KH SAFKAT AMIN

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PROFILE

Automotive Engineer based in Germany with a Bachelor's degree in Mechanical Engineering from Bangladesh and a Master's degree in Automotive Engineering from RWTH Aachen University. Experienced in problem-solving, software development, and system integration, with a strong focus on AI and machine learning applications. Passionate about research and development in automated driving systems, with additional interests in robotics and intelligent mobility. Committed to continuous learning and innovation to drive impactful technological solutions.

EDUCATION

10/2020 - 03/2025
Aachen, Germany

Master of Science in Automotive Engineering

RWTH Aachen University
Grade: 2.1
Thesis: Development of a framework for harmonization, enrichment and classification of behavioral data.

05/2012 – 02/2017
Dhaka, Bangladesh

Bachelor of Science in Mechanical Engineering

Bangladesh University of Engineering and Technology
Grade: 3.03 (US Scale)
Thesis: Analysis of the production process for homemade cornflakes.

TECHNICAL SKILLS

- **AI & Machine Learning:** Deep Learning, Generative AI (GANs, Diffusion Models, LLMs), PyTorch, TensorFlow
- **Computer Vision:** YOLO, U-Net, SegNet, PointPillars, Object Detection, Image Segmentation, 3D Perception
- **Autonomous Systems:** Sensor Fusion, Kalman Filters, SLAM, Motion Planning (A*, Dijkstra)
- **Robotics & Simulation:** ROS/ROS2, Gazebo, Carla, OpenScenario
- **Programming Languages:** Python, C++, Bash, MATLAB
- **Development Tools:** Docker, Git, VS Code, Linux
- **Databases:** MongoDB (NoSQL), MilvusDB (Vector DB)

LANGUAGES

- Bengali (Native)
- English (C1)
- German (B2)

WORK EXPERIENCE

06/2024 – 03/2025
Aachen, Germany

Institute for Automotive Engineering, RWTH, *Master Thesis Student*

- Designed and implemented a modular **Python** framework for harmonizing **multimodal trajectory datasets**, with structured storage in a **MongoDB** backend.
- **Automated the enrichment pipeline** by integrating external data sources, including **OpenStreetMap (OSM)**, high-definition **Lanelet2** maps, and **Deutscher Wetterdienst (DWD)** weather APIs.
- Developed **analytical modules** for **road junction detection**, **maneuver classification**, **pairwise interaction labeling**, and computation of **safety-critical risk metrics**.
- Designed **advanced MongoDB queries** enabling efficient **scenario-based filtering** (e.g., by location, maneuver, weather) and **data retrieval** through the application interface.

03/2024 – 03/2025
Aachen, Germany

Institute for Machine Elements and Systems Engineering, RWTH, *Student Assistant*

- **Operated a tribological test bench** to collect experimental data on **wear** and **boundary layer formation**.
- Developed and validated predictive models using **classical** and **neural network**-based techniques implemented in **scikit-learn** and **TensorFlow** to analyze complex tribological phenomena.

12/2022 – 07/2024
Aachen, Germany

Team Galaxis RWTH, *Team Member | Software*

- **Upgraded perception system** from basic lane detection to a holistic solution using **Inverse Perspective Mapping (IPM)** for Bird's Eye View (BEV) transformation and deployed **SegNet** for **semantic segmentation** on **NVIDIA Jetson AGX Xavier** with **ROS 2** integration.
- **Trained and fine-tuned YOLO-based** models for **traffic sign detection** and **classification**, leveraging transfer learning and custom augmentation strategies to improve accuracy in diverse environments.
- Developed multiple in-house **datasets** by collecting **ROSBAGs**, **post-processing sensor data**, **annotating** with tools like **Roboflow**, and building end-to-end pipelines for model training, validation, and deployment.
- Validated perception modules in both **real-world testing** and **Gazebo** simulation.
- Contributed to **hardware debugging**, **Jetson software environment setup**, and **code documentation**, collaborating across disciplines within an Agile development framework to ensure smooth system integration and deployment.

01/2018 – 02/2021
Dhaka, Bangladesh

Rancon Auto Industries Limited, *Executive Engineer*

- Worked at RAIL, a Bangladesh automotive assembly company specializing in CKD passenger and commercial vehicles.
- Supervised **quality control** and **repair operations**, ensuring regulatory compliance and performing **diagnostics, root cause analysis, and FMEA**.
- Led **Material Management**, **optimizing logistics** and **digitalizing workflows** with **advanced Excel** to enhance efficiency and traceability.

PROJECTS

03/2024 - 03/2024

Customer Experience Enhancement with Public Data and Generative AI
EESTECH Challenge AACHEN

- Designed and implemented a **Generative AI** feedback system analyzing GitHub issues using **Llama-2** as the language model, enabling personalized responses via three distinct **AI personas** with varied communication styles.
- Developed backend services in **Python** and frontend interface using **Node.js** to create an **interactive chatbot** for automated issue resolution.
- Presented the solution in the EESTECH Challenge Aachen, securing **2nd place**.

04/2023 - 09/2023

A Comparative Study on YOLOv5-Based Traffic Light Recognition for Automated Driving
Automated and Connected Driving Challenges - Research Project

- Developed a real-time **traffic light detection** and classification system using **YOLOv5** model, trained on **DTLD** and **BSTLD** datasets.
- Created **custom data preprocessing** scripts to convert and harmonize annotations across datasets for consistent training.
- Implemented the full pipeline using **Python** and the **Ultralytics YOLOv5** (**PyTorch-based**) framework to fine-tune models and perform cross-dataset evaluation.

INTERESTS

- Exploring AI applications
- Watching documentaries on engineering and innovation
- Cycling, hiking, and outdoor exploration
- Watching Formula One, football, and cricket