Aditya Agarwal

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Hyderabad, Telangana, India

Education

Massachusetts Institute of Technology — Cambridge, USA
PhD in Electrical Engineering and Computer Science; GPA: ***5.0/5.0*** — *Sep 2023 - Current*

International Institute of Information Technology Hyderabad — Hyderabad, India
Masters by Research in Computer Science and Engineering; GPA: ***9.83/10.0*** *(Top 2%)* — *Aug 2021 - May 2023*

PES University (formerly PES Institute of Technology) — Bangalore, India
Bachelor of Engineering in Computer Science and Engineering; GPA: ***9.31/10.0*** *(Top 10%)* — *Aug 2013 - May 2017*

Kendriya Vidyala — New Delhi, India
Class XII AISSCE, CBSE; ***94.2%*** *(Top 1.5% in India); Class X AISSE, CBSE;* ***10.0/10.0*** *(Top 1% in India)* — *Apr 2010 - Mar 2013*

Experience

Massachusetts Institute of Technology — Cambridge, USA
Graduate Research Assistant – Working in the areas of robotic perception and planning — *Sep 2023 - Present*

- **Learning and Intelligent Systems Group (CSAIL)**: *Supervised by Professors* ***Leslie Kaelbling*** *and* ***Tomas Lozano-Perez***.
  - Working on general-purpose robot autonomy - making robots that can seamlessly integrate with humans.

Université de Montréal & Mila — Montreal, Canada
Visiting Researcher – Worked in the areas of representation learning and robotic manipulation — *May 2023 - Aug 2023*

- **Robotics and Embodied AI Lab (REAL)**: *Supervised by Professors* ***Liam Paull*** *and* ***Florian Shkurti***.
  - Worked on integrating a novel graph based scene representation with a robotic tabletop manipulator. *(Under Review 2023)*

IIIT Hyderabad — Hyderabad, India
Research Fellow – Working in the broad areas of Robotics, Generative Modeling and 3D Computer Vision. — *Feb 2021 - May 2023*

- **Robotics Research Center**: *Supervised by Professors* ***Madhava Krishna*** *and* ***Srinath Sridhar***.
  - Advised undergraduate and graduate students towards learning generalizable motion planning motion by learning to generate collision-free kinematically valid trajectories guided through an ensemble of cost-guidance functions. *(Under Review 2023)*
  - Worked on learning NeRF priors for generating high-resolution NeRFs (512× spatial resolution) across categories. *[NeurIPS 2023]*
  - Worked on 3D shape completion of pointclouds in arbitrary poses for improved grasp pose estimation. *[ICRA 2023]*
  - Leading a group of four undergrad researchers on tabletop manipulation by exploring synergies between pushing and grasping.
  - Developed an end-to-end pipeline for tabletop rearrangement and planning. Secured 3rd place in an international robotics competition Robotic Grasping and Manipulation Competitions hosted by ICRA. *[ICRA 2022]*
- **Centre for Visual Information Technology**: *Supervised by Professors* ***C V Jawahar*** *and* ***Vinay Namboodiri***.
  - Proposed a novel area of video-to-video face-swapping for swapping a double's face (target) with a starring actor's (source) in movie scenes by preserving the facial features and expressions of the source and pose and background features of the target using techniques in blending and generative modeling. Outperformed existing SOTA networks on multiple metrics. *[WACV 2023]*
  - Developed a novel formulation for bootstrapping lipreading training platforms at scale by building on SOTA talking-head generation and TTS models for training hard-of-hearing people to lipread in any accent/language without vocabulary constraints and with real-world variations. *[WACV 2023]*
  - Proposed a novel video representation network where the videos are parameterized as implicit neural representations (INRs). A hypernetwork learns a prior over these INRs. Achieved SOTA performance in several video-based generative tasks. *[TMLR 2022]*
  - Developed a lipreading model for an ALS patient using data augmentation and domain adaptation techniques. *[BMVC 2021]*

Microsoft India R&D — Hyderabad, India
Data Scientist II - Bing Search Technology Center India — *Jan 2018 - Mar 2021*

- **Related QnA (People Also Ask), Bing STCI**: PAA experience shows a block of related questions and answers on the search page for any given user query. We aid the user in query exploration and reformulation.
  - Developed deep-learning techniques to improve the coverage and relevance of PAA in English, French, and German markets.
  - Worked on universalization techniques to enable PAA in 100+ languages and 200+ markets for millions of users at scale.
- **Azure Health Data Workbench, Azure Global Engineering**: We try to leverage the power of AI and the Cloud to solve some of the challenging problems in the sphere of healthcare in India and the world impacting the lives of millions of people.
  - Built an Azure Data workbench to pull medical health records from on-premise healthcare systems to the cloud performing a series of pre-processing, de-identification and ingestion steps to store data in a secure and queryable format ensuring interoperability.
  - Worked on several data analysis and visualization techniques to draw intelligent insights from the data.

