PARTH BHALERAO

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EDUCATION

Santa Clara University (SCU) *Jun-2025 - current*
PhD in Computer Science and Engineering - AI Specialization
PhD guided by - Dr. Oana Ignat
Current Research Work: Building AI Agents, Multi-modal AI Image+Video+Audio, RAG

Santa Clara University (SCU) *Sep-2023 - Jun-2025*
M.S. in Computer Science and Engineering
GPA: 3.71/4.0 & Thesis: Multi Agent Image Gneration System
Selected courses: Directed Research - AI & NLP, Distributed Systems, Algorithms

Ramdeobaba Univeristy India *Aug-2019 - May-2023*
B.E. in Electronics and Computer Science
GPA: 9.4/10.0
Selected courses: Artificial Intelligence, Machine Learning, Data Analysis, Software Engineering

SKILLS

Programming	Python, C/C++, CUDA Programming
Frameworks & Libraries	PyTorch, TensorFlow, scikit-learn, HuggingFace, LangChain, CrewAI
Databases	Vector Databases & RAG pipelines, SQL
Data Science Tools	NumPy, Pandas

RESEARCH INTERESTS

I am interested in Agentic AI and Multimodal AI (text, image, video, audio), with a focus on building intelligent agents and scalable systems. I also contribute to creating novel datasets for low-resource languages, enabling inclusivity and broader accessibility in AI research. My work includes optimizing large AI models on multi-GPU setups and distributed infrastructures, leveraging sequential and parallel computation strategies for efficiency and real-world deployment.

RESEARCH EXPERIENCE

Mentorship4All: Multi-Agent QA Extraction for Long-Form Mentorship Videos
June 2025 – current - Under Experimentation and Review (soon to be released)

- Proposed a multi-agent framework for QA from long-form mentorship and educational videos.
- Developed a novel chunking algorithm, benchmarking single vs. multi-agent performance.
- Completed RAG comparisons, confirming multi-agent superiority.
- Found significant QA metric gains in faithfulness, relevance, and coherence across three languages.
- Finished by showcasing scalable multilingual capabilities for accessible learning.

MoSAIG - Multi-Agent Multimodal Models for Multicultural Text to Image Generation
October 2024 - May 2025 - Under Review ArXiV Page

- Proposed MosAIG, a Multi-AI-Agent framework for multicultural image generation.
- Found multi-agent models outperform simple baselines.
- Completed and open-sourced a 9,000-image multicultural dataset and the multi-agent pipeline.
- Modified workflows with agent-based captioning.
- Finished with steps for fairness and multilingual improvements.

Performance Analysis of YOLOv5 for ASL Detection
November 2022 – Apr 2023 – SSRN Page

- Proposed YOLOv5 evaluation for ASL detection using PyTorch, TensorFlow, and multi-GPU training.
- Found consistent misclassifications in specific letters across devices and frameworks.
- Completed 4,500 automated experiments across Intel CPUs, Raspberry Pi, and Jetson Nano GPUs.
- Modified workflows with automation scripts and parameter sweeps (image size, weights, thresholds).
- Finished by open-sourcing all model weights, code for community use, and suggested the most optimal and best framework setup across various platforms.

PUBLICATIONS

ECG Classification Using Machine Learning on Wave Samples for the Indian Population
Bhalerao P, Essaji H, Korde M. — IEEE InCACCT, 2023 — PDF

Design of a Dynamic Traffic Signal System with IoT and Digital Circuit Integration
Bhalerao P, Thakre P, Dongre A — IEEE ICCCNT - Top Conference, 2023 — PDF

Point of Care Device for Measurement of Vital Parameters
Bhalerao P, Korde M — Springer SmartCom International Conference, 2023 — PDF

WORK EXPERIENCE

Research Assistant — AIM Lab
Santa Clara University, Santa Clara, CA — June 2025 – Present

- Tech: Python, PyTorch, CUDA, multi-GPU optimization, multimodal datasets, AI agent frameworks.
- Developing AI agents for advanced multimodal research, integrating image, text, and video understanding tasks.
- Designed and implemented chunking algorithms to efficiently preprocess and manage large multimodal datasets.
- Researching and prototyping optimized deployment strategies for sequential and parallel AI agents across multi-GPU systems, improving scalability and throughput.

