

# Bhuvan Sachdeva

Research Fellow, Sankara Eye Hospital and Microsoft Research

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## Education

May 2023	Delhi Technological University (DTU)	Delhi, India
Aug 2019	B.Tech - Computer Science and Engineering, GPA: 9.22/10	

## Select Publications

S=Under Review, C=Conference, W=Workshop, P=Poster/Demo, J=Journal

- [W.1] **Understanding Task Transfer in Vision-Language Models** [Q] Bhuvan Sachdeva\*, Karan Uppal\*, Abhinav Java\*, Vineeth N. Balasubramanian *UniReps Workshop @ Neurips'25 / Under Review at CVPR'26* [CVPR (Under Review)]
- [S.1] **CataractCompDetect: Intraoperative Complication Detection in Cataract Surgery** [Q] Bhuvan Sachdeva, Sneha Kumari, Rudransh Agarwal, ..., Thomas Schultz, Kaushik Murali, Mohit Jain *Under Review at CVPR'26* [CVPR (Under Review)]
- [C.2] **Phase-Informed Tool Segmentation for Manual Small-Incision Cataract Surgery** [Q] Bhuvan Sachdeva\*, Naren Akash\*, Tajamul Ashraf, Simon Mueller, Thomas Schultz, Maximilian WM Wintergerst, Niharika Singri Prasad, Kaushik Murali, Mohit Jain *International Conference on Medical Image Computing and Computer Assisted Intervention* [MICCAI'25]
- [J.3] **CataractBot: An LLM-Powered Expert-in-the-Loop Chatbot for Cataract Patients** [Q] Pragnya Ramjee\*, Bhuvan Sachdeva\*, Satvik Golechha, Shreyas Kulkarni, Geeta Fulari, Kaushik Murali, Mohit Jain *ACM Journal on Interactive, Mobile, Wearable and Ubiquitous Technologies* [ACM IMWUT'25]
- [C.1] **ASHABot: An LLM-Powered Chatbot to Support the Informational Needs of Community Health Workers** [Q] Pragnya Ramjee, Mehak Chhokar, Bhuvan Sachdeva, Mahendra Meena, Hamid Abdullah, Aditya Vashistha, et al *ACM Conference on Human Factors in Computing Systems* [ACM CHI'25]
- [J.2] **Learnings from a Large-Scale Deployment of an LLM-Powered Expert-in-the-Loop Healthcare Chatbot** [Q] Bhuvan Sachdeva\*, Pragnya Ramjee\*, Geeta Fulari, Kaushik Murali, Mohit Jain *European Journal of Ophthalmology* [EJO'25]
- [J.1] **Phase recognition in manual Small-Incision cataract surgery with MS-TCN++ on the novel SICS-105 dataset** [Q] Simon Müller, Bhuvan Sachdeva, Singri Niharika Prasad, Raphael Lechtenboehmer, Frank G Holz, et al *Nature Scientific Reports* [Scientific Reports'25]

## Research Experience

Present	Sankara Eye Hospital   (Visiting Researcher) Microsoft Research	Bangalore, India
Aug 2023	Research Fellow   Advisors: Dr. Mohit Jain, Prof. Vineeth N Balasubramanian, Dr. Kaushik Murali Working on task transfer in vision-language models for perception tasks, complication detection in cataract surgery, and healthcare chatbots for patient support.	
Mar 2023	Kroop AI	Remote
Sept 2022	Research Intern   Advisor: Prof. Abhinav Dhall Developed facial expression transfer for avatars and deepfake detection using facial landmarks.	
July 2022	Prime Video, Amazon	Bangalore, India
May 2019	Applied Scientist Intern   Advisor: Dr. Anil Nelakanti Improved machine translation for Prime Video system using Automatic Post Editing.	
Apr 2022	Kroop AI	Remote
June 2021	Research Intern   Advisor: Prof. Abhinav Dhall Worked on projects involving face swapping, voice cloning and generating lip movements from audio.	

