Manan Patel

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EDUCATION

- **Georgia Institute of Technology,** Atlanta, GA — Fall 2021 – Spring 2023
  - **M. S. in Robotics** – GPA: 3.61 / 4.0
- **Purdue University,** West Lafayette, IN — Fall 2018 – Fall 2020
  - **B. S. in Mechanical Engineering** – GPA: 3.87 / 4.0

SKILLS

- **Software:** C/C++, Python, PyTorch, ROS, MATLAB, Unity, OpenGL, Simulink, SOLIDWORKS
- **Computer Vision:** SIFT, Depth from Stereo, Image classification/segmentation (ResNet, PSP net)
- **Machine Learning:** knn, k-means, GMM, Decision Trees, Neural Nets, Bayes Nets, HMM, Viterbi
- **Graph Search:** UCS, A*, Constraint Satisfaction, RRT, RRT*
- **Deep Learning:** Reinforcement Learning, CNNs
- **Parallel Processing:** MPI, threads, OpenMP, CUDA, TCP/IP
- **Mechanics**: Lagrangian Mechanics, Forward and Inverse Kinematics, Path Planning for manipulators
- **Control Systems**: PID, System ID, LQR, Extended Kalman Filter, Assembly language (Keil)

WORK EXPERIENCE

- **Control Systems Engineer Co-op (Python, Arduino) –** SharkNinja R&D, MA — June 2023 – Dec 2023
  - Contributed to developing a state machine for automatic coffee system
  - Developed customized least squares to predict set of parameters to dispense good coffee based on TDS
  - Involved with controller development for temperature of boiler
  - Automated iteration and testing for preliminary prototype products
- **Robotics Engineer Intern (3D Computer Vision) –** Equipment Share, MO — May 2022 – Aug 2022
  - Developed computer vision pipeline for safety vest detection and depth estimation using stereo
  - Camera calibration and image rectification to undistort images
  - Color filtering to segment out safety vest colors under different lighting conditions
  - Performed one to one feature matching between keypoints in left and right camera images using SIFT
  - Estimated depth of the matched keypoints by triangulation
  - Incorporated multi-threading to boost performance

PROJECTS

- **3DOF Manipulator Dynamics and Control (MATLAB, Simulink)** — Fall 2022
  - Deployed joint PD feedback control to achieve reference trajectory within error bounds
  - Applied gravity compensation using LaGrange's equations of motion
  - Computed the torque required at each joint using Jacobian matrix for the manipulator
- **Reinforcement Learning Based Wall Follower Robot (ROS, Python)** — Fall 2022
  - Designed a neural network to learn policy for following a wall using LiDAR data as input
  - Simulated and trained Turltebot3 robot in gazebo using custom world using REINFORCE algorithm
  - Performed online update of weights to reduce sim to real gap and account for changing dynamics
- **High Performance Computing (C++, MPI)** — Spring 2022
  - Solving N-Queens problem using multi-threading
  - Simulating John Conway's game of life using custom MPI datatypes, communicators and cartesian topologies
- **Multi-modal Sensing and Navigation on Turtlebot3 (ROS, Python)** — Fall 2021
  - Implemented Dead Reckoning to navigate robot through a maze based on sensory input (Lidar, Camera)
  - Designed algorithms for dynamic and static obstacle avoidance, detect and follow a particular object
  - Incorporated control architecture to regulate the movement of the robot
- **Controller Design for an Air Engine (PID, STM32, Simulink)** — Fall 2020
  - Developed a PI controller to regulate the speed of a miniaturised air engine
  - Involved System ID, Controller Design, Simulation using Simulink, and Implementation