Software Automation Developer
Santa Clara University, Santa Clara, CA — Jan 2024 – Aug 2025 | Part-Time

- Tech: Workday, Python, ELK Stack (Elasticsearch, Logstash, Kibana), JavaScript/HTML/CSS
- Built automation scripts for Workday client processes, streamlining student enrollment and salary calculations and reducing administrative effort.
- Implemented structured logging with the ELK Stack, introducing correlation IDs and custom middleware for request tracking, improving end-to-end traceability and cutting issue resolution time by 60%.
- Developed and maintained frontend components for SCU websites, enhancing UI/UX design and creating new pages for academic and administrative use.

Research Assistant — HASO Labs
Santa Clara University, Santa Clara, CA — Sep 2023 – Dec 2023

- Tech: Python, CLIP, Mediapipe, CUDA, AWS (Lambda, SQS, API Gateway), GPU optimization.
- Designed and implemented a GPU-optimized video processing pipeline using Python, CLIP, and Mediapipe for a 300GB+ dataset.
- Parallelized frame-level operations, reducing vector embedding generation time from 50+ hours to ∼21 hours.
- Deployed trained models on AWS cloud, integrating SQS queues, Lambda, and API Gateway for scalable query handling and complete META-VR headset UI-integration with cloud service.

Machine Learning Intern

Innovative Technologies, New Delhi — June 2022 – Nov 2022 | Internship

- Tech: Python, scikit-learn, NumPy/Pandas, signal processing, XML automation, deployment.
- Researched and trained ML models for 3-lead ECG rhythm prediction, achieving ∼93% accuracy with medically graded sensor integration.
- Contributed to a novel 3-lead ECG dataset, including collection standards and labeling guidelines.
- Built XML automation pipelines for data extraction and preprocessing to accelerate experimentation.

Systems Programmer Intern

ECDS, Nagpur, MH, India — Dec 2021 – Apr 2022 | Internship

- Tech: C++, custom libraries, IoT, system performance optimization.
- Developed C++ libraries for system software, optimizing hardware–software interaction.
- Reduced IoT transfer latency from 5–7s to milliseconds, drastically improving end-to-end system performance.

ACHIEVEMENTS

Meta Hackathon, SFO (Oct 2024) – 3rd Place

- Built GitLlama, an AI-powered tool using RAG + Agentic AI for repo insights and deep analysis.

NVIDIA AI Global Hackathon (Jun 2024) – In Top 10 Featured Projects

- Designed AI-Based System Design Builder enabling drag-and-drop and natural-language system design.

Patent Granted – Govt. of India (Nov 2024)

- Invented Point-of-Care Device integrating biomedical sensors with ML for portable diagnostics.

Ramdeobaba University (May 2023) – Best Student & Scholarship

- Awarded INR-10,000+ scholarship and Best Student Award as Department Topper.

International Biomedical Conference, RBU (Aug 2022) – Best Research Poster Award

- Presented novel Point-of-Care Device with ML integration, recognized for innovation and clarity.

TEACHING & MENTORSHIP

Research Mentor, AIM Lab-SCU Jun 2025 – Present

- Leading 5–6 student researchers on Agentic AI projects, guiding code and workflow.
- Organized paper reading groups and explained complex flows via whiteboard sessions.

Teaching Assistant, Algorithms-SCU Sep 2025 – Present

- Assisted in teaching undergraduate Algorithms, covering design and analysis.
- Conducted recitations, workshops, and office hours to support student learning.

Teaching Assistant, Data Structures & Algorithms-RBU Apr 2023 – Jul 2023

- Taught core DS & Algorithms in Java, from arrays to advanced graph-based topics.
- Supervised LLD projects with focus on OOP principles and real-world coding practices.