# Deep Patel

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## EDUCATION

**Birla Institute of Technology and Science, Pilani** 08/2018 – 05/2022
Bachelor of Engineering in Mechanical GPA: 8.28/10.00
**Coursework:** Internet of Things, Computer Programming, Applied Statistical Methods, Linear Algebra and Complex Analysis, Differential Equations, Applied Calculus, Computer Aided Design

## WORK EXPERIENCE

**Robotics Software Developer** – Geometric Vision team 06/2023 – present
vimaan.ai Bengaluru, India
- Developing the core software for LiDAR based industrial pallet dimensioning of high business value in a team of 3.
- Automated the LiDAR extrinsic calibration using Python and ROS for the industrial pallet dimensioning product which reduced the installation time from 1 week to 3 hours.
- Setup the CI pipeline with linting, unit testing and build automation on GitLab as part of reliability enhancements.
- Led and managed sprints on Jira using Agile methodology.

**Autonomy and SLAM Engineer** – Navigation team 08/2022 – 06/2023
vimaan.ai Bengaluru, India
- Integrated 2D Cartographer SLAM with fiducial marker (ArUco) detection to get reliable odometry source crucial to get location information for mobile platform products used for inventory counting. Achieved location accuracy within 10cm.
- Proposed and implemented a position data-based validator in Python that halts incomplete data points in a multi-camera capture system which reduced the Root Cause Analysis (RCA) workload and increased the object count accuracy by 10%.
- Created the Docker container for server-side data aggregation microservice.
- Implemented an application health monitoring system in Python and connected it with alerting service using Kafka to track production issues.

**Undergraduate Research Assistant** 01/2022 – 05/2022
Embedded Systems and Robotics Lab, BITS Pilani Pilani, India
- Accomplished plane segmentation using RANSAC from depth images of Kinect sensor for indoor features such as doors, windows, and elevators which accelerated object detection by cropping RGB images in mask of plane.
- Transformed pointclouds to global SLAM map for visualization marker placement in RViz to add semantics like text and room numbers for mapping in indoor SLAM.

**Research Intern** 06/2021 – 03/2022
Robotics Research Center, IIIT Hyderabad Hyderabad, India
- Designed a multi-functional gripper for drone which can grasp objects (8cm to 20cm diameter), perch passively onto a support and act as a landing gear for drone.
- Fabricated 2 prototypes ground-up by 3D-printing and laser cutting, capable of lifting 1.2kg payload during flight.
- Achieved adaptive landing with the motor control using ESP8266 for inclined terrain and passive perching on cylindrical supports.

## PROJECTS

**Quadruped Robot** 09/2019 – 11/2020
(Robotics Team) ROBOCON, BITS Pilani Pilani, India
- Developed a simulation of a trotting quadruped robot in Gazebo ROS. The project raised INR 200k (USD 2400) in funding from BITS Alumni Association (BITSAA) for prototyping.
- Implemented five gaits and leg kinematics in Python, making the robot fully capable of stable motion within a range of variable speeds based on MIT Cheetah research – 'High speed Trot Running'.
- Created a smooth trajectory for each footstep using Bezier curves and architected the overall control flow for walking in ROS.

**Flipkart GRID 3.0 Robotics Challenge - competition** 09/2021 – 10/2021
BITS Pilani Pilani, India
- Implemented A* search path planning algorithm in MATLAB for 4 mobile robots controlled centrally in a leader-follower configuration for a relay race.
- Achieved both dynamic and static obstacle avoidance by developing a custom path planning algorithm merging A* search and Artificial Potential Fields (APF) to navigate 4 mobile robots in 2D space.

**Smart Traffic Management** 02/2021 – 04/2021
Internet of Things – course project, BITS Pilani Pilani, India
- Implemented object detection and segmentation using transfer learning with YOLOv4 model to determine traffic density at a road crossing along with emergency vehicle detection.
- Built a webpage to show live traffic data with vehicle count plot and location using Google maps API with a HTML, CSS frontend and Flask backend hosted on AWS.
- Achieved dynamic switching of traffic lights based on traffic density from live object detection running on Raspberry Pi.

## SKILLS

**Programming Languages:** Python, C/C++
**Software tools:** Gazebo, Git, Docker, Solidworks, Fusion 360, MATLAB
**Libraries:** Robot Operating System (ROS), OpenCV, NumPy, Pandas, Open3D, Tensorflow, PCL
**Hardware Platforms:** NVIDIA Xavier, LiDAR, Intel D455, Kinect, Raspberry Pi, Arduino

## CERTIFICATIONS

**Robotics: Computational Motion Planning**, Coursera – University of Pennsylvania [certificate]
**Python for Everybody: Introductory course**, Coursera – University of Michigan [certificate]

## ACTIVITIES & LEADERSHIP ROLES

**Mechanical subsystem Head**, College Robotics Team (ROBOCON), BITS Pilani 08/2020 – 05/2021
**Coordinator – Arduino Workshop**, College Robotics Team (ROBOCON), BITS Pilani 09/2019