

# Manan Patel

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## EDUCATION

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- **Georgia Institute of Technology, Atlanta, GA** Fall 2021 – Spring 2023
  - **M. S. in Robotics** – Major GPA: 4.0 / 4.0
- **Purdue University, West Lafayette, IN** Fall 2018 – Fall 2020
  - **B. S. in Mechanical Engineering** – Major GPA: 3.9 / 4.0

## SKILLS

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- **Programming:** C/C++, Python, PyTorch, ROS, MATLAB, Unity, OpenGL
- **CAD:** SOLIDWORKS
- **Parallel Processing:** MPI, std::thread, OpenMP, CUDA
- **Artificial Intelligence:**
  - **Graph Search:** Uniform Cost Search (UCS), Bi-directional UCS, A\*, Bi-directional A\*
  - **Path Planning:** RRT, RRT\*
  - **Reinforcement Learning:** Q-learning, Value iteration, Policy iteration, A2C, Constraint Satisfaction
  - **Probability:** HMM, Viterbi algorithm, Bayes networks
- **Computer Vision:**
  - **Classical:** SIFT descriptors, Depth from stereo
  - **Machine Learning:** Image classification using (custom NN, RESNET), Image segmentation (PSPNet)
- **Other skills:** Mechatronics (assembly, sensors, actuators), TCP/IP, I2C, SPI

## WORK EXPERIENCE

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- **Robotics Engineering Intern (3D Computer Vision)** – Equipment Share, MO Summer 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

## RESEARCH PROJECTS

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- **Neural Network Based Wall Follower Robot (Deep RL, Gazebo, ROS)** Fall 2022
  - Designing a neural network to learn policy for following a wall using LiDAR data as input
  - Perform real time weight update to reduce sim to real gap and account for changing dynamics

## ACADEMIC PROJECTS

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- **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

## LEADERSHIP EXPERIENCE

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- **Lab Teaching Assistant** – Electrical Engineering Fundamentals Lab, Purdue Aug 2019 – Dec 2020
  - Analyse and debug errors in audio amplifier circuits and validate its source