Arnab Karmakar

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Summary of Qualifications

- Machine Learning Engineer with 4+ years of experience, spearheading over 15 impactful ML projects in the field of Computer Vision, NLP and generative AI, showcasing adaptability and successful project execution
- Proficient in the complete ML software development lifecycle, adept at data engineering, ML model development, benchmarking and optimization for real-time and resource-constrained environments
- Collaborated seamlessly across 5 centers and 20+ engineering teams, bridging the gap between user requirements, data/system constraints, and safety criticality
- Strong foundation in statistics, mathematical modeling, and data analysis (data cleaning, mining, visualization)

Education

University of Washington, Seattle, WA — *Expected 2025*
Master of Science, Electrical Engineering

Indian Institute of Space Science and Technology, Trivandrum, India — *2019*
Bachelor of Technology, Electronics and Communication Engineering

Skills

Programming	Python, MATLAB, C/C++, Git/Github, Linux, SQL, Arduino Programming, LATEX
Machine Learning	Pytorch, Tensorflow, Keras, Scikit-Learn, OpenCV, Numpy, SciPy, Pandas, Matplotlib, Seaborn
Software	ROS, Gazebo, Wireshark, RiskSpectrum

Publications

- A. Karmakar, and D. Mishra, **"Pose Invariant Person Re-Identification using Robust PT-GAN."** IEEE SMC (S), 2021 [pdf]
- A. Karmakar, and D. Mishra, **"A Robust PT-GAN for Pose Guided Person Image Synthesis."** NCVPRIPG, Springer 2019. [pdf]
- A. Karmakar et al., **"Stellar Cluster Detection using GMM with Deep Variational Autoencoder."** IEEE RAICS, 2018. [pdf]

Relevant Experience

Reasoning, AI, and VisioN (RAIVN) Lab, University of Washington — *Seattle, WA, USA*
Graduate Research Assistant — *Nov 2023 - Present*

- Developed a comprehensive benchmarking method to systematically evaluate the compositionality and interpretability of large Vision-Language Models, improving their performance in complex Visual Question Answering tasks

Human Space Flight Centre, Indian Space Research Organisation — *Bengaluru, KA, India*
Applied Research Scientist — *Aug 2019 - Aug 2023*

- Designed a Machine Learning pipeline for real-time astronaut health monitoring system, achieved an impressive 96.8% accuracy while minimizing false negatives to only 0.7%
- Developed a time series analysis model using LSTM to predict Remaining Useful Life (RUL) of turbo engines, through extensive data analysis of 26 sensor data streams, to enhance preventive maintenance operations
- Delivered the first prototype of the safety-critical Life Support System (LSS) Simulation software, led a team of 6 to outline efficient resource utilization algorithms for long duration human space mission
- Executed Human-in-Loop usability evaluation for India's first manned spaceflight program, developed usability benchmarks and the end-to-end evaluation methodology, leading to significant improvements of human system interfaces

Virtual Reality (VR) Lab, Indian Institute of Space Science and Technology — *Trivandrum, KL, India*
Undergraduate Research Assistant — *May 2018 - July 2019*

- Developed Generative Modeling techniques using a GAN model to create photo-realistic human images, attaining a 9% improvement in image generation quality
- Designed a state-of-the-art viewpoint invariant person re-Identification model using GAN and feature fusion, achieved 9.6% improvement in rank-1 accuracy and 16% improvement in mean Average Precision

Projects

Electrical Substation Detection from Satellite Data – Applied a U-Net based deep learning model and extensive data augmentation to localize electrical substations in hyperspectral satellite images, achieved f1 score of 87.9% (link)

Synthesizing Hand-Object Interactions for Robotic Grasping – Implemented a large-scale diffusion model to accurately synthesize complex hand-object interactions, achieving robust out-of-distribution scene comprehension