

PRAVEEN NATARAJAN

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EDUCATION

University of Illinois Urbana-Champaign | B.S. Computer Engineering | GPA: 3.86

August 2022 - December 2025

Current Coursework: Operating Systems, Algorithms, Machine Learning Programming Methods

Past Coursework: Data Structures, Digital Systems, Principles of Safe Autonomy, Engineering Probability, Numerical Methods

WORK EXPERIENCE

Safe Autonomy Course Assistant | University of Illinois | Urbana, IL | publish.illinois.edu/safe-autonomy

August 2024 – Present

- 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

Software Engineering Intern | Sevanun | San Diego, CA

May 2024 – Present

- 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

Robotics Research Intern | University of Illinois | Urbana, IL | auvsl.ise.illinois.edu

January 2023 – Present

- 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

PROJECTS

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

FPGA Rhythm Game | SystemVerilog, C

March 2024 - April 2024

- Implemented a mouse clicking rhythm game using a SoC (Microblaze processor) on an AMD Spartan 7 FPGA board
- Interfaced FPGA with a VGA graphics controller in SystemVerilog and C to display 3 different alternating rhythm game elements
- Engineered an IP core for real time audio processing and streaming to mesh game soundtracks with player actions using BRAM

Simple Little Computer 16-bit Microprocessor | pnatarajan123.github.io/projects/SLC3 | SystemVerilog

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

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