AL ARAFAT

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SUMMARY

Result-driven **Computer Vision** and **Machine Learning lead** with **10+** years of experience in delivering Vision, Perception, and LLM systems from research to PoC to production at Toyota and Sony. I combine deep technical expertise in **Vision & Multi-Modal Language Models**, **Data Preparation**, **Model Designing & Training**, and **Model Optimization** with a proven ability to lead projects from defining roadmap to driving execution, mentoring teams, and shipping measurable outcomes.

STRENGTHS

GenAI:	LLM, VLM, Agentic AI, Assistive Reasoning.
Vision:	2D & 3D Object Detection, Classification, Recognition, & Tracking; Scene Segmentation; Pose Estimation.
ML Tech Stacks:	PyTorch, TensorFlow, LangGraph, MLflow, ONNX, OpenVINO, Scikit-learn, OpenCV, ChromaDB, AWS, Pydantic.
Dev:	Python, FastAPI, C++, Docker, Git CI/CD, CMake, Kanban, Jira.

EXPERIENCE

May 2024 – Present

Computer Vision Engineer — **Toyota Motor Europe, Brussels, Belgium**

- Led a full-cycle multi-modal GenAI project for user behavior understanding using **multi-modal data (video-audio-text)** from early concept to model development and deployment. Delivered a prototype within 8 months with **92% accuracy**.
- Designed the project **roadmap**, defined specifications, prepared **data**, **mentored engineers**, and coordinated collaboration across **AI teams** and **stakeholders**.
- Trained **CNNs** and State-of-the-Art **VLMs** to have a robust multi-modal system.
- **Filed a patent** for a **real-time user satisfaction recognition system**.

Dec 2016 – Apr 2024

R&D Engineer, Computer Vision — **Sony Depthsensing Solutions, Brussels, Belgium**

- Designed and deployed ML models for real-time 3D perception, driver monitoring, and facial recognition. Oversaw end-to-end pipelines including **data acquisition, annotation, model training, quantization**, and **deployment** on embedded systems.
- Developed a **3D industrial scene segmentation** system using state-of-the-art DL models, achieving **70% mIoU** and **90% object detection accuracy** in complex scenarios. Deployed in **C++** using **ONNX Runtime**.
- Built a real-time high-accuracy **>90%** driver drowsiness system, developed in **PyTorch**, quantized with **ONNX Runtime** for a **30%** runtime reduction, and deployed with **libTorch**.
- Designed and integrated a lightweight **CNN** model for driver skeleton detection, developed in **PyTorch** and deployed with **TensorFlow Lite**, resulting in a **10% performance improvement** over the baseline.
- Developed high-accuracy face detection and facial landmark detection models (**98% and 89% accuracy**, respectively). Quantized models using **OpenVINO** and deployed using **MXNet**.
- Developed a model to detect and track driver hand presence on the steering wheel, achieving **85% accuracy**.

Jun 2013 – Dec 2016

Lecturer, Computer Science & Engg. — **Bangladesh University of Business & Technology**

- Taught core undergraduate courses in **AI, ML, & OOP**. Mentored students on research projects and contributed to curriculum development.

Sep 2012 – Jun 2013 **Lecturer, Computer Science & Engineering** **Dhaka International University**

- Delivered undergraduate courses in **AI, OOP**, and mentored student project work.

SELECTED PROJECTS

Almobron AI **AI Fashion Stylist & Virtual Try-On.** **post**
Designed a **multi-modal**, **agentic RAG** system using **LangGraph** and local LLMs **Qwen2.5-VL, SAM2, & Florence2** featuring an integrated VTON component that achieved superior mask generation accuracy over the SOTA IDM-VTON baseline.

Almobron AI **GOLPO: Interactive GenAI EdTech Solution** **post**
Independent R&D into generative AI, focused on prototyping and evaluating state-of-the-art text-to-video and diffusion models for structured content generation.

Almobron AI **DatesNet: Facial Emotion Recognition.** **code**
Developed a novel **U-Net-based** architecture trained on the **FER+ dataset** to classify emotions using **soft-label probabilities** instead of traditional hard-labels.

PUBLICATIONS & PATENTS

2024 (Filed) **Real-time User Satisfaction Recognition System (Patent Filed)** **A. Arafat, et al.**
Toyota Motor Europe – Patent filed for a real-time system using multi-modal deep learning for estimating user satisfaction in varying environments.

2016 **Airplane tire inspection by image processing technique** **Jovancevic I., Arafat A., Orteu J.-J., Thierry Sentenac**
In 5th Mediterranean Conference on Embedded Computing, MECO' 2016, Bar, Montenegro, pp.176-179

2012 **Intelligent Autonomous Vehicle Navigated by using Artificial Neural Network,** **Firoz Mahmud, Al Arafat, Syed Tauhid Zuhori**
International Conference on Electrical & Computer Engineering (ICECE), BUET, Dhaka, Bangladesh, pp.105-108

EDUCATION

Sep 2014 - Jun 2016 **M.Sc in Computer Vision and Robotics** **Heriot-Watt University, Edinburgh, UK**

- Awarded prestigious **Erasmus+ Mundus Scholarship**.
- *Thesis:* **Computer Vision-based Aircraft Parts Inspection**. Developed computer vision algorithms to detect and inspect **Airbus A320's tires, pitot tubes, and engine blades** from RGB images.

Feb 2008 - Sep 2012 **B.Sc in Computer Science and Engineering** **RUET, Bangladesh.**
Thesis: Intelligent Autonomous Vehicle Navigated by Artificial Neural Network & DTMF Signaling

TRAINING & CERTIFICATIONS

2019 **Advanced Course on Data Science & Machine Learning** **Siena, Italy (Summer School)**
Covered: **Reinforcement Learning**, **GANs**, **AutoML**, **NLP**, **Meta-Learning**, **Mathematical Optimization**, and more.

2019 **Computer Vision Nanodegree** **Udacity**
Hands-on course with projects in **facial keypoints detection**, **image captioning using RNN**, and **Graph SLAM**.

2018 **International Summer School on Deep Learning (DeepLearn)** **University of Genoa, Italy**
Topics included: **CNNs**, **GANs**, **Domain Adaptation**, **Model Selection**, **Tensor Decomposition**, **Deep Kernel Machines**, and more.

AWARDS & SCHOLARSHIPS

2014 – 2016 **Erasmus+ Mundus Scholarship (Category A)**
Awarded by the **European Commission** to pursue the prestigious VIBOT Master's program. Among the top 4 selected scholars globally.

2010 **Best Student Award – Department of CSE**
Recognized as the top-performing student in the Computer Science and Engineering department at RUET.

2010 – 2012 **University Merit Scholarship – RUET**
Awarded for academic excellence for 3 consecutive years during undergraduate studies.