

# SHIVANGI DEO

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## EDUCATION

### Georgia Institute of Technology

Aug 2022 - May 2024

Master's, Robotics

GPA: 3.6

- Electrical and Computer Engineering (Specialization in Perception, AI and Control)
- Relevant Courses: AI, Computer Vision, Interactive Robot Learning, Advanced Programming Techniques (OpenGL, CUDA, C++)

### Vishwakarma Institute of Technology

Aug 2018 - Jun 2022

Bachelor's, Instrumentation and Control Engineering

GPA: 9.4

- Relevant Courses: Data Structures and Algorithms, Microcontrollers and Microprocessors, Linear Algebra, Probability and Statistics

## SKILLS

**Languages:** C/C++, Python, MATLAB, CUDA, OpenGL

**Libraries:** PyTorch, scikit-learn, Pandas, Numpy, gym, networkx, Deep Graph Library(DGL), Keras, MPI

**Others:** wandb, Docker, Visual Studios, PyTest, Git, Docker, CMake, ROS, Linux, Windows

## PROFESSIONAL EXPERIENCE

### Volunteer Backend ML Developer – Medicine Reminder App

Remote, USA

Rebecca Everlene Trust Org.

Since Sept 2024

Python | PyTorch | Convolutional Neural Networks (CNN) | Computer Vision | Voice Cloning | ML Model Optimization

- Developing **ML-based** features for a medicine reminder app, for aiding elderly users with pill identification and voice-based assistance.
- Built a camera-based pill identification system leveraging a **CNNs** to extract features and **generate binary hash** codes for over 1K pharmaceutical pills, enabling reliable pill retrieval and tracking on mobile devices.
- Benchmarking open-source **voice cloning models** for accuracy, latency, and resource efficiency and selecting optimal models.
- Building a **scalable pipeline** to deploy and optimize features, enhancing real-time processing and inference speed on mobile devices.

### Graduate Research Assistant

Atlanta, GA, USA

Georgia Institute of Technology

May 2023 - May 2024

PyTorch | Graph Transformers | Deep Graph Library (DGL) | Proximal Policy Optimization | Reinforcement Learning | Optimization

- Formulated a multi-agent task allocation and scheduling problem as an **NP-hard optimization** challenge, achieving a 20% improvement in task allocation for **heterogeneous robot systems**.
- Developed a task scheduling system using **Graph Attention Networks** and **Transformers** to optimize task completion time by 10%.
- Integrated deterministic solvers with **machine learning models**, boosting scheduling accuracy by 15% in complex environments.
- Designed an **end-to-end pipeline** for model training and evaluation, with hyperparameter tuning via **wandb**.
- Applied **Proximal Policy Optimization** for **reward-based policy training**, advancing algorithm development for effective allocation.

### Machine Learning Engineer Intern

Pune, MH, India

Automotive Research Association of India

Jul 2021 - Jun 2022

OpenCV | PyTorch | Python | CUDA | JAX | Jetson Xavier AGX | Convolutional Neural Networks (CNN)

- Developed a **Deep Learning** based Driver Monitoring System for real-time head pose estimation using **ResNet50 architecture**.
- Achieved a robust head pose estimation, reducing errors in yaw, pitch, and roll angles to under 5° for 85% of test cases.
- Containerized the application with **Docker** for **streamlined deployment** and reproducibility across various environments.
- Leveraged **JAX** for **efficient gradient computations** in model fine-tuning, reducing model training time, enabling faster prototyping.
- Implemented automatic brightness and contrast adjustments, increasing face detection from 45% to 73% in low-light conditions.
- Enhanced system speed by 30% using **Python multiprocessing** on **Jetson Xavier AGX**, achieving 18-23 fps.
- Optimized code execution through **GPU acceleration**, improving system speed by 25%

## PROJECTS

### Reinforcement Learning Algorithms for Autonomous Robots

Jan 2024 - Apr 2024

- Developed an **Advantage Actor-Critic (A2C) model**, implementing value networks from scratch for autonomous task efficiency.
- Increased learning speed by 20% with **human-in-the-loop training** using the TAMER framework.

### Generative Adversarial Network (GAN) - Implementation on MNIST

Aug 2023 - Dec 2023

- Built and trained a **generative-discriminative network** using GANs to generate novel images on the MNIST dataset.
- Developed **custom data loader**, implemented the generator and discriminator networks, and created a training loop for GANs.
- Analyzed training stability, explored GAN evaluation metrics, and generated images to compare performance across loss function, addressing issues like model collapse.

### Decentralized Collision Avoidance for Multi-Robot Systems

Jan 2023 - Apr 2023

- Built a **deep reinforcement learning** model using PPO to map **2D Lidar data** to robot velocities, reducing collision rates by 30%.
- Reduced training time by 25% through a **two-stage training process**, optimizing the learning efficiency of the model.
- Simulated over 500 robot paths**, achieving a 98% success rate in avoiding **dynamic obstacles**.

## PUBLICATIONS

- Heterogeneous Graph Transformers for Multi-Robot Task Allocation and Scheduling under Temporal Constraints (AAMAS 2025)**
- Experimental Analysis of Machine Learning Algorithms used in Predictive Maintenance (ICSSIT 2020)**