- **Project Sangam - Digital Learning Platform, Azure Global Engineering**: Project Sangam is cloud-hosted, mobile-first community learning platform built to deliver content at large scale.
  - Owned several key areas like setting up the deployment health monitoring framework, API automation, developed the reward based program called Certificates, automated creation of deployments etc. to help us scale quickly and in customer acquisition.
  - Seamlessly on-boarded the Swachhbharat Mission program to our platform which helped train 110,000+ municipal functionaries across 4000+ cities in India on best sanitation practices. The result was a partnership between Microsoft India and Ministry of Urban and Housing Affairs (MoHUA), Government of India that received widespread media coverage, Link.

IIIT Hyderabad Hyderabad, India
*Visiting Researcher – Supervised by Professor **Anil Kumar Vuppala*** *Oct 2019 - Jul 2020*

- **Reed**: An Approach Towards Quickly Bootstrapping Multilingual Acoustic Models.
  - Built a multilingual acoustic model based on convolutional networks operating on raw speech signals to validate the compatibility of different languages in building a robust multilingual system. Achieved SOTA on three low-resource Indic languages. *[SLT 2021]*

VMWare India R&D Bangalore, India
Member of Technical Staff *Jul 2017 - Dec 2017*

- **Workspace One - SSO vIDM for VMWare's SAAS offering**: Workspace One is a digital platform that delivers and manages any app on any device by integrating access control, application management and multi-platform endpoint management.
  - Worked on automating several release pipelines and processes ensuring the highest quality of code in the production systems.

Microsoft Research Bangalore, India
Research Intern *Nov 2016 - May 2017*

- **Second Opinion**: Second Opinion is a medical application platform to detect the onset of an oncoming serious illness.
  - Developed a platform to connect patients with doctors from multi-specialty hospitals in India. Implemented several ML models to predict commonly occurring diseases in patients in India from their medical history and lab tests.

  This work was done in collaboration with the Microsoft Intelligent Network for Eyecare (MINE), Microsoft India Development Center

University of Calgary Calgary, Canada
MITACS Research Intern – Supervised by Professor Mike Smith *May 2016 - Aug 2016*

- **The Ranchlands Hum**: A low-frequency audio noise nuisance plaguing the residents of the Ranchlands community of Calgary.
  - Developed a low-cost smartphone application to store and analyze low-frequency audio noise data using techniques in DSP.
  - Developed techniques to perform large scale calibration of android device microphones, code.

Microsoft Research Bangalore, India
Software Engineering Intern *Nov 2015 - May 2016*

- **MEC - Massively Empowered Classrooms**: MEC is a flagship project developed by Microsoft Research India designed to explore how online educational content and techniques in blended learning can be used for undergraduate education in India. MEC
  - Worked on automating several data retrieval tasks and providing insights into data with interactive data visualization techniques.
  - Worked on developing and deploying this platform for education in Mauritius called Virtual Campus which was launched as a *partnership between Microsoft Research India and Mauritius Institute of Education that received widespread media coverage*.

PUBLICATIONS

- **ConceptGraphs: Open-Vocabulary 3D Scene Graphs for Perception and Planning**:
  Qiao Gu*, Ali Kuwajerwala*, Sacha Morin*, Krishna Murthy Jatavallabhula*, Bipasha Sen, **Aditya Agarwal**, Kirsty Ellis, Celso Miguel de Melo, Corban Rivera, William Paul, Rama Chellapa, Chuang Gan, Joshua B. Tenenbaum, Antonio Torralba, Florian Shkurti, Liam Paull
  IEEE International Conference on Robotics and Automation (ICRA), 2024; *CoRL PRL Workshop (CoRL-W), 2023*

- **EDMP: Ensemble-of-costs-guided Diffusion for Motion Planning**:
  Kallol Saha*, Vishal Mandadi*, Jayaram Reddy*, Ajit Srikanth, **Aditya Agarwal**, Bipasha Sen, Arun Singh, Madhava Krishna
  IEEE International Conference on Robotics and Automation (ICRA), 2024; *CoRL LangRob & TGR Workshops (CoRL-W), 2023*

- **HyP-NeRF: Learning Improved NeRF Priors using a Hypernetwork**:
  Bipasha Sen*, Gaurav Singh*, **Aditya Agarwal***, Rohith Agaram, Madhava Krishna, Srinath Sridhar
  NeurIPS, 2023

- **Disentangling Planning and Control for Non-prehensile Tabletop Manipulation**:
  Vishal Reddy Mandadi, Kallol Saha, Dipanwita Guhathakurta, Mohammad Nomaan Qureshi, **Aditya Agarwal**, Bipasha Sen, Dipanjan Das, Brojeshwar Bhowmick, Arun Kumar Singh, Madhava Krishna
  IEEE International Conference on Automation Science and Engineering (CASE), 2023