## Select Research Projects

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### Task Transfer in VLMs

Microsoft Research, Jun'25 - Present

Advisors: Prof. Vineeth N Balasubramanian

- › Finetuned Qwen-2.5VL models on 13 perception tasks to analyze cross-task performance transfer.
- › Proposed *Perfection Gap Factor (PGF)* as a novel metric for quantifying task transferability.
- › Demonstrated asymmetric transfer patterns and task properties; (results under submission).

### Surgical Anomaly Detection

Sankara Eye Hospital | Microsoft Research, Aug'23 - Present

Advisors: Dr. Mohit Jain, Dr. Kaushik Murali, Prof. Thomas Schultz

- › Curated a dataset of **400 videos** for **Manual Small-Incision Cataract Surgery (MSICS)** from conventional and smartphone-based systems at **Sankara Eye Hospital**.
- › Built a **SAM-based web application** for surgical instrument labeling, deployed on Azure.
- › Utilized a **conditional decoder** and **semi-supervised setup** to improve **tool segmentation**; accepted at **MICCAI, 2025**.

### Machine Translation for Conversational Data

Amazon, May'22 - July'22

Advisor: Dr. Anil Nelakanti

- › Improved **machine translation** for **conversational data** using **Automatic Post Editing (APE)**.
- › Developed novel **transformer decoder** methods, achieving **5% higher BLEU scores** on the **Flores dataset**.

### BYOeB: Build Your Own Expert Bot

Microsoft Research, Aug'23 - Feb'24

Advisor: Dr. Mohit Jain

- › Developed an **expert-in-the-loop chatbot** framework using Python, supporting **multilingual** and **multi-modal** queries in **Indic languages**.
- › Implemented a **Retrieval-Augmented Generation (RAG)** pipeline for expert-curated query responses and **Query rewriting** for contextualized retrieval and improved responses.
- › Open-sourced the framework via Microsoft at **BYOeB**, adopted by multiple hospitals and organizations, including **CataractBot** and **ASHABot**.
- › **CataractBot** has been used by over **1000 cataract patients** at Sankara Eye Hospital and **ASHABot** has been used by over **50000 ASHAs and ANMs** in Rajasthan; accepted at **IMWUT'25** and **CHI'25**.

## Achievements and Awards

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Secured Rank 98 in Amritapuri Region Prelims, ACM ICPC	2021
Ranked 309 out of 7400 participants in Google Kickstart Round B	2021
Candidate Master on Codeforces: <a href="#">_bhuvan21</a>	2021
Selected for Microsoft Engage Mentorship Program	2021
Achieved 99.59 percentile in JEE Mains examination out of 1.5 million candidates	2019

## Relevant Coursework

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- › **Machine Learning:** Artificial Intelligence, Machine Learning, Deep Learning, Reinforcement Learning, Computer Vision
- › **Computer Science:** Data Structures, Algorithms, Operating Systems Design, Computer Architecture, Database Management Systems, Software Engineering
- › **Mathematics:** Mathematics - 1&2, Probability and Statistics, Discrete Structures, Information Theory and Coding

## Teaching and Volunteering Roles

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### Sankara Eye Hospital

Sep'23 - Nov'23

Delivered an *Introduction to AI* course for second-year Ophthalmology fellows.

### Make A Difference (MAD) NGO Fundamental Support Volunteer

Nov'19 - Jun'20

- › Mentored and taught underprivileged children in a government-run center, focusing on their holistic development.

## References

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- › Dr. Mohit Jain ..... Principal Researcher, Microsoft Research, India [✉]
- › Prof. Vineeth N. Balasubramanian ..... Principal Researcher, Microsoft Research, India [✉]
- › Prof. Thomas Schultz ..... Professor, Dept. of Computer Science, University of Bonn, Germany [✉]
- › Dr. Kaushik Murali ..... President Medical Administration, Sankara Eye Hospital, India [✉]