Madhav Rapelli

madhav.rapelli@stonybrook.edu | linkedin.com/in/madhav-rapelli | github.com/MadR7

Education

Stony Brook University – *BS in Computer Science* **Expected May 2028**

- **Coursework:** Data Structures and Algorithms, Object Oriented Programming, Linear Algebra, Discrete Math

Experience

Nylock Nuts Robotics **March 2024 – Present**
Robotics Instructor *Jericho, NY (Hybrid)*

- Teaching a new competitive VEX Robotics team to design, build, program and document robots focusing on Design, C++ Programming involving motion control and position tracking.
- Led the team to be ranked 13 in their division in the Middle School VEX Worlds Championship in their first season competing (Top 0.01% of all Middle School VEX Robotics teams **worldwide**).

Competitive VEX Robotics **September 2021 - May 2024**
Lead Programmer *Farmingdale, NY*

- Developed a robotics program utilizing C++ and the PROS (Purdue Robotics Operating System) framework. Implemented features including motion control algorithms, real-time position tracking, robot localization using distance sensors, and multi-threaded operations to enhance robot performance.
- Led my team to win a dozen awards over our high school career ranging from regional to the international level. We also ranked in the top 0.005% of VEX Robotics teams **worldwide** in 2024.

Projects

MazeSolver

- Developing an adaptive maze-solving agent in Python, using Gymnasium for custom dynamic environments and PyTorch to implement a Deep Q-Network (DQN) with experience replay, epsilon-greedy exploration, and target networks for stability.
- Utilizing libraries like NumPy for computations, Matplotlib for real-time metric visualization, Pygame for environment rendering, and PyQt5 for an interactive GUI, allowing real-time adjustments to the maze environment.

DocSage

- Developing a web application for intelligent document analysis, featuring PDF upload, storage in AWS S3, and an interface for document management and interaction.
- Implementing a text processing pipeline with OpenAI embedding models, document chunking, and vectorization techniques using PineconeDB for efficient storage and retrieval.
- Utilizing OpenAI's language models to create a chatbot that responds to document-specific queries, helping users better understand their documents.

AskTheBot

- Developed a web application that analyzes articles from any URL and enables user queries about the content
- Leveraged Meta's LLAMA 3 8b language model for article comprehension and question-answering capabilities. Utilized Upstash's free LLM service for this application.

Robot Tour

- Worked in a two-person team to design and build a custom robot for Science Olympiad using CAD software and 3D printing for the chassis.
- Integrated an Arduino Uno and servo motors, implementing a PID algorithm for accurate path following.
- Placed in the top 15% at our regional competition.

Skills

Programming Languages: Python, C++, Java, Javascript, Typescript, CSS
Technologies: Git, Linux, AWS S3, Arduino
Frameworks: PROS, Next.js, React, Tailwind, Drizzle ORM, PyTorch