# RAGHAVENDRA DINESH

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## SUMMARY

Robotics and Artificial Intelligence graduate with 3 years of experience in Data Science and Automation at Bosch, demonstrating strong problem-solving, teamwork, and project management skills.

## PROFESSIONAL EXPERIENCE

**Multi Modal Deep Learning Researcher** June 2024 - Present
**Arizona State University**
Plant Image based Health Diagnostics System with BLIP-2 Image Captioning using Vicuna 7B and Gemini API

- Trained ResNet50 with PlantVillage Data. Obtained TFLite using ONNx. Integrated with Gemini API as LLM for PoC and reference.
- Initially trained Google's ViT for same dataset but due to low accuracy shifted to SWIN Transformer for Low Level feature extraction
- Integrated SWIN with Vicuna 7B as LLM to obtain plant information, disease/problem and remedies.

**Automation Engineer** Sep 2019 - Aug 2022
**Bosch Global Software Technologies Pvt. Ltd.**
RF Emission Analysis and Harmonic Anomaly Detection for Automotive Conformance

- Initiated a website to view and store RF Emission data based on spectrum to compare for conformance analysis using Django.
- Employed **BiLSTM Autoencoder** to find anomalies in the emissions and used them to find harmonics of resonant frequencies.
- Generated reports with plots automatically taking 10% of the time taken manually with 85% accuracy.

Smart Inventory Tracking Using Asset Detection and OCR

- Developed a website to store Inventory data and track arrival, use, storage, and shipment of packages using Django.
- Leveraged Computer Vision **YOLOv4-tiny** algorithm to detect artifacts and **Tesseract OCR** to detect Label data and store in **SQL**.
- Deployed the software on Raspberry Pi 3B+ with Pi SC0818 camera and Barcode Reader saving 25 hours/week.

**Artificial Intelligence Intern** Jan 2019 - Mar 2019
**ConnectM Technology Solutions Pvt. Ltd.**
Truck Driver Assistance System with Safety Constraints using Facial Recognition and Voice Assistance ChatBot.

- Built voice recognition and face recognition systems using **CMU Pocket Sphinx** and **Haar Cascade** and **AWS Face Rekognition**.
- Trained **drowsiness detection** using Facial **Landmark detection** and made sure modules can be deployed on **Edge devices**.
- Seamlessly integrated the modules onto a Raspberry Pi 3B, ensuring optimal performance, user experience, and road safety

## EDUCATION

Masters in **RAS-Artificial Intelligence**
*Arizona State University* 3.97 GPA
Bachelor of Engineering: **Electronics and Communication Engineering**
*PESIT South Campus* 7.5/10 GPA

Relevant Coursework: Artificial Intelligence, Linear Algebra, Modeling and Control of Robots, Statistical Machine Learning, Mathematical Foundations of ML, Perception in Robots, Embedded ML, Biomedical Image Processing, Advanced Computer Architecture.

## TECHNICAL SKILLS

**Programming & Scripting:** Python, C & Embedded C, MATLAB/Simulink, C++, Java, JavaScript, HTML, Bash
**Interests:** Computer Vision, Deep Learning, Natural Language Processing, Generative AI, Large Language Models, Transformers
**Tools and Platforms:** Pandas, NumPy, TensorFlow, Keras, PyTorch, OpenCV2, Scikit-learn, TensorRT, Onnx, TFLite, SQL, GIT, Docker
**Certifications:** Machine Learning and Deep Learning Specialization by Andrew Ng, DeepLearning.AI TensorFlow Developer Specialization by Laurence Moroney, MLOps | Machine Learning Operations Specialization by Duke University.

## PROJECTS

**Negative CLIPort: Improved Robotic Arm Control enhanced with Negative Language Goals | Arizona State University** Spring 2023

- Improved CLIPort to handle a wider range of requirements by making it more robust to **negative language goals**.
- Training data augmented with goals that specify actions arm avoids, and loss function modified to penalize conflicting actions.

**Medical Image Analysis for Lung Disease Classification and Detection | Arizona State University** Fall 2023

- As a team of eight, tasked with datasets and models for lung disease classification, localization, detection, and segmentation.
- Handled diverse medical datasets such as **VinBigData CXR, SIIM-ACR Pneumothorax, MedMNISTv2, MINIJSRT** Database.
- Implemented techniques such as **Snakes: Active contours** and **UNet, UPerNet, Swin Transformer and Faster R-CNN**.
- Gained skills in **transfer learning**, Transformers, ensemble methods, and evaluation metrics such as **AUC, IoU, FROC,** etc.
- Debated and integrated the best models for each task to solve multi-task problems.

**Real-Time Hand Gesture Recognition System for Conference Calling and Media Control | Arizona State University** Fall 2023

- Utilized Google's Mediapipe framework to extract hand features from the image. Based on the app we developed 3 classifiers.
- Deployed ASL, conference call and media control apps on Raspberry Pi 4B. Achieved a high frame rate and 93% accuracy.

**Facial Image Synthesis from Segmentation Maps and Sketches using GANs for Forensics | Arizona State University** Fall 2023

- Utilized CelebAMask-HQ dataset with **Pixel2Style2Pixel GAN** to transform sketches and segmentation maps to real images.
- The real face images generated with good accuracy and clarity and is useful for Detective work.

**GAN Abstract Art fusion with LSTM Poetry for NFT Auctioning | Personal** March 2021

- Generated Artwork with poetry using GAN-LSTM and Stable Diffusion. Observed better results with GAN-LSTM.
- The integrated Art Poetry output images were auctioned as NFT.

## EXTRA CURRICULUM

- Tutored at Salvation Army Kroc Center, teaching Reading, Writing, and Math for 2 years.
- Volunteered as weekend teacher 9 months for underprivileged immigrant kids with FSL India and Bosch.