

# Candidate 9

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May 2024 graduate seeking full-time opportunities in Robotics & AI

## Experience

### Brainchip, Robotics & AI Solutions Architect Intern | Remote

May 2023 - Aug 2023

- Developed and deployed **RL** models for robotic systems, integrating **physics engines** to solve real-world problems.
- Drove advanced solutions, optimizing robotic platform performance and stability through **ML-driven control systems**.

### NICE Lab – Stretch RE1, Research Volunteer (Prof. Zhe Xu) | Arizona, USA

Jan 2023 - Present

- Develop and evaluate differential control synthesis algorithms for multi-agent systems.
- Conduct perception and RL research with the Hello Robot, focusing on causal inference and counterfactuals for RL.

### Indian Institute of Technology Bombay, Robotic Software Engineer Intern | Remote

May 2020 - July 2020

- Led an 8-person team to develop a **fiducial-marker-based localization** model for an unstable camera feed.
- Optimized the localization model using **V-rep** for real-time camera feeds, achieving a calibration error of  $\leq 0.5\%$ .
- Designed a rule-based visual scripting framework for configuring **auto-evaluators** through **B0RemoteAPI** for evaluation.
- Incorporated a **unit testing** framework with automated test cases to validate the auto-evaluator model.

### e-Yantra – Quadraped Bot, Co-Founder and Team Lead – Robotic Engineer | Bihar, India

Aug 2019 - Feb 2020

- Led a 4 member team of IIT Patna's student quadruped robot team to National (India) Finalist Status (99.7 percentile).
- Built a robot from scratch possessing vision, picking, placing, and autonomous decision-making capabilities.
- Worked with **2D Path Planning**(A\* & Dijkstra) algorithms to take the shortest path during natural emergencies.

### Neyveli Lignite Corporation India Ltd. (NLCIL) : Mechanical Engineer Intern | Neyveli, India

June 2019 - Aug 2019

- Improved circulating water pump efficiency by 8.44% using **coating technologies** with a payback period of  $< 2$  months.
- Led team to assess and maintain water circulating pump through coatings, showcasing strong team leadership skills.

## Education

4.0/4.0 **MS in Robotics and Autonomous Systems**, Arizona State University | Arizona, USA

2022-24

7.5/10 **BTech in Mechanical Engineering**, Indian Institute of Technology Patna | Bihar, India

2018-22

**Achievements:** Finalists @ International Robotic Competition (eYRC, IIT Bombay) | Finalists in Mech. Dept. - Bachelor's Capstone Proj.

**3 International Conferences:** I-4AM '22 (Indian Institute of Science, Bangalore) | IEEE (Submitted) | Delivered 2 lighting talks

**Courses:** Advance Linear Algebra | Sequential Decision Making | RL | ML | UAVs | Perception | Design Optimization | Controls | PDE

## Skills

<b>Programming</b>	Python, C/C++, C#, embedded C, Java, Catkin, CUDA, CMake, Matlab, Git, Scripting (Bash), LaTeX, HTML, Vim
<b>Robotics</b>	ROS 1/2, V-Rep, Gazebo, Ansys, MoveIt, MuJoCo, FEA, CFD, Arduino, AtMega 2560, Sensor Interfacing, Sensor Fusion, PLC
<b>Software</b>	Linux, Tensorflow, Pytorch, Docker, OpenCV, ZeroMQ, B0RemoteAPI, CorelDraw, Solidworks, Fusion360, Unity Engine
<b>Certifications</b>	Robotics Software Engineer, Udacity Nanodegree – (2023)   Self-Driving Cars, University of Toronto – (2023)

## Projects

### Home-Delivery Bot

Dec 2022 - April 2023

Service bot, Personal Project

- Developed an environment utilizing **Gazebo** and implemented a mobile robot integration with ROS node to chase a dynamic target.
- Utilized **Adaptive Monte Carlo localization** algorithms in ROS and deployed a optimized **RTAB-Map** to create 2D environment.
- Designed and implemented **C++ ROS** packages to autonomously navigate using **Dijkstra's** and to perform robotic manipulation.

### IEEE Control Systems Society Conference (Paper Submitted)

Jan 2023 - May 2023

Distributed Differentially Control Synthesis for Multi-Agent Systems with Metric Temporal Logic Specifications

- A distributed RHC approach for multi-agent systems with privacy by adding noise to their outputs, maintaining MTL specifications.
- Utilized **Kalman filter** equations and **MILP** to encode MTL specifications as constraints.

### Visual Tracking Unmanned Vehicle - Mambo Drone

Jan 2023 - April 2023

EGR 598 - Robotics Systems II (Course Project)

- Developed a high-performance, **low-level flight control** algorithm with integrated **Kalman Filter** for autonomous Mambo Drone.
- Successfully integrated an advanced image processing module for various capabilities in a real-world Mambo drone.

### Object Goal Navigation using Goal-Oriented Semantic Exploration

Jan 2023 - April 2023

CSE 598-Perception in Robots (Course Project)

- Integrated **YOLOv7** and performance enhancements led to a 7% success rate boost in object navigation per path length.
- Collaborated on a deep RL model, leveraging **On Policy** & Local Policy, Integrated **RRT** to path planning replacing **Fast Marching**.

### Deep Convolutional-GAN using Fashion MNIST

Nov 2022 - Dec 2022

EGR598-Machine Learning and Artificial Intelligence(Final Project)

- Developed a Deep Convolution Generative Adversarial Network **DC-GANs** architecture and successfully trained within 50 epochs.
- Attained an impressive DCGAN loss rate of 0.014 for the generator model, demonstrating generation of realistic synthetic images.

### Singularity Analysis of a Robotic Arm

Nov 2022 - Dec 2022

Modeling and Control of Robots

- Observed a behavior of the **6-DoF robotic arm** in the singularity space. A drastic change of  $10^{-4}$  to  $10^{-6}$  over 0.005 seconds.
- An swift behavior in the Jacobian matrix was noticed to set a safe boundary avoiding singularity space.