Aditya Raj Maheshwari

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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
B.Tech. Electronics and Instrumentation Engg.	Nirma University	7.4(Current)	2021-Present
Minor Specialization in Computer Engg.	Nirma University	7.5(Current)	2023-Present
Senior Secondary	CBSE Board	90.4%	2021
Secondary	CBSE Board	91.5%	2019

Technical Skills

- **Programming**: C/C++, Python, C#
- **Databases**: MySQL
- **Operating System**: Windows, Linux
- **Libraries & Frameworks**: PyTorch, TensorFlow, Scikit-learn, Keras, SpaCy, Transformers, OpenCV, Pandas, NumPy, mavlink, Streamlit
- **Other**: Data Structures and Algorithms(DSA), ROS, OOPs, dronekit, Arduino, Image processing, , Generative AI, UI&UX, Diffusion Tensor Imaging

Projects

- **Product Entity Extraction from Images** *Sept. 2024*
  Domain: Computer Vision, NLP, OCR, Deep learning, E-commerce Github
  - Developed a machine learning pipeline for extracting product attributes from images in the absence of detailed product descriptions.
  - Increased detection accuracy with improved text box merging and proximity-based classification.
  - Increased entity extraction accuracy by handling unit ambiguity, misclassified dimensions, and incomplete textual descriptions.
  - Combined CRAFT text detection and TrOCR text recognition to extract and preprocess product details from images, followed by entity extraction using SpaCy.

- **AI Pipeline for Image Segmentation and Object-Analysis** *July 2024*
  Domain: Transformer models, Image Segmentation, Deep Learning, Computer Vision, UI development Github
  - Developed an advanced AI pipeline that segments, identifies, and analyzes objects in images using deep learning and transformer models.
  - Built a Streamlit application for real-time image uploads, segmentation visualization, and object analysis.
  - Integrated ResNet for object identification, EasyOCR for text extraction, and SAM(segment anything model) for image segmentation.
  - Extracted and stored segmented objects as separate images with unique IDs, mapped data, and generated comprehensive outputs with annotated images and data tables.
  - Optimized pipeline for accuracy, efficiency, and robustness, ensuring smooth handling of complex images.

- **SUAS 2024 (Team Captain)** *June 2024*
  AUVSI SUAS 2024: Maryland USA, Domain: ODCL(object detection classification and localization), Lua Scripting
  - Led a team of 7 to develop a high speed multi-rotor under 25kg with autonomous navigation, classification, localization and payload delivery capabilities.
  - The multi-rotor was designed to cover a path of 15 miles in under 30 minutes while performing the given mission hence maintaining a cruise speed of 18m/s.
  - Manually tuned the copter to achieve high speed stable flights even in strong wind conditions.
  - Implemented a real time queue based object detection, classification and autonomous navigation pipeline.
  - Reduced inference time by firstly running a detection algorithm and then implemented HOG transforms and template matching for accurate classification taking into account for perspective errors and rotation variance inplace of multi class object detection model.
  - Achieved 20% reduction in processing time enhancing mission efficiency and reliablity.

- **Mission Chandra** *Sept. 2023*
  SAC ISRO Ahmedabad, Domain: Microcontroller integration and UI development
  - Worked with a team of 4 to develop a 1:200 scale of two-stage Chandrayan-3 launch vehicle with parachute recovery.
  - Used Arduino nano with burn wire setup for rocket separation and parachute deployment.

- Used barometer sensor and saved real time telemetry data logs on SD card connected to onboard Arduino along with sending to ground station.
- Created a WPF application using C# which acts as ground station and displays real time telemetry data and required graphs.
- Developed failsafe mechanisms in case of any in-flight error to safeguard the onboard electronics.

- **Aerothon 2023 (Team Captain)** *Nov. 2023*
  Domain: Systems Engineer
  - Lead a team of 10 to develop a multirotor under 2kg with autonomous navigation and payload delivery capacity of 200g along with identification of four hotspots.
  - Worked with NVIDIA's Jetson Xavier NX and ArduCam 12MP camera.
  - Developed custom trained YOLOV5 algorithm for target detection and hotsopt identification.
  - Developed algorithm to prevent same hotspot detection due to hotspot being identical in nature.

- **SUAS 2023** *June. 2023*
  AUVSI SUAS 2023: Maryland USA, Domain: Machine Learning and Autonomous Navigation
  - Worked with a team of 10 to develop a multirotor under 25kg with autonomous navigation and five payload delivery each weighing 500g and cover path of 12miles under 30minutes.
  - Worked on NVIDIA's Jetson Xavier NX and Viewpro Q10F 14MP camera.
  - Employed a custom trained improved YOLOV5 based algorithm with transformer prediction head.
  - Developed a new autonomous navigation algorithm for payload dropping with 0.1m accuracy.

- **Aerothon 2022** *Nov. 2022*
  Domain: Machine Learning
  - Worked with a team of 10 to develop a multirotor under 2kg with autonomous navigation and payload delivery capacity of 200g.
  - Worked with NVIDIA's Jetson Xavier NX and ArduCam 12MP camera.
  - Used custom trained YOLOV5 algorithm for target detection.
  - Developed a relative navigational algorithm for payload delivery.

Certifications

- **NVIDIA**, Generative AI with Diffusion Models *Link*
- **Docker**, Docker Foundations Professional Certificate *Link*
- **Microsoft**, Career Essentials in Generative AI by Microsoft and LinkedIn *Link*
- **Udemy**, Machine Learning & Deep Learning in Python & R *Link*

Key courses taken

- **Mathematics**: Calculus, Linear Algebra and Ordinary Differential Equation-I, Complex Analysis and Differential Equations-II, Numerical Methods
- **Electrical Course**: Circuit Theory,Basic electronics, Control theory, Industrial Electronics, Electrical and Electronics Measurement, Control System Design, Linear Integrated Circuits, Signals and Systems, Process Control, Transducers and Measurement
- **Computer Science**: Computer Programming, Machine Learning, Microprocessors and Microcontrollers, Cloud Computing, Data Science, Programming with Python and Matlab, Object Oriented Programming, Data Structures, Image Processing and its applications, Deep Learning for Vision Systems, Operating System, Soft Sensors, Software Engineering

Positions of Responsibility

- **General Secretary**, SAE Nirma Collegiate Club , Nirma University *Jan. 2024 - Present*
- **Team Captain**, Team Arrow, Nirma University *Apr. 2023 - Present*
- **Computer Systems Lead**, Team Arrow , Nirma University *Nov. 2022 - Present*
- **Member**, SAE Nirma Collegiate Club , Nirma University *Jul. 2022 - Jan. 2024*
- **Member**, Student Chapter of the Computer Society of India , Nirma University *Aug. 2021 - Present*

Achievements

- **Rank 391**, Amazon ML Challenge *Sept. 2024*
- **Rank 3 internationally**, AUVSI SUAS 2024, Maryland, USA *Jun. 2024*
- **Qualified for finales**, Mission Chandra, SAC ISRO Ahmedabad *Sept. 2023*
- **Rank 5 internationally**, AUVSI SUAS 2023, Maryland, USA *Jun. 2023*
- **Rank 5**, SAE Aerothon 2022, Bangalore *Nov. 2022*