Siddharth Yayavaram

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Education

Carnegie Mellon University — Dec 2026
MS in Computer Science - Machine Learning & Natural Language Processing (**GPA: 4.25/4.0**) — Pittsburgh, PA
Coursework: Advanced Natural Language Processing, Generative AI, Multimodal ML, LLM Systems
Teaching Assistant: Advanced Natural Language Processing (Spring 2026)

Birla Institute of Technology and Science, Pilani — June 2025
BE in Computer Science (**CGPA: 9.97/10**, Institute ***Gold*** Medalist - Rank **1**) — Pilani, India

Publications

CAIRE: Cultural Attribution of Images by Retrieval-Augmented Evaluation. — ICCV'25, EACL'26
CEGIS @ ICCV'25, EACL'26 (Main Conference) | Paper | Code

BERT-based Idiom Identification using Language Translation and Word Cohesion. — LREC-COLING'24
Multiword Expressions and Universal Dependencies @ LREC-COLING | Paper | Code

GameDevBench: Evaluating Agentic Capabilities Through Game Development. — ICML'26 (under review)
International Conference on Machine Learning (ICML 2026)

Experience

Carnegie Mellon University, Machine Learning Department — Pittsburgh, PA
Graduate Student Researcher — Aug 2025 – Present

- Developing `GameDevBench`, a scalable benchmark for evaluating multimodal LLM and computer-use agents (CUAs) in agentic Godot game development, comprising ∼200 tutorial-derived tasks with automated task and test generation.
- Built automated task-quality scoring using pixel-level metadata and VLM-judge-assessment, eliminating manual validation.
- Under review at **ICML** 2026.

Carnegie Mellon University, Language Technologies Institute — Pittsburgh, PA
Research Intern (Undergraduate Thesis), NeuLab | Advisor: Prof. Graham Neubig | Code — May 2024 – Mar 2025

- Built `CAIRe`, a retrieval-augmented evaluation system for cultural attribution in images, grounding visual content via large-scale entity linking. Implemented efficient retrieval over a 6M-entity FAISS index with multimodal SigLIP embeddings, outperforming LVLM baselines on fine-grained object grounding (FOCI benchmark).
- Improved visual entity linking precision by reranking retrieved candidates using text-based semantic disambiguation.
- Showed that `CAIRe` enables open-source VLMs to outperform frontier models on cultural relevance evaluation by conditioning predictions on retrieved cultural context, achieving **+28% F1** and Pearson $r > 0.65$ alignment with human judgments; accepted at **ICCV-W** and **EACL** (Main Conference).

Amazon, Applied Science — Bangalore, India
Summer Intern | Advisor: Abhishek Persad — May 2023 – Aug 2023

- Shipping cost anomaly detection: trained regression models to estimate expected shipping costs beyond a rule-based heuristic, flagging anomalies via prediction residuals and reducing false negatives by ∼25%; deployed via a Django REST API.
- Product entity extraction (NER): fine-tuned a BERT-based token classification model to extract brand and model fields from noisy product webpages, producing structured entities for downstream product knowledge bases.

Nanyang Technological University — Singapore
Research Intern, SpeechLab | Advisor: Prof. Chng Eng Siong | Code — Mar 2024 – Sep 2024

- Built a text-based depression detection system by LoRA-fine-tuning LLaMA-3.1-8B on DAIC-WOZ, reformulating prediction as PHQ-8–aligned symptom scoring for interpretability and structured reasoning; leveraged transcript preprocessing and LLM-based synthetic dialogue augmentation, achieving +7.1% F1 over prior text-only baselines.

Projects

Hybrid Retrieval RAG System with Qwen2.5

- Built a Qwen2.5-7B RAG system using hybrid retrieval (MXBAI dense + BM25 sparse) with RRF.
- Implemented grid-search evaluation over retrieval hyperparameters using accuracy, BLEU, BERTScore, and LLM-as-Judge.

Structured Agentic Reasoning with Diffusion Language Models

- Fine-tuned diffusion language models (Fast-dLLM v2, 1.5B) to act as ReAct agents, generating structured Thought–Action–Observation trajectories and improving tool-call reliability (5% → 60%) while reducing trajectory length (9.2 → 6.4 steps).

Skills

Programming & OS: Python, C/C++, Java, SQL, Linux, Git, REST APIs, High Performance Computing Clusters (HPC)
Libraries & Frameworks: PyTorch, Scikit-Learn, HuggingFace, PEFT (LoRA), FAISS, Django, NumPy, Pandas