

PRAVEEN NATARAJAN

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EDUCATION

University of Illinois Urbana-Champaign

Expected: May 2025

Bachelor of Science in Computer Engineering

GPA: 3.76

Relevant Coursework: Data Structures, Autonomous Vehicles, Digital Systems, Computer Systems & Programming, Engineering Probability, Computational Linear Algebra, Calculus 1-3, Differential Equations

RELEVANT EXPERIENCE

Autonomous and Unmanned Vehicle Systems Laboratory

January 2023 – Present

Autonomy Researcher

Urbana, IL

- Enhanced a D-star navigation algorithm for robotic path planning by integrating incremental re-planning with real-time LiDAR and sensor data, improving obstacle avoidance and goal-directed navigation
- Modeled the incremental re-planning D-Star code in MATLAB/Simulink to quantify the performance improvements of the proposed navigation algorithm and translated simulations to C++ with Gazebo/ROS
- Spearheaded collaboration with graduate students to test, validate, and process 1800+ frames of real-world vehicle navigation data into a JSON file using Python to train artificial intelligence navigation algorithm

Illini RoboSub

December 2022 – Present

Software Engineer

Urbana, IL

- Led the computer vision team of 10 in developing object tracking algorithms with simulated Zed X camera and Gazebo
- Created mission planning strategies for 4 key tasks, enhancing decision-making in real-time simulation scenarios
- Developed SLAM algorithms to map environment markers and robot positions using ROS2 and camera data

Air & Space Forces Association

June 2020 – May 2022

CyberPatriot Competitor

San Diego, CA

- Placed #1 nationally in Linux/Windows System Administration and cybersecurity competitions that utilized Bash scripting, Group Policy, network administration, and forensic analysis
- Competed in 15+ Capture the Flag (CTF) competitions and used Red Team/Blue Team exercises that trained security concepts like decryption, web exploitation, Unix, vulnerability hardening, and system knowledge
- Created Bash scripts that secure Linux machines by automating hardening processes, including user permissions, password policies, port scanning, firewall configuration, software updates, and application security

PROJECT EXPERIENCE

Autonomous Polaris GEM Vehicle | Python, OpenCV, ROS, Gazebo [\[Link\]](#)

January 2024 – Present

- Developed AI lane detection algorithm in Python and OpenCV for self-driving Polaris GEM car by integrating gradient/color thresholding, perspective transformation, and polynomial fitting with ROS for real world and simulated scenarios
- Created lateral and longitudinal fine-tuned vehicle controllers for the GEM vehicle, integrating vehicle models and control theory to navigate a real track in under 130 seconds, achieving 100% accuracy in waypoint navigation
- 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

Bit-Serial Computer | Altera Quartus, SystemVerilog, Vivado [\[Link\]](#)

January 2024 – February 2024

- Engineered a computer module capable of performing 8 bitwise operations using digital logic chips and breadboards
- Created 4 core computer components (register, computing, routing, and control units) with muxes, counters, and registers
- Drafted detailed schematics in Altera Quartus and ran waveform simulations to optimize efficiency and validate circuit
- Implemented and optimized processor functionality for AMD's Spartan-7 FPGA, leveraging SystemVerilog with Vivado

Raspberry Pi People Counter | Python, OpenCV [\[Link\]](#)

January 2023 – May 2023

- Designed cost-effective people detection algorithm using OpenCV and Haar-Cascades for quick object tracking
- Incorporated highly accurate directional movement analysis to distinguish between entering and exiting people
- Developed monitoring interface featuring video display, control settings, and data-driven insights on occupancy

HONORS AND AWARDS

- 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** - For Excellence in Academic and Extracurricular Involvement

SKILLS

- Languages:** Python, C/C++, HTML/CSS/JavaScript, Bash, MATLAB, SystemVerilog, LC3 Assembly, Linux/Unix
- Simulation:** Altera Quartus, Vivado, Cisco Packet Tracer, Gazebo, Fusion360, PTC Creo, Onshape
- Developer Tools:** Github, Valgrind, VS Code, PyCharm, IntelliJ, Jupyter Notebook
- Libraries:** OpenCV (Computer Vision), ROS (Robot Operating System), PyTorch, Numpy