by Microsoft MSAI. — January 2021
- Awarded Dean's Best Outgoing Undergraduate Student (Out of 620 students) — March 2016
- Awarded Dean's Best Entrepreneur (founder of TheBhaad that hosted 5000+ users) — March 2015
(Undergrad, 50+ nominees)

Additional Wins and Updates

- Taking a session on "Computer vision challenges in robotic table-top rearragement and planning" at 6th Summer School on AI with a focus on Computer Vision & Machine Learning.[website] — Aug 2022
- Taking a session at MLADS 2020 on Quick Bootstrapping of Multilingual Models and AiGraph — July 2020
- 3rd in Microsoft One Week Hackathon - Mobile Endpoint (3k+ participants) — August 2016
- 126th in TCS CodeVita '15 Round 2 (19800+ participants) — February 2016

Academic Contributions @ International Institute of Information Technology, Hyderabad

Teaching Assistant for CS7.503 Mobile Robotics (course taught by Prof. K. Madhav Krishna)	Aug. - Nov. 2022
Coordinator for 6th Summer School on AI (conducted by CVIT) [website]	Aug. 2022
Tutor at Robotics Research Center (RRC) Summer School 2022	May. 2022
Tutor at CSE-DU Machine Learning-AI Workshop (conducted by IIIT-H, IIT-H, and IIT-Delhi)	Mar. 2022
Coordinator for 5th Summer School on AI (conducted by CVIT) [website]	Aug. 2021

Skills

Languages	Python, Spark.net, SQL, C#, C/C++, HTML, CSS, jQuery
Framework	Pytorch
Techonologies	Apache Spark and HDIInsight, Full-Stack Web Development
Tools	draw.io, TLC (The Learning Code), Adobe Premiere Pro

More to know?

I am a musician: vocalist, guitarist, and composer. I've toured around India along with my previous band, Andrometa. I've also traveled to 6 countries, 11 states solo over a period of 5 months and interviewed 70+ independent music bands (180+ artists) about their struggles as independent artists that broadened my perspective of life and passion.