Yashodhan Deepak Hakke

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Education

Virginia Tech University **Aug 2024 – May 2026**
Master of Science in Computer Engineering *Blacksburg, Virginia*

MIT Academy of Engineering **Aug 2020 – May 2024**
Bachelor of Technology in Electronics Engineering *Pune, India*

Experience

Virginia Tech **Oct 2024 – Ongoing**
Graduate Research Assistant *Blacksburg, USA*

- Developed a reinforcement learning-based control policy utilizing Partially Observable Markov Decision Processes (POMDPs) and multi-agent deep Q-learning (MADDPG) to regulate emotional state transitions during calamities and enhance resilience.
- Constructed a multi-time-scale dynamic model using singular perturbation theory, capturing fast and slow emotional dynamics through coupled nonlinear differential equations and stability analysis via Lyapunov functions.
- Designed a decentralized optimal control framework employing model predictive control (MPC) and game-theoretic resource allocation to enhance local stabilization and improve global coordination efficiency.

Devot AI **Nov 2023 – Jul 2024**
Machine Learning Engineer Intern *Bengaluru, India*

- Developed, fine-tuned, and trained large language models (LLMs) such as LLaMA and GPT, achieving a 15% improvement in model accuracy.
- Extensive experience in developing, training, and fine-tuning LLM models, including the use of LoRA (Low-Rank Adaptation) techniques for efficient model tuning. Gained hands-on expertise with vision transformers, enhancing performance on multimodal tasks.
- Implemented SQL queries for data extraction and analysis, using Snowflake for efficient data warehousing. Integrated cloud tools to scale data analysis and optimize model training pipelines.

Ankureto Store **Oct 2021– Jan 2022**
Web Developer Intern *Pune, India*

- Developed an e-commerce website for Ankureto Store, improving online sales by 25% and user engagement by 40%, using a tech stack of React, HTML, CSS, JavaScript, and GitHub.
- Optimized website performance, reducing page load time by 50% and enhancing site functionality with seamless front-end and back-end integration, resulting in a 20% improvement in overall performance.

Projects

LAGORI ROBOT | *Abu Robocon* **Aug 2021 – Jun 2022**

- Designed and built two Lagori Robots inspired by the Indian game Lagori for Abu Robocon 2022, an international tournament with global participation.
- Implemented YOLO for object detection, achieving 95% accuracy in real-time tracking. Worked on advanced electronics by actuating various motors with Raspberry Pi and Arduino, optimizing actuation to increase response speed by 20% through precise force calculations.

RideX | *Major Project* **Aug 2022 – Jul 2023**

- Developed a unified transport system that consolidates public and private services, reducing average travel time by 25% and transportation costs by 15%.
- Optimized the A* algorithm to traverse a dataset of transits and provide optimal path and transit solutions, combining both private and public transport to enhance user convenience.
- Utilized knowledge graphs to map relationships across 50+ transport sources, enabling dynamic transitions, real-time decisions, and improved route accuracy, enhancing travel efficiency and user experience.

MediMate | *Research Project* **Jun 2023 – Dec 2024**

- Developed a medical chatbot leveraging BioBERT to simulate doctor-patient interactions with high accuracy, ensuring precise understanding of medical terminology and diagnoses.
- Applied Deep Question Generation techniques to enhance the chatbot's ability to assess patient symptoms, achieving a 20% improvement in query relevance and contextual understanding.
- Fine-tuned BioBERT on curated medical datasets for reliable and context-aware diagnostic suggestions tailored to medical domain requirements.

DocuQ&A | *Personal Project* **Aug 2024 – Sep 2024**

- Developed a system to parse data from PDFs and answer user queries using the GraphRAG technique, integrating pipelines like Rewoo and React agents for scenario-specific handling.
- Implemented Claude AI in the backend to enhance natural language understanding and response generation, leveraging large language models (LLMs) for real-time query responses.
- Built a user-friendly Gradio interface, enabling PDF uploads and interaction through a chatbot with optimized query responses based on parsed data.

GraphDocuMind | *Personal Project* **Feb 2025 – Mar 2025**

- Designed a graph-based workflow using LangGraph to define modular actions (nodes) and decision flows (edges), integrating Mistral (via Ollama) for text generation and customized prompts to improve accuracy and relevance of responses.
- Built a hybrid retrieval system combining Nomic Embeddings for semantic document search and Tavily API for real-time web results, with LangSmith integrated to monitor, debug, and optimize the end-to-end flow.

Technical Skills

Languages: Python, Kotlin, Matlab, Java, C, HTML/CSS, JavaScript, Typescript, React, Node.js, SQL; **Developer Tools**: VS Code, Google Cloud Platform, AWS, Android Studio; **Frameworks**: TensorFlow, scikit-learn, PyTorch, OpenCV, NLTK, Langchain; **Specialized Skills**: Reinforcement Learning, Control Theory, Deep Learning, AWS, MongoDB; **Domains**: Artificial Intelligence and Machine Learning, Robotics, Control Systems