Arpan Swaroop

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Education

University of Illinois at Urbana Champaign Urbana Champaign, IL

B.S. Computer Engineering, Grainger College of Engineering *Aug. 2021 – May 2025*

Relevant coursework: Computer Systems Engineering, Database systems, Intro to Artificial Intelligence, Multimedia Signal Processing, Data structures and Algorithms, Digital Systems Laboratory, Computer Systems and programming, Analog Signal Processing, Linear Algebra with Python Applications, Introduction to Computing

Technical Skills

Languages: Python, C/C++, SQL (MySQL), JavaScript, HTML/CSS, System Verilog, x86 asm, Golang
Technologies: React, Node.js, Express, Google Firebase, ROS, Nav 2, pandas, Matplotlib, FPGA
Developer Tools: Git, Docker, VS Code, Linux

Experience

Research Assistant Feb 2023 – Present

Advanced Controls laboratory

- Implemented path planning algorithms in quad-copters, to allow for autonomous flight
- Developed these algorithms using Euclidean signed distance fields for fast and flexible local planning
- Implemented the rapidly exploring random trees algorithm for efficient path planning
- Utilized **ROS** to integrate the depth sense cameras used for localization and planning
- Developed on the Nvidia Xavier nx platform

Illini Robotics in Space autonomous team Aug 2022 - Present

University of Illinois at Urbana Champaign *Champaign, IL*

- Specialised in writing code which allowed a lunar rover to navigate a lunar environment autonomously In order to participate in the Lunabotics competition hosted by NASA
- Contributed to a physics simulation model of the robot in Gazebo
- Configured odometry to aid in the simultaneous localization and mapping of the robot
- Configured a cost-map using the **Nav 2** library in the **ROS** ecosystem
- Configured **Nav 2** plugins, and a behavior tree, to utilize navigation algorithms and complete navigation tasks

Projects

Unix Like 32-bit x86 Operating System | *C, x86 asm*

- Implemented support for round-robin process scheduling policy, with terminal switching
- Supported virtual memory using paging data-structures, and implemented a readable file system
- Supported system calls such as Execute, Halt, and Vidmap
- Created device drivers for keyboard, Real Time Clock, Programmable Interrupt Controller, and Programmable Interval Timer

Game Developer's toolkit | *Javascript, HTML, CSS, Node.js, Express, MySQL, Python*

- Developed full-stack web application using a steam game database to help game developers
- Implemented multiple advanced queries to the database to output useful information for game developers
- Implemented interactive graphs in **Python**, showing helpful patterns in game data across all steam games
- Added features to enable user sign in and login, and the ability to add other users as friends
- Utilized a **REST API** made with **Node.js** and **Express**
- Hosted website on the Google Cloud Platform

Wikipedia graph analysis | *C++*

- Analyzed a directed unweighted graph based on 4 million Wikipedia pages to create a "you might also like" tool
- Implemented the BFS algorithm, to trim and process the dataset
- Used the Brandes algorithm to efficiently calculate betweenness centrality for each node, utilizing this to return a related topic to two wikipedia pages inputted by a user
- Used Kosaraju's algorithm to find strongly connected components in the graph

Chat-App | *Golang, javascript, HTML, CSS*

- Created a simple chat-app utilizing a backend http web-server written in Go
- Utilized **web-sockets** with **Go-routines** and **Go-channels** to allow multiple users to connect to the server
- Utilized javascript, HTML, CSS to create dynamic webpages served from the web server