

PRAVEEN NATARAJAN

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EDUCATION

University of Illinois Urbana-Champaign

Expected: May 2026

Bachelor of Science in Computer Engineering

GPA: 3.76

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

WORK 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 50% 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 lane detection algorithm

Air & Space Forces Association

June 2020 – May 2022

CyberPatriot Competitor

San Diego, CA

- Achieved national recognition by securing the #1 spot in Linux/Windows System Administration and cybersecurity competitions, showing expertise in Bash scripting, Group Policy, network administration, forensic analysis, and Operating System knowledge
- Enhanced cybersecurity skills by participating in over 15 Capture the Flag (CTF) competitions, employing Red Team/Blue Team exercises to master security concepts such as decryption, web exploitation, Unix, vulnerability hardening, and system knowledge
- Strengthened Linux machine security on 3 distributions by developing Bash scripts that automate hardening processes, focusing on user permissions, password policies, port scanning, firewall setup, software updates, and application security

PROJECT EXPERIENCE

F1TENTH Autonomous Vehicle System | Python, OpenCV, ROS, Gazebo

March 2024 – April 2024

- Implemented line following algorithm for the F1Tenth Autonomous vehicle using Intel RealSense depth camera and computer vision for lane feature extraction, achieving a 95% accuracy in real time navigation along a track
- Refined track pathing with a PID controller, boosting agility and safety by dynamically adjusting velocity and steering angle
- Enabled LiDAR-based obstacle avoidance by analyzing PointCloud data and stopping the vehicle at a safe braking distance

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

January 2024 – March 2024

- Developed 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

SLC3-ISA (Simple Little Computer 3) 16-bit Microprocessor | SystemVerilog, Vivado [\[Link\]](#)

January 2024 – February 2024

- Developed a processor featuring a 16-bit Program Counter, 16-bit Instructions, and 16-bit Registers using SystemVerilog in Xilinx Vivado for the AMD Spartan-7 FPGA
- Designed a Finite State Machine (FSM) for 11 unique 4-bit opcodes to execute 16-bit instructions on FPGA on-chip memory
- Created Datapath (SRAM, ALU, etc.) and the Finite State Machine (Fetch, Decode, Execute) for managing CPU architecture

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 bi-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
- 2023 James Scholar Recipient** - For Excellence in Academic and Extracurricular Involvement

SKILLS

- Programming:** Python, C, C++, MATLAB, OpenCV, ROS, Bash, Linux/Unix, SystemVerilog, Verilog, LC3 Assembly
- Simulation:** Altera Quartus, Vivado, Xilinx Vitis, Cisco Packet Tracer, Gazebo, Fusion 360, PTC Creo, Onshape
- Libraries:** OpenCV (Computer Vision), ROS (Robot Operating System), PyTorch, Numpy
- Developer Tools:** Git, Github, Docker, VSCode, Jupyter Notebook