

# Bipasha Sen

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## Research Interests

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Robotics, 3D Computer Vision, Implicit Neural Representations

## Education

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**International Institute of Information Technology, Hyderabad** Aug '21 - Mar 2023  
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.  
One out of 620 graduating students
- Thesis: Reinforced and Collaborative Music Recommendation

## Research Experience

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### Mila / Université de Montréal

Visiting Research Student - Robotics and Embodied AI Lab (REAL) Center May 2023 - Present  
[ advised by **Prof. Liam Paull** and **Prof. Florian Shkurti** ]

- Working on Low-Rank Adaptation for continual learning on large language models to enables robotics applications.

### 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 3D generalization (Under Review), rotation invariant shape-completion (ICRA 2023), and RL based manipulation (CASE 2023).

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 (WACV 2023), user-study for lipreading training platforms (WACV 2023), representation space for video-based generative tasks using hypernetworks and implicit neural representations (TMLR 2022), and ethical generative modeling.

### Microsoft, India

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

- 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.
- 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<sup>rd</sup>-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

Visiting Researcher - Speech and Vision lab, LTRC Oct 2019 - Jul 2020  
[advised by **Prof. Anil Kumar Vuppala**]

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

### Microsoft, India

Research Scientist - Intern (Search Technology Center India) Dec 2015 - Feb 2016

- **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

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\*Equal contribution / Highlighted Papers

- **HyP-NeRF: Learning Improved NeRF Priors using a HyperNetwork**, [ [preprint](#) ]  
**Bipasha Sen\***, Gaurav Singh\*, Aditya Agarwal\*, Rohith Agaram, K. Madhava Krishna, Srinath Sridhar  
*Under Review*
- **Disentangling Planning and Control for Non-prehensile Tabletop Manipulation**  
Vishal Mandadi, Kallol Saha, Dipanwita Guhathakurta, Mohammad Nomaan Qureshi, Aditya Agarwal, **Bipasha Sen**,  
Dipanjan Das, Brojeshwar Bhowmick, Arun Kumar Singh, Madhava Krishna  
*International Conference on Automation Science and Engineering (CASE)*, 2023
- **Uncovering hidden biases against Indian independent artists in the perception of music quality by Indian Audience**  
**Bipasha Sen\***, Aditya Agarwal\*, Vinoo Alluri  
*International Conference on Music Perception and Cognition (ICMPC)*, 2023
- **SCARP: 3D Shape Completion in ARbitrary Poses for Improved Grasping**, [ [project page](#) ]  
**Bipasha Sen\***, Aditya Agarwal\*, Gaurav Singh\*, Srinath Sridhar, K. Madhava Krishna  
*International Conference on Robotics and Automation (ICRA)*, 2023
- **INR-V: A Continuous Representation Space for Video-based Generative Tasks**, [ [project page](#) ]  
**Bipasha Sen\***, Aditya Agarwal\*, Vinay Namboodiri, C V Jawahar  
*Transactions on Machine Learning Research (TMLR)*, 2022
- **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**, [ [project page](#) ]  
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 AUTOMATICALLY GENERATING SYNTHETIC HEAD VIDEOS USING A MACHINE LEARNING MODEL**  
C V Jawahar, Aditya Agarwal, **Bipasha Sen**, Rudrabha Mukhopadhyay, Vinay Namboodiri  
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 \$2250 by ICRA RAS for ICRA 2023 March 2023
- Awarded a travel grant of \$500 by VUB to act as a Social Media Ambassador for ICRA 2023 January 2023
- Awarded a travel grant of \$2000 by Microsoft Research for WACV 2023 September 2022

- Prize money of \$1000 (to the team) - 3<sup>rd</sup> 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 (One out of 620 graduating students) March 2016
- Awarded Dean's Best Entrepreneur (founder of TheBhaad that hosted 5000+ users) March 2015  
(Undergrad, 50+ nominees)

## Additional Talks and Wins

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- Official "Social Media Ambassador" for RAS-ICRA 2023! May 2023
- 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 6<sup>th</sup> Summer School on AI with a focus on Computer Vision & Machine Learning [ [talk recording](#) ] Aug 2022
- Taking a session at MLADS (internal Microsoft conference) 2020 on Quick Bootstrapping of Multilingual Models and AiGraph July 2020
- 3<sup>rd</sup> in Microsoft One Week Hackathon - Mobile Endpoint (3k+ participants) Aug 2016
- 126<sup>th</sup> in TCS CodeVita '15 Round 2 (19800+ participants) Feb 2016

## Academic Contributions during Masters

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Teaching Assistant for CS7.503 Mobile Robotics (course taught by Prof. K. Madhav Krishna)	Aug. - Nov. 2022
Coordinator for <a href="#">6<sup>th</sup> Summer School on AI</a> (conducted by CVIT)	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 <a href="#">5<sup>th</sup> Summer School on AI</a> (conducted by CVIT)	Aug. 2021

## Reviewing

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ICRA 2023, NeuralFields Workshop @ ICLR 2023, SIGGRAPH Asia 2023

## Past Relevant projects

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- 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

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

## More to know?

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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.