Inish Melroy D Souza

inishds7@gmail.com 9740052015
Mangalore, Karnataka, India, 574211
LinkedIn GitHub

Education

Maulana Azad National Institute Of Technology (NIT), Bhopal *October 2021 - May 2024*
Master's in Computer Application *8.94 CGPA*

St. Aloysius College Autonomous, Mangalore *June 2018 - August 2021*
B.Sc (Physical Sciences) *8.9 CGPA*

Research Experience

Academic Research

Beyond Buttons and Screens: Conversational Interfaces to Edge Devices **(Master's Thesis)**
Supervisors: Dr. G.S. Thakur (MANIT Bhopal), Mr.Kapil Patel (Qualwebs Indore)

- Explored deploying language models on edge devices for function calling.
- Developed a model of sub-billion parameters for memory-constrained edge devices.
- Open-sourced a dataset used for fine-tuning models, achieving high accuracy with deployable quantized versions.

Virtual Try and Buy: (3D Computer Vision and Robotics)
Mentors: Dr. G.S. Thakur (MANIT Bhopal), Devendra Hazare (Bajaj Markets Pune)

- This project was part of HackRx 2.0, organized by Bajaj Finserv, aiming to enhance product pages with a virtual try-on feature using 3D models
- We successfully integrated 3D models of users and products, but faced challenges with automating 3D asset editing and manipulation, revealing a significant research gap.
- My ongoing work focuses on the strong parallels between 3D manipulation and robotic manipulation, aiming to address challenges in both areas.

Industrial Research

Retrieval Augmented Generation *Supervisor:* Kapil Patel (Qualwebs Indore)

- Built a optimized RAG pipeline good accuracy and latency for document QA and summarization tasks
- Involved running experiments at each stage of the pipeline and test multiple optimization techniques
- Evaluated thoroughly using RAG evaluations frameworks

Image Enhancement for OCR Supervisor: Kapil Patel (Qualwebs Indore)

- Experimented with various Image Enhancement techniques
- increased the accuracy from 85% to greater than 95% for Hindi characters of provided client documents

Skin/Scalp Analysis and Product Recommendation *Supervisor:* Kapil Patel (Qualwebs Indore)

- Literature Review and DataSet curation and generation
- Distillation methods were used to distill knowledge from Larege VLMs to open source small VLMs

Internship/Work Experience

AI Research Intern - Qualwebs Indore
- Worked on deploying language models to edge devices and enhancing retrieval systems.
- Implemented OCR for Hindi characters and contributed to a skin analysis and product recommendation project.

Freelance Python Developer
- Handled backend development and data management for a startup based in Pune.

Awards and Achievements

- Received the **Government of India's Inspire SHE Scholarship**, awarded to meritorious students pursuing research-oriented degrees, for a duration of three years.
- Achieved an **All India Rank of 399** in NIMCET, the entrance exam for the Master of Computer Applications (MCA) program at NITs.
- Received **Academic Excellence Award** for the years 2019-20 and 2020-21 during undergraduate degree.
- Finished in the **top 10 in HackRx 2.0 hackathon** conducted by Bajaj Finserv for the novel idea of using 3D computer vision in virtual try-on for e-commerce.
- **"Best Project"** Award in South Indian Science Fair (Thrissur, Kerala 2015).
- **1st Place in State Level** Science Fair (Dharwad, Karnataka 2016).
- District Level **Inspire Award Winner** awarded by Department of Science and Technology, 2014.
- **District Innovation Award** Winner by Rotary Club Mangalore, 2016.

Skills

- **Languages:** Python, JavaScript, Java, C, SQL
- **Web Development:** Next.js, React.js, Node.js, Express.js, FastAPI, Flask, Django
- **AI & Machine Learning:** PyTorch, NLTK, Numpy, Pandas, OpenCV, Docker, AWS, GenAI, Transformers, vLLM, Vector Databases (ChromaDB, pgvector, Faiss)
- **DevOps:** Git, Docker, Linux
- **Mobile App Development:** Python Kivy library

Personal Projects

Flappy Bird - Reinforcement Learning using PyTorch
- Developed a reinforcement learning model in PyTorch for the game Flappy Bird.
- Utilized CNN to capture game states.
- Tech stack: PyTorch, Pygame

Mobile Application for Hymns
- Achieved 5K organic downloads on Google Play Store.
- Tech stack: Python Kivy library, SQLite

More projects can be found on my GitHub profile.

Seminars/Presentations

- Presented on **"Advances in String Theory"** at the Mangalore University Intercollege Fest, 2019.
- Delivered a talk on **"Fundamentals of Blockchain and Decentralized Applications"** at an interdepartmental fest at NIT Bhopal.

Conferences Attended

- National Interdisciplinary Conference on "Physics of Living Matter and Medical Equipment" at St. Aloysius College, Mangaluru, December 2018.
- National Conference on "Advances in Electrochemical Research" at Poornaprajna College, Udupi, February 2020.

