

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 - Differential Privacy, Group and Individual Fairness (Depth)

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 outstanding senior year research, academic contributions, and representing the school at national venues.
Out of 620 graduating 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 **Dr. Madhav Krishna** and **Dr. 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 (Under Review @ICRA 2023), and RL based manipulation.
- 3rd 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 **Dr. CV Jawahar** and **Dr. Vinay Namboodiri**]

- Working on diverse topics such as few-shot domain adaption (BMVC 2022), video-to-video face-swapping (WACV 2023), user-study for lipreading training platforms (WACV 2023), and representation space for video-based generative tasks using hypernetworks and implicit neural representations (TMLR 2022).
- 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, India Jul 2016 - Feb 2021
Research 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 3rd-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).

- **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

INR-V: A Continuous Representation Space for Video-based Generative Tasks, [[preprint](#)]

Bipasha Sen*, Aditya Agarwal*, Vinay Namboodiri, C V Jawahar

Transactions on Machine Learning Research (TMLR) 2022

SCARP: 3D Shape Completion in ARbitrary Poses for Improved Grasping, [[project page](#)]

Bipasha Sen*, Aditya Agarwal*, Gaurav Singh*, Srinath Sridhar, K. Madhava Krishna

Under Review at International Conference on Robotics and Automation (ICRA), 2023

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

IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2023

FaceOff: A video-to-video face swapping system

Aditya Agarwal*, Bipasha Sen*, Rudrabha Mukhopadhyay, Vinay Namboodiri, C V Jawahar

IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2023

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

Awards and Achievements

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|---|----------------|
| • Awarded a travel grant of \$2000 by Microsoft Research | September 2022 |
| • Prize money of \$1500 (to the team) - 3 rd in ICRA 2022's Robotic Manipulation Competitions | 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)
(Undergrad, 50+ nominees) | March 2015 |

Additional Talks and Wins

- Presenting "INR-V: A Continuous Representation Space for Video-based Generative Tasks" at Vision India, Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) Dec 2022

- Taking a session on “Computer vision challenges in robotic table-top rearrangement and planning” at 6th Summer School on AI with a focus on Computer Vision & Machine Learning [[my talk](#)] Aug 2022
- Taking a session at MLADS (internal Microsoft conference) 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 6 th 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 5 th Summer School on AI (conducted by CVIT) [website]	Aug. 2021

Mentoring

IIIT-H: 4 undergraduate research students and 3 research assistants.

Microsoft: 2 data scientists (Srimukha Paturi and Sourav Maity) and 1 research intern (Jay Paranjape)

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.

Skills

Languages	Python, Spark.net, SQL, C#, C/C++, HTML, CSS, jQuery
Framework	Pytorch
Techonologies	Apache Spark and HDInsight, 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.