

# RAKTIMJYOTI PARASHAR

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## SUMMARY

Skilled AI professional with 5+ years of experience in machine learning algorithms, model development, and Python programming. Proficient in using ROS, Docker, TensorFlow, PyTorch, OpenCV and Pandas libraries, with expertise in Computer Vision and NLP for robotic applications.

## SKILLS

- **Programming and Scripting** — Python (NumPy, Pandas, scikit-learn, TensorFlow, PyTorch), SQL, MATLAB, CUDA.
- **Data Manipulation and Analysis** — Data cleaning, visualization and preprocessing, EDA, Statistical analysis, Feature engineering, Time series analysis.
- **Tools, Cloud** — Linux, ROS, Docker, Git, AWS SageMaker, Rekognition, IAM, EC2, Lambda, S3, Serverless, Snowflake.
- **Artificial Intelligence & Machine Learning** — Keras, Sci-kit Learn, Deep Learning Algorithms (CNN, Transformers, ViT), NLP, RAG
- **Computer Vision** — OpenCV, Open3D, YOLO, NeRF, Multi-view stereo, Structure from Motion, SLAM, Optical Flow, 3D Reconstruction, Kalman Filters, EKF, DeepSORT

## WORK EXPERIENCE

### GRASP LAB, University of Pennsylvania

Research Engineer (June 2023 – May 2024)

- Collaboratively led the design and implementation of a cutting-edge 6-DOF, occlusion-aware **object tracking pipeline** using state-of-the-art **Computer Vision** models. This system utilizes segmented point cloud data and a **deep neural network** to compute optimal grasp poses for robotic handling of novel objects, significantly enhancing automation capabilities in unstructured environments.
- Engineered a robust pipeline for reconstructing detailed 3D models from raw point cloud data using Log-GPIS and **Open3D** frameworks. This initiative has improved the accuracy of robot perception systems, enabling finer control and interaction with complex environments, and has been instrumental in refining the lab's autonomous robotic systems.
- Collaborated with a cross-functional team to create a **Neural Radiance Field (NeRF)** representation of indoor spaces to accurately model and navigate around obstacles using vision-based systems only.
- Worked on **LiDAR-Depth Camera Sensor Fusion** onboard AgileX SCOUT using **ROS**.
- Worked on **synthetic data generation** to fine-tune and enhance the accuracy of various object detection and tracking models.
- Designed a pipeline for thermal camera based human detection using deep neural network for human and object detection in low-light settings. Created training dataset using ThermalGAN.

### PENN MEDICINE, Philadelphia

Data Science Intern (June 2022 - August 2022)

- Engineered a 3D **U-Net** deep learning model for brain tumor segmentation using MRI data in DICOM format, achieving high sensitivity (0.902) and specificity (0.9894) for edema and enhancing tumor detection, significantly improving diagnostic accuracy and **reducing analysis time for radiologists by 40%**.
- Developed a state-of-the-art AI chest X-ray classifier using **DenseNet121** and advanced data preprocessing techniques, achieving high diagnostic accuracy with AUROC scores of 0.896, surpassing average radiologist performance and **reduced the time radiologists spent reviewing images by 30%**.
- Achieved a **5x increase in inference performance** of DL-based human face mask detector (20 fps to 100 fps) using **quantization** without drop in model accuracy.

### GENPACT, India (Remote)

Data Scientist (November 2017 – July 2021)

- Architected and implemented a scalable multi-cloud **Snowflake-AWS** solution to analyze patient length of stay data across multiple hospital systems. This initiative supported advanced analytics to forecast patient flows and optimize hospital resource allocation, contributing significantly to the efficiency of healthcare delivery.
- Developed data-driven strategies to enhance the hospital supply chain management by integrating patient stay insights with supply chain needs. Enabled precise inventory control and reduced waste by aligning supply levels with anticipated patient care requirements, leveraging cloud-based analytics platforms.
- Led the design and deployment of bioinformatics workflows that utilize patient data to improve hospital logistics. Created robust data pipelines that support the continuous analysis of large datasets, enhancing the decision-making processes in hospital management and care provision.
- Established strict data governance frameworks to ensure compliance with healthcare regulations, including HIPAA. Implemented secure data storage and transfer protocols within multi-cloud environments, safeguarding sensitive patient information against unauthorized access.

## PROJECTS

- Applied projective transformations and homographies in Python and OpenCV to project logos onto video sequence.
- **Augmented Reality (AR)** with AprilTags: Developed an AR application by solving the PnP, P3P and Procrustes problem.
- **Structure from Motion (SfM)**: Implemented SfM pipeline to recover 3D transformation between two views using SIFT feature matching, 8-point algorithm with RANSAC filtering, camera pose estimation and point triangulation.
- **3D Reconstruction** using Stereo Vision: Performed stereo rectification, block matching with SAD, SSD and ZNCC kernels, and left-right consistency check to build disparity map and reconstruct point cloud.
- **Cancer Prediction**: Implemented advanced machine learning and deep learning models for the accurate detection and segmentation of polyps from colonoscopic images, using **PyTorch, OpenCV, Scikit-learn, pandas, numpy, albumentations**. Enhanced diagnostic precision by developing algorithms that surpass traditional methods, aiding medical professionals in identifying subtle abnormalities that might not be visible to the human eye, thereby significantly improving patient outcomes in colorectal cancer screenings.
- **Search Engine**: Developed a **BERT**-based NLP pipeline to extract disease labels and perform question answering from clinical reports increasing accuracy and efficiency in medical data retrieval for healthcare professionals.
- **Enhancing Business Engagement: Advanced AI and LLM for Detoxifying and Moderating Hate Speech in Online Communities**: Leveraged advanced AI and **Large Language Models (LLM)** to combat toxicity in online communities. Our findings revealed how sophisticated models like FLAN-T5, enhanced through Proximal Policy Optimization (PPO), can significantly reduce hate speech and improve digital interactions.
- **End to end deep learning project** to classify disease in potato plant as either early blight or late blight. Technology stack of this project consists of **TensorFlow, tf dataset, tf serving, FastAPI, data augmentation, react js, react native, Google cloud platform (for deployment), quantization, tf lite**.
- **Chicken Disease Classification**: End to end deep learning project using **MLOps** tools such as **DVC** along with deployment using **GitHub Actions** in AWS Cloud using **EC2** instance.
- **Text Summarizer**: End to end **NLP** project along with deployment using **GitHub Actions** in **AWS Cloud** using EC2 instance.
- Push Up Counter using **YOLOv7 Pose Estimation**.
- Built a **Speech Recognition and Summarization** System using vosk, pydub and transformers packages.
- Stock Price Predictor using yfinance package.
- mRNA Degradation Prediction using deep neural networks.

## EDUCATION

### UNIVERSITY OF PENNSYLVANIA

Master of Science in Mechanical Engineering and Applied Mechanics

Concentration: Robotics and Mechatronics (GPA: 3.68/4.0)

### MANIPAL INSTITUTE OF TECHNOLOGY

Bachelor of Technology in Mechanical Engineering and Manufacturing Technology (8.5/10)