References

Dr. G.S. Thakur
Assistant Professor
Department of Mathematics and Bioinformatics
MANIT Bhopal
Email: ghanshyamthakur@manit.ac.in

Dr. Amit Bhagat
Associate Professor
Department of Mathematics and Bioinformatics
MANIT Bhopal
Email: amitbhagat@manit.ac.in

Dr. Madhvi Shakya
Professor
Department of Mathematics and Bioinformatics
MANIT Bhopal
Email: shakyam@manit.ac.in

Curiosity is often hailed as a key ingredient for success in research, but as Richard Feynman aptly noted, there is no substitute for hard work and dedication. Throughout my journey towards becoming a scientist, these qualities—nurtured by my deep-seated curiosity—have been my driving forces.

From an early age, I excelled academically and actively engaged in scientific activities. In high school, I eagerly participated in numerous science project competitions, where my dedication and enthusiasm earned me multiple accolades at both state and national levels. These experiences not only honed my problem-solving skills but also reinforced my passion for tackling challenging problemswith the potential to benefit society.

Growing up in a picturesque village, surrounded by nature and a wealth of books, fueled my curiosity further. However, I soon recognized a limitation: the lack of extensive information available to me compared to those living in cities. When the cost of internet access in India dropped significantly during my 11th grade, I persuaded my parents to invest in a connection. This decision was transformative. With the vast expanse of knowledge now at my fingertips, my interest in physics and mathematics deepened. Despite the long commute to college—an endeavour I undertook in defiance of my parents' suggestions to pursue engineering for its lucrative prospects—I remained committed to studying these subjects. I am proud to have been awarded the INSPIRE SHE scholarship by the central government,which supports meritorious students like myself who are dedicated to advancing fundamental science rather than pursuing immediate high-paying jobs in engineering. This scholarship has further cemented my resolve to contribute to the field of scientific research.

Although attending one of the best colleges in my district, the resources available for conducting meaningful research in physics were limited. However, this limitation led me to discover the field of computer science, which quickly captured my interest. I realised that, unlike physics, research in computer science could be pursued with fewer resources, thanks in part to the transformative power of the internet. As I delved deeper into computer science, my fascination grew, culminating in my decision to pursue a master’s degree in the field. I secured an All India Rank of 399 and gained admission to the prestigious National Institute of Technology (NIT) Bhopal.

My time at NIT Bhopal was profoundly rewarding. Beyond excelling academically

and engaging in various college activities and hackathons, I found that my passion for research intensified. While many of my peers focused on engineering applications, I was increasingly drawn to the theoretical underpinnings of our projects. I spent countless hours immersed in books and scientific literature, driven by a desire to understand concepts from first principles. This approach, which I had cultivated through my studies in physics and mathematics, allowed me to gain a deeper grasp of complex topics.

Even in hackathons, where practical applications were emphasised, I was more interested in exploring state-of-the-art algorithms and striving to improve them. My internship experiences further solidified my love for research. I revelled in reading research papers, implementing cutting-edge algorithms, and seeking ways to enhance them. These experiences have led me to the decision to pursue a PhD, a path that many experts have affirmed as an excellent fit for my aspirations.

During my internship, I had the opportunity to work on several machine learning projects, and a common challenge across all these projects was the need for high-performance data processing. Achieving better results often required training models with larger and more diverse datasets, which, in turn, necessitated increased computational power. This surge in computing power, however, translates to higher energy consumption and contributes to a growing carbon footprint in the AI community. Observing this trend, I became acutely aware of the environmental impact associated with the escalating demands for computational resources. This realisation underscored the critical need for developing more efficient learning systems that minimise energy consumption while maintaining high performance. Addressing this issue has become a central focus of my research interests.

Through this PhD I would like to delve deeper into this area of research. I am eager to explore innovative solutions that balance computational efficiency with environmental sustainability, and contribute to advancements that could mitigate the carbon footprint of AI technologies. I am excited to bring my dedication and curiosity to this field, working to develop effective lifelong/continual learning systems that align with both technological and environmental goals.

Completing my master's degree in computer science from an institute of national importance has significantly enhanced both my theoretical knowledge and practical skills in machine learning and AI. Through personal projects, academic thesis work, and research

internships, I have addressed a variety of challenges, from large-scale language models to computer vision and natural language processing. These experiences have refined my ability to handle complex datasets and employ advanced analytical techniques, equipping me to make meaningful contributions to fundamental research.

Beyond my technical expertise, I bring a strong work ethic, meticulous attention to detail, and a proactive approach to problem-solving. I am committed to continuous learning and professional development, thriving both independently and within collaborative team environments. My interpersonal skills further complement my ability to excel in interdisciplinary research settings, fostering effective communication and teamwork.

I am enthusiastic about the opportunity to contribute my skills and passion to lifelong learning systems as a member of your esteemed research team. I am eager to engage in innovative researchand work alongside like-minded individuals to push the boundaries of knowledge and address criticalchallenges in the field. Thank you for considering my application. I look forward to the possibility of contributing to your groundbreaking research.