

Vijay Chevireddi

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RELEVANT COURSEWORK

Multimodal Foundation Models (CNN, Transformers, RoPE, Flash Attention, Fine Tuning, MAMBA, GPT-1,2,3, Agentic AI, Vision Lang. Models, Variational Auto Encoder, Diffusion Models, Flow Matching, SWIN Transformer, RAG, CLIP, DINO, LLaVA), Natural Language Processing (Audio Signal Processing for ML, RLHF, PPO, DPO, AI Alignment, AI Distillation, BERT, ELMO, RNN, LSTM), Robot Learning (Reinforcement Learning), Perception for Autonomous Robots (Computer Vision), Planning for Autonomous Robots, Control Systems

EDUCATION

University of Maryland, College Park, MD <i>Master of Engineering, Robotics</i> (GPA: 3.77/4.0)	Aug 2023 - Present
Osmania University, India <i>Bachelor of Engineering, Mechanical</i> (GPA: 9.05/10.0)	Aug 2018 - Jun 2022

WORK EXPERIENCE

Fischell Department of Bioengineering - University of Maryland <i>Machine Learning Intern</i> • Implemented YOLOv8 for dredger detection in a University of Maryland initiative to modernize oyster farming, later upgrading to RT-DETR which improved IoU by 6%. • Developed human pose detection for walking style classification using MMPose and a CNN transformer, enhancing classification accuracy and contributing to improved gait analysis.	Jun 2024 - Present
Sai Vamsi Industries <i>Machine Learning Engineer</i> • Integrated a camera-based system using the YOLO framework to detect visual anomalies in press tool machines, showcasing applied computer vision and image understanding skills. • Combined vibration data from Fluke 3561 FC Vibration Sensors with real-time image analysis to enhance defect detection by 5%, demonstrating practical software development and distributed training methodologies.	Jan 2022 - May 2023

PROJECTS

Implementation of GPT and GPT 2 Models from Scratch • Developed a Generative Pretrained Transformer (GPT) model entirely from scratch using PyTorch, implementing core components such as tokenization, self-attention mechanisms, multi-head attention, positional embeddings, and transformer blocks based on foundational deep learning research. • Reproduced a 124M parameter GPT-2 model, including architecture design, model training, fine-tuning, and inference. Optimized training pipelines, configured hyperparameters, and validated model performance against standard language modeling benchmarks.	March 2025
Adaptive Text-to-Command Translation for Robot Navigation Using T5-small [GitHub Link] • Fine-tuned a T5-Small transformer to translate natural language commands into structured navigation plans with 98% test accuracy. • Integrated Low-Rank Adaptation (LoRA) to reduce training parameters by 99.64% while retaining 92.5% test accuracy. • Implemented the resulting NLP model with ROS2 and Gazebo to validate autonomous navigation on a TurtleBot3.	Oct 2024 - Dec 2024
Transformers for 3D Object Detection in LiDAR Point Cloud [GitHub Link] • Developed and trained a custom transformer-based 3D object detection model for LiDAR point clouds on the KITTI dataset. • Combined PointNet++ embeddings with specialized transformer encoders and introduced a novel loss function, achieving a 3D bounding box detection mAP IoU of 0.67—on par with leading benchmarks.	Nov 2024 - Dec 2024
AI learns to Play MARIO Using Deep-Q Learning and SWIN Transformer [GitHub Link] • This project combines DQN with a SWIN Transformer to train Mario-playing AI agent. • Enabling efficient interpretation of complex visuals and achieving a 500-moving average reward of 2700 in just 1250 episodes—far outperforming a model without SWIN.	Mar 2024 - May 2024
Advanced Vision Systems for Autonomous Navigation Using YOLOv5 and Homography [GitHub Link] • Applied homography for dynamic route planning. • Optical flow and YOLOv5 were used to detect obstacles and their velocities in real time, enabling adaptive navigation. • By leveraging projective geometry to locate vanishing points and horizon lines, the robot achieved over 80% successful navigation.	Jan 2024 - May 2024

SKILLS

- **Programming Languages:** Python, C/C++, SQL, MATLAB
- **Tools & Frameworks:** PyTorch, TensorFlow, AWS, SageMaker, SQL, OpenAI Gym, MuJoCo, Langchain, Langgraph, Hugging Face, Docker, Scikit-learn, xgboost, NLTK, Stable-baselines3, ROS2
- **Optimization & Tools:** CUDA, NumPy, Pandas, OpenCV, SciPy
- **Machine Learning & AI:** Machine Learning, Multimodal Machine Learning, RAG, NLP, Finetuning, Distillation, LLM, Vision Language Models, Reinforcement Learning, Distributed Training,