Praveen Natarajan

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Education

University of Illinois Urbana-Champaign | B.S. Computer Engineering *August 2022 - May 2026*

Relevant Coursework: Autonomous Vehicles, Operating System Design, Computer Systems Engineering, Deep Learning for Computer Vision, Applied Machine Learning, Algorithms, Data Structures, Independent Research Study

Work Experience

Systems Engineering Intern | NXP Semiconductors | Austin, TX *May 2025 - August 2025*

- Developed a Python Retrieval Augmented Generation (RAG) application using LangChain to cross-verify register bitfield attributes between Verilog RTL and hardware documentation, enhancing validation accuracy and automation
- Engineered timestamp validation scripts in Bash to ensure simultaneous updates between RTL and XML specification files
- Identified synchronization errors between RTL and XML using the scripts, confirming a $400K reset-bit mismatch in ROM

Safe Autonomy Course Assistant | University of Illinois | Urbana, IL | publish.illinois.edu/safe-autonomy *August 2024 – May 2025*

- Guided students in deploying a $100k autonomous research vehicle to navigate a course, adhering to traffic and safety scenarios
- Conducted office hours and graded various computer vision and autonomy assignments focusing on safety principles and controls
- Refined course content and assessments to enhance understanding of autonomous systems, machine learning, and safety concepts

Robotics Research Intern | University of Illinois | Urbana, IL | auvsl.ise.illinois.edu *January 2023 – May 2025*

- Accelerated AI lane detection algorithm training by using Python to process 1800+ vehicle data frames leveraging OpenCV for edge detection, image segmentation, and feature extraction to generate JSON training sets
- Optimized a novel Fuzzy control system for skid-steer vehicles by translating MATLAB algorithms into C++ code, validating with over 4 million parameter combinations to ensure fidelity between simulation models and real world performance
- Improved robotic path planning efficiency by 50% by enhancing a Dstar algorithm that integrated incremental replanning with simulated LiDAR data to optimize obstacle avoidance and goal-directed navigation in changing environments

Software Engineering Intern | Sevanun | San Diego, CA *May 2024 – December 2024*

- Developed a Central and Peripheral gateway hub for medical devices using Bluetooth Low Energy (BLE) with the Nordic NRF52 development kit in C, facilitating communication from the devices to the cloud and ensuring centralized patient monitoring
- Implemented BLE client interfaces for 3 medical sensors (infrared thermometer, blood pressure monitor, pulse oximeter) using GATT specifications, handling connection establishment, characteristic discovery, and data parsing in real time
- Documented and designed a multi-channel UART protocol using Zephyr RTOS for concurrent sensor data transmission to the BLE embedded system hub, increasing throughput by 300% over the previous single-connection model

Project

Autonomous Polaris GEM Vehicle | pnatarajan123.github.io/projects/GEM | *Python, OpenCV, ROS, Gazebo* *January 2024 – May 2024*

- Achieved 100% accuracy in waypoint navigation by developing a lane detection algorithm with OpenCV, integrating gradient and color thresholding, perspective transformation, and polynomial fitting with ROS for real-world and simulated scenarios
- Optimized autonomous navigation to complete a 1-mile simulated track in under 130 seconds by developing fine-tuned lateral and longitudinal controllers for the GEM car, integrating vehicle models and control theory for efficient path traversal
- Engineered a high precision Monte Carlo Localization (MCL) system in Python within a ROS and Gazebo simulated environment, leveraging advanced techniques in probabilistic robotics, sensor fusion, and particle filter optimization

Awards

AFA CyberPatriot Champion: Won national Linux cybersecurity competitions testing bash, sysadmin, forensics, and operating systems
National Cyber Scholarship: Winner of $2500 Capture the Flag programming and cybersecurity competition
Tau Beta Pi: Awarded to top 10% of graduating class by GPA - Company Outreach Committee
James Scholar Recipient: For Excellence in Academic and Extracurricular Involvement

Skills

Hardware: Altera Quartus, Vivado, Xilinx Vitis, Cisco Packet Tracer, Gazebo Simulator, Fusion 360, PTC Creo, Onshape
Libraries: OpenCV (Computer Vision), PyTorch, TensorFlow, BLE (Bluetooth Low Energy), ROS (Robot Operating System)
Languages/OS: Python, C, C++, MATLAB, SystemVerilog, RISC-V, Bash, Linux