Pushkar Dave

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SKILLS

Programming: Python, C, C++, MATLAB, C#, Bash, Git, Linux
Robotics: ROS1, ROS2, CoppeliaSim, Gazebo, Unity, RViz
Libraries: NumPy, Matplotlib, SymPy, ModernRobotics

EDUCATION

Northwestern University   **September 2024 - Present**
Master of Science in Robotics   *Evanston, IL, USA*

Visvesvaraya National Institute of Technology   **December 2020 - May 2024**
Bachelor of Technology in Electrical and Electronics Engineering   *Nagpur, India*

EXPERIENCE

Multi-robot Systems Group, Czech Technical University   **May 2023 – September 2023**
Research Intern   *Advisor: Dr. Martin Saska*

- Developed an estimation algorithm to predict the position of a focal UAV within a swarm
- Integrated the novel UVDAR localization system and applied sensor fusion using Linear Kalman Filter

IvLabs, VNIT   **July 2021 – October 2021**
Summer Intern   *Advisor: Dr. Shital Chiddarwar*

- Studied the architecture of convolutional neural networks, and built an MNIST digit classifier from scratch
- Developed and implemented an image denoising autoencoder model on the MNIST dataset using PyTorch

PROJECTS

Whack A Mole with 7-DOF Robot Arm   **November 2024 - December 2024**

- Led a team of 4 to develop a Python, ROS2 package for a Franka 7-DOF robot arm to play a whack-a-mole game
- Set up serial communication between a ROS2 node and Arduino to actuate a servo-controlled hammer end effector
- Wrote a custom Python wrapper for the MoveIt2 API to plan, inspect, save and modify the robot's trajectories

Feedback Control of Omnidirectional Mobile Manipulator   **October 2023 - November 2023**

- Generated a trajectory for the end effector of a 5-DOF robot arm to perform a pick-and-place task
- Simulated the kinematics of the omnidirectional robot using odometry equations to determine its next configuration
- Implemented a feedforward PI controller to minimize the error between the current and desired robot states

Multibody Dynamics Simulation   **November 2024 - December 2024**

- Modeled a free falling jack and box system using Lagrangian mechanics
- Simulated and animated impacts between the jack and box using Runge-Kutta integration

Sequential Planner for Multi UAV Mobility   **August 2023 - December 2023**

- Designed a high-level sequential approach to prevent collisions between UAVs operating in the same airspace
- Tested the approach in multi-robot ground and aerial environments in MATLAB

ESP32 based Navigation Device   **March 2023 - May 2023**

- Developed a program to showcase dynamic animations synchronised with audio signals using an ESP32 and LED Matrix
- Integrated the Waze navigation app as an audio source to transmit signals to the ESP32

Quadrotor Control and Trajectory Generation   **December 2021 - January 2022**

- Created a PD control system for 2D and 3D quadorotor control in MATLAB
- Generated and simulated minimum snap trajectory using seventh order polynomial for the quadorotor model