

# Omkar Chittar

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## WORK EXPERIENCE

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### Radical AI

New York (Remote)

*Artificial Intelligence Intern*

*Feb. 2024 – Present*

- Leveraged deep learning models from **OpenAI** and **Google Cloud Platform** using APIs to develop an AI Coach, enhancing career development and increasing user engagement by **40%**
- Engineered an **open-source** tool leveraging **VertexAI**, **Langchain**, **React** and **FastAPI** to analyze and distill YouTube transcripts, transforming digital learning by condensing extensive educational videos into accessible key concepts, markedly enhancing study efficiency and instructional methods
- Collaborated on the **AutoGrade** project by benchmarking state-of-the-art LLMs for grading code submissions, which improved grading accuracy by **30%** and reduced manual review needs
- Created API endpoints using **FastAPI** for code file submissions, and handled errors and edge cases efficiently; improved system reliability and reduced response time by **25%** through **Docker**-based dependency management

### Sakar Robotics

Pune, India

*Computer Vision Engineer*

*July 2019 – June 2022*

- Implemented **NeRF** for **synthesizing novel views** of construction sites, enabling high-fidelity volumetric analysis, lowering manual inspection requirements and improving project tracking accuracy by **15%**
- Led the development of a **3D face reconstruction** system for surveillance using **deep Structure from Motion** and facial keypoint detection, improving surveillance capabilities whilst lowering man-power and saving **\$10000** yearly
- Designed a system for robotic navigation by integrating **U-Net** architecture for precise **semantic segmentation** and **YOLO** for **object detection**, resulting in a **40%** improvement in object recognition and path planning capabilities
- Enhanced localization capabilities of a mobile robot by integrating **Normal Distribution Transform** & fusing **GPS/IMU** data with **Kalman filters**, increasing mapping precision by **20%** and a **50%** gain in efficiency; conducted research to refine odometry processes for enhanced sensor-based localization
- Implemented **PointNET** architecture for classification and segmentation of point clouds from **LiDAR** sensor mounted on a mobile robot, achieving **97%** accuracy for classification and **90%** for segmentation
- Trained a **7-DOF** robotic arm using **Reinforcement Learning** for a pick-and-place task by leveraging **DDPG** algorithm and **Hindsight Experience Replay** technique, resulting in a **30%** improvement in precision
- Streamlined data workflow and model training, enhancing data/image acquisition via **ROS** APIs, and boosting training speed by **20%** and policy rollout by **35%** through strategic **CUDA** optimization and **SLURM** scheduling
- Partnered with cross-functional teams to integrate software modules for a robotic arm, resulting in a **30%** reduction in development time and improved overall system performance
- Coordinated with software engineering and product teams to transition models from **PyTorch** to production environments in **C++** using **libtorch** and **Docker**, significantly enhancing operational efficiency and scalability
- Managed the full software development life-cycle of a robotic system, using **Agile** methodologies & pair-programming with object-oriented design patterns and rigorous unit testing to ensure system robustness & maintainability

### Defence Research and Development Organisation

Pune, India

*Robotics Trainee Engineer*

*July 2018 – July 2019*

- Innovated an **active exoskeleton** system for assisting humans while lifting heavy loads, achieving **95%** gait prediction accuracy with **PoseNet** and **LSTM** networks, enhancing load support capabilities by **30%**
- Integrated the orientation and odometry information from **IMU** and **2D LIDAR** scans to build occupancy grid map of the environment by updating the log odds while simultaneously performing **particle filter** based localization
- Deployed **Model Predictive Control** on 7 DoF manipulator arm to plan collision-free trajectories in an obstacle cluttered environment, leading to a **15%** reduction in response time and improved system stability
- Devised **LQG** and **LQR** control by linearizing the dynamic model of a crane carrying suspended masses to minimize the oscillations & control effort; used **Kalman filter** to account for Gaussian noise in the sensor measurements
- Performed image segmentation using **superpixels** generated with **SLIC** algorithm, resulting in **95%** accuracy
- Employed **Siamese neural network** for face recognition utilizing **TensorFlow** and **One-Shot Learning**
- Devised localization methods for deep **few-shot** vision models, improving accuracy on **densely-annotated** datasets
- Successfully trained and deployed **CycleGAN** for image-to-image translation; achieved **0.25 mAP** increase in the cross-domain **object detection** performance over baseline
- Implemented **Search-based algorithms** like BFS, DFS, Dijkstra, A\*, and **Sampling-based algorithms** like RRT, RRT\* and bi-RRT on holonomic and non-holonomic robots

## EDUCATION

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### University of Maryland

*Master of Engineering in Robotics & AI — 3.96 CGPA*

College Park , MD

*Aug. 2022 – May 2024*

### Pune University

*Bachelor of Engineering in Mechanical*

Pune, India

*July 2014 – June 2018*

## SKILLS

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**Languages:** Python, C/C++, MATLAB, SQL, HTML, CSS, JavaScript, R

**Tools:** CUDA, TensorRT, Git, Docker, GCP, Linux, ROS, OpenVINO, ONNX, Carla, AWS, Azure, VertexAI, Gazebo

**Libraries:** pandas, NumPy, Matplotlib, PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, PCL, PIL, OpenGL

**Expertise:** Motion Planning, Robot Perception, Robot Control, Reinforcement learning, SLAM, SolidWorks, CNN, RNN, GANs, GenAI, Linear Algebra, Calculus, Probability, Statistics, 3D reconst, NLP, LLMs, RAG

## PUBLICATIONS

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**Chittar. O. A.**, Dr. Barve. S. B. Waist-Supportive Exoskeletons: Systems and Materials.

Paper, MATPR 2022

**Chittar** et al. Experimental investigations on waist supportive passive exoskeletons.

Paper, MATPR 2022

## LEADERSHIP EXPERIENCE

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**Recruitment & Retention Manager** at the Department of Transportation Services, University of Maryland.

**Proprietor and Teacher** at SAI Classes, an educational institute for mathematics and computer science in Pune, India.