Sai Vamsi Alisetti

Santa Barbara, California

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Education

University of California, Santa Barbara **Santa Barbara, CA**

Master of Science (M.S.) in Computer Science; GPA: 4.00/4 *Sep. 2024 – Jun. 2026 (expected)*

- ***Courses:*** *Graph ML, Explainable AI, Runtime Systems, Advanced Distributed Systems*

Indian Institute of Technology (IIT), Palakkad **Kerala, India**

Bachelor of Technology (B.Tech.) in Computer Science and Engineering; GPA: 8.64/10 *Jul. 2018 – Jul. 2022*

- ***Courses:*** *Vector Calculus & Liner Algebra, Data Structures, Design & Analysis of Algorithms, Database Management Systems, Operating Systems, Probability & Stochastic Processes, Reinforcement Learning, Artificial Intelligence, NLP*

Work Experience

AirAsia **Bengaluru, India**

Software Development Engineer *Aug. 2022 – Sep. 2024*

- Designed and implemented a **Spring Boot microservice** to reduce data processing time for **10 million routes** from **2 hours** to **10 minutes**, improving the flight search uptime from **99.7%** to **99.98%**. Leveraged MySQL table partitioning and Hikari connection pool for distributed computing.
- Optimized **MySQL InnoDB** settings (read/write threads, log buffer sizes) to align with workload demands, reducing cloud database compute cost by **35%**.
- Built an in-house scheduler platform that provides a scalable solution for management of **Google Cloud** schedulers using **Python**, **GitLab** & **Bash** that increased the team's productivity saving around **10 hours weekly.**
- Engineered a **self-healing platform** using **Google Cloud's serverless functions** and **pub-sub topics** that performs circuit breaking & applies automated recovery actions, reducing platform error rate by **80%**.

Research Experience

Networks Lab, UC Santa Barbara **Santa Barbara, CA**

Research Assistant - Supervisor: Dr. Sanjukta Krishnagopal *Jan. 2024 – Present*

- Designed and implemented traffic network prediction algorithms leveraging covariance metrics, graph theory, centrality measures, and graph shift operators.

Systems & Networking Lab, UC Santa Barbara **Santa Barbara, CA**

Research Assistant - Supervisor: Dr. Arpit Gupta *Sep. 2024 – Present*

- Processed and analyzed 50TB of network packet data using PySpark on the NERSC supercomputing platform to reply it as cross-traffic to simulate bottleneck link behavior in a realistic network emulator.
- Engineered a scalable pipeline to group traffic from hosts sharing routing hops and generated prefix-tree-based cross-traffic profiles at 100ms intervals, achieving a 60% reduction in computational overhead.

Google Summer of Code - Alaska Organization **Anchorage, AK**

Research Intern - Supervisor: Dr. Pradeeban Kathiravelu | Link *May 2024 – Sep. 2024*

- Developed **open source** trace driven **software defined networking emulator** using **Mininet** & **Ryu SDN**, for establishing a global standard testbed for overlay routing algorithms. Leveraged **RIPE Atlas** latency traces to optimize traffic routing in northern Alaska, enhancing **telehealth services** in underserved regions.

CiSTUP Research Group, Indian Institute of Science **Bengaluru, India**

Summer Research Intern - Supervisor: Dr. Tarun Rambha *Jun. 2021 – May 2022*

- Built custom microscopic traffic RL environment using Open AI Gym, PyGame & SUMO simulator.
- Developed cooperative & independent vehicle driving policies using multi-agent reinforcement learning (MARL) algorithms like QMIX & VDN using PyTorch, Ray RLlib, in open & closed traffic systems, achieving a 16% reduction in traffic congestion.
- Developed DQN and PPO-based driving policies using Stable Baselines, TensorFlow, improving collision rates by 23% and average velocities by 28% in microscopic highway traffic scenario.

Infinity Labs, UST Global **Trivandrum, India**

Research Intern *Jun. 2020 – Aug. 2020*

- Performed extensive research on **huggingface library** for transformer models & integrated **SOTA NLP transformers** for **sentence similarity (BERT)** and **paraphrase generation (T5)** into their project development pipeline.
- Developed a **web interface** using **streamlit** and **Flask** for realtime model inference and data collection.

Project Experience

Covariance-Driven Graph Embedding for Real-Time Traffic State Prediction | *Link* *Sep. 2024 – Dec. 2024*
***Supervisor**: Dr. Sanjukta Krishnagopal | Python, PyTorch, Numpy, Pandas, Tensorboard, Git*

- Conceptualized & implemented a novel dynamic traffic forecasting framework using PyTorch by leveraging covariance-based temporal graph embeddings to capture complex spatio-temporal dynamics. Integrated principal eigenvectors for adaptive feature selection and attention mechanisms for spatial correlations, achieving a 21.1% improvement in accuracy on the SZ-Taxi dataset.

Explainable Grounded Segment Anything | *Link* *Sep. 2024 – Nov. 2024*
***Supervisor**: Dr. Misha Sra | Python, PyTorch, Numpy, Pandas, Gradio, Git*

- Constructed an image segmentation pipeline that leverages Grounding DINO and Segment Anything Model (SAM) for text guided image segmentation, using PyTorch and Gradio. It features an explainable interface that overlays the attention maps from the Vision Transformer onto the original image to provide insights into the model's decision-making process.