- **SCARP: 3D Shape Completion in ARbitrary Poses for Improved Grasping, project page**:
  Bipasha Sen*, **Aditya Agarwal***, Gaurav Singh*, Brojeshwar B., Srinath Sridhar, Madhava Krishna
  IEEE International Conference on Robotics and Automation (ICRA), 2023; *RSS Robot Representations Workshop (RSS-W), 2023*

- **Towards MOOCs for Lip Reading: Using Synthetic Talking Heads to Train Humans in Lipreading at Scale, project page**:
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

- **INR-V: A Continuous Representation Space for Video-based Generative Tasks, OpenReview, project page**:
Bipasha Sen*, **Aditya Agarwal***, Vinay Namboodiri, C V Jawahar
Transactions on Machine Learning Research (TMLR), 2022

- **Approaches and Challenges in Robotic Perception for Table-top Rearrangement and Planning, paper**:
Aditya Agarwal*, Bipasha Sen*, Shankara Narayanan V*, Vishal Reddy Mandadi*, Brojeshwar Bhowmick, K Madhava Krishna
Robotic Grasping and Manipulation Competition, ICRA, 2022

- **Rethinking Approaches to Training Humans with Hearing Loss in Lipreading**:
C V Jawahar, **Aditya Agarwal**, Bipasha Sen, Rudrabha Mukhopadhyay, Vinay Namboodiri
Provisional US Patent 2021

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

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

** indicates equal contribution* | Full publication list at Google Scholar | Project details at skymanaditya1.github.io

Additional Experience & Achievements

- Awarded NeurIPS 2023 Scholar Award ($1700).
- Selected in a competitive pool of applicants to attend the fully-funded Google Research Week at Bangalore, 2023.
- Secured 3rd place in the International Robotics Competition on Table-top Rearrangement and Planning (OCRTOC), ICRA, Link, 2022
- Selected among 6000+ employees at Microsoft for a video shoot conducted for Microsoft's campus hiring program, Link, 2020
- Awarded *Delight Your Customer, Azure Global Engineering, Microsoft*, for being among the top performing employees in the org., 2018
- Winners at VMWare Global Relay Open Source Borathon; a global hackathon across all teams from VMWare. Link, 2017
- Received *Academic Distinction Award* for exceptional academic performance for consistently scoring 9+ CGPA on a grade scale of 10, 2013-17
- Awarded *MITACS Globalink Award*, for carrying out a fully funded summer research internship at The University of Calgary for the year 2016.
- Co-Founded the *Official Android Community* of PES University called AndroidLabs., 2015
- Won the Best Application Award at Ayana'15 (a 24-hour hackathon)., 2015
- Won the *Best Paper Presentation Award* at NCACCT'15., 2015
- Awarded *Certificate of Excellence* by CBSE for being among the top 0.1% of successful candidates of AISSCE 2013 in Computer Science, 2012
- Recipient of INSPIRE scholarship (deferred) for academic performance within top 1% of successful candidates of AISSCE 2013
- Represented the country as an *Indian delegate* during a fortnight long Exchange Program at Nagano and Tokyo as part of the *JENESYS Program* in Nov'11., 2011
- Extra curricular: Drummer Keyboard and Tabla player *(distinction)*, Fitness Enthusiast, Traveler, Badminton player.

Academic Service

- MIT EECS GAAP mentor for FY2024 cohort & EECS GSA Executive Member.
- Reviewer for CVPR 2024, ICRA 2024/2023, IROS 2023, SIGGRAPH Asia 2023, ICLR Workshops 2023, ICRA 2023.
- Coordinator for 6th Summer School on AI (CVIT, IIITH), 2022
- TA for CSEDU-ML Workshop conducted jointly by IIIT-H, IIT-H, and IIT-D
- Coordinator for 5th Summer School on AI (CVIT, IIITH), 2021

Students Mentored/Mentoring

- Vishal Reddy Mandadi (Website) – Undergraduate CS student at IIIT-Hyderabad – October 2021 - September 2023
- Shankara Narayanan V (Website) – Visiting research student at IIIT-Hyderabad – October 2021 - May 2023
- Gaurav Singh (Website) – Undergraduate research student at IIIT-Hyderabad – January 2021 - July 2023
- Kallol Saha (Website) – Visiting research student at IIIT-Hyderabad – January 2023 - September 2023
- Yina Wang – Undergraduate student in EECS at MIT – January 2024 - present
- Elijah Bell (Website) – Junior student in EECS at MIT – January 2024 - present
- Eugenia Feng (Website) – MEng student in EECS at MIT – January 2024 - present
- Caroline Zhang (Website) – Junior student in EECS at Brown – February 2024 - present