Adaptive Software-Defined Wide Area Network for Telehealth Access | *Link* *May 2024 – Sep. 2024*
***Supervisor**: Dr. Pradeeban Kathiravelu (Google Summer of Code) | Python, Mininet, RyuSDN*

- Developed **open source** trace driven distributed **software defined networking emulator** using **Mininet** & **Ryu SDN**, for establishing a global standard testbed for overlay routing algorithms. Leveraged **RIPE Atlas** latency traces to optimize traffic routing in northern Alaska, enhancing **telehealth services**.

MultiAgent RL for Cooperative & Independent Behaviours on Highways | *Link* *Aug. 2021 – May 2022*
***Supervisor**: Dr. Tarun Rambha | Python, PyTorch, Ray RLlib, OpenAI Gym, StableBaselines*

- Analyzed and studied novel coordinated MARL algorithms to avoid collisions on highways and dissipating traffic congestion waves in ring road systems. Developed cooperative and independent driving policies in multi agent systems in different traffic scenarios.

Sparse Reward Propagation for Deep Reinforcement Learning | *Link* *Feb. 2021 – May 2021*
***Supervisor**: Dr. Chandrashekar Lakshminarayan | Python, PyTorch, Tensorboard, Numpy*

- Extracted a potential-based reward shaping function automatically from the MDP using a Graph Convolutional Network (GCN) and augmented it on the sparse reward system to propagate rewards and accelerate RL algorithms. Proto Value Functions (PVF) have been used as features into GCN, since PVF form basis of value function space.

Paraphrase Generator with T5 Transformer | *Link* *Jun. 2020 – Jul. 2020*
***Supervisor**: UST Global | Python, PyTorch, Huggingface, Streamlit, Flask*

- Built a paraphrasing model based on the T5 transformer, fine-tuned on Google's PAWS dataset that generates semantically diverse paraphrases. The model incorporates a novel auto-regressive inference technique constrained with semantic similarity thresholding, which enables controlled generation of paraphrases. The model is published on the Huggingface transformer hub and has been cited in multiple research papers listed on GitHub.

IIT Palakkad's Project Allocation Portal | *Link* *Mar. 2020 – May 2020*
***Supervisor**: Dr. Albert Sunny | Node.js, Angular, Express.js, MongoDB, NGINX*

- Developed a smart productivity tool for automating capstone project allocations using a modified Gale-Shapley algorithm to handle two-sided preferences from both students and teachers, ensuring stable matches. Built the web app using **MongoDB**, **Angular**, **Node.js**, **Express.js** and deployed it on the university's server with **NGINX** web server.

Technical Skills

Languages: Python, Java, C, Bash, Javascript
Frameworks: Git, GitLab CI/CD, Spring Boot, Node.js, React, Angular, Agile, PySpark, REST APIs, GraphQL
Computing Environments: Linux/UNIX, Docker, Kubernetes
Databases & Cloud: MySQL, MongoDB, Google Cloud Platform, Redis

Certification/Workshops

Natural Language Processing (*NPTEL*) | *Link* *Jul 2021 – Oct 2021*
HackMIT (*Hackathon - MIT*) | *GitHub* *Sep 2020*
PenApps Hack (*Hackathon - University of Pennsylvania*) | *Link* | *GitHub* *Sep 2020*
Shell Hacks (*Hackathon - Florida International University*) | *Link* | *GitHub* *Sep 2020*
Natural Language Processing in Tensorflow (*Coursera - DeepLearning.AI*) | *Link* *Jun 2020 – Jul 2020*
Neural Networks & Deep Learning (*Coursera - DeepLearning.AI*) | *Link* *Jun 2020 – July 2020*
MindShift (*Coursera - McMaster University*) | *Link* *May 2020 – Jun 2020*

Leadership/Community Involvement

UC Santa Barbara - Undergraduate Curriculum Committee *Jan. 2025 – Present*

Graduate Representative

- Collaborated with faculty members to evaluate and refine the undergraduate Computer Science curriculum.
- Offered insights from a graduate student's perspective, ensuring that course content aligns with current industry trends and academic advancements.
- Advocated for the inclusion of interdisciplinary and modern topics, such as AI, data science, and software engineering, to enhance undergraduate learning outcomes.

IIT Palakkad Alumni Cell | *Link* *Jun 2020 – Jan 2021*

Content Writer - Interviewer - Web Design Team

- Developed yearbook content by interviewing alumni and covering their stories. Reinforced alumni network link by developing a web platform for alumni providing live updates and opportunities for students. Mentored a team of 5 juniors in developing the alumni social network platform using MERN stack.

Robin Hood Army | *Link* *Jul 2023 – Jul 2024*

Volunteer

- Distributed surplus food from restaurants and the community to serve less fortunate people. Taught English/Math to underprivileged kids in government schools.

Sync To Beat - Dance Club | *Link* *Jul 2019 – Jul 2022*

Member

- Organized and performed a flash mob in Prozone Shopping Mall as a part of promoting our Techno Cultural Fest Petrichor
- Secured 2^{nd} place in the Intra-IIT dance competition Naatya 2k20 with Team Mystique, performing a hip-hop dance themed on school life.
- Choreographed and performed Bhangra for the Ek Bharat Shresht Bharat (EBSB) program, an initiative by the Government of India to promote cultural exchange and celebrate India's heritage.