Ekagra Gupta

📱 +49 15758489284   ✉ ekagrag99@gmail.com   🏠 Stuttgart, Germany
in/ekagra   github.com/ekagra   𝕏 portfolio/ekagra

Profile

Master's student at Universität Stuttgart specializing in machine learning, perception models, and signal processing. Gained practical experience at Bosch, DaimlerTrucks AG, and Fraunhofer IPA, focusing on perception models, data-driven analysis, and API integration. Recent research includes evaluating adversarial robustness in machine learning classifiers, with a passion for challenges in computer vision and AI.

Areas of Expertise

Machine Learning - Computer Vision - Research and Evaluation - Software Development - Simulation and Modeling - Data Analysis - Autonomous Systems - Engineering Tools - Platforms and Systems

Professional Experience

Praktikum, *(Bosch Center for Artificial Intelligence)*   **Renningen, DE** *11/2023 - 04/2024*
- Applied common corruptions and instance manipulations, including consistent object scaling, to the nuScenes dataset for autonomous driving.
- Ensured instance manipulation maintained consistency with one object per scene, based on provided masks for all objects.
- Evaluated the altered nuScenes dataset using StreamPETR, FAR3D, and both static and temporal configurations of FIERY models to analyze their behavior and identify corner cases.

Werkstudent im bereich (e)Powertrain, *(DaimlerTrucks AG)*   **Stuttgart, DE** *02/2023 - 10/2023*
- 08 hours/week.
- Improving the simulation software, focused on MoLaSim, an in-house tool utilized for fundamental engine mount analysis.
- Through VBA scripting to enhance analysis capabilities and user interface, the software was upgraded, resulting in a more sophisticated and user-friendly tool that has brought tangible benefits to the team.
- The data and model export process in Simpack (a multi-body simulation tool) was streamlined and optimized through the creation of custom Python scripts, enhancing efficiency and data accuracy in daily operations.

Studentische Hilfskraft, *(Fraunhofer IPA)*   **Stuttgart, DE** *04/2023 - 09/2023*
- 12 hours/week.
- Utilized public data sources for model training and collaborated on Python-based dashboard implementation for transport route monitoring using Google Maps API, expanding its functionalities, and documenting results comprehensively.

Studentische Hilfskraft, *(Greenteam Uni Stuttgart)*   **Stuttgart, DE** *11/2022 - 03/2023*
- 20 hours/week.
- As a part of the collegiate Formula Student Electric Team, I contributed to the development of a driverless race car for international competitions.
- Estimated vehicle poses with perception data, developing localization in C++ and ROS2, and mapping using landmark-based pose-graph.

Studentische Hilfskraft der Universität, *(Universität Stuttgart IPV)*   **Stuttgart, DE** *01/2022 - 09/2022*
- 20 hours/week.
- Designed Equivalent Circuit Models of Li-ion batteries using MATLAB/Simulink.
- Conducted estimation of SOC and SOH degradation of a cell using various algorithms.
- Characterized Li-ion cells at different temperatures and parameterized them using the DRT of synthetic EIS data.

Publications

Towards a Practical Evaluation of Adversarial Robustness of Machine Learning Classifiers
In proceeding IMECE 2024

- Developed a comprehensive method to assess the adversarial robustness of machine learning image classifiers.

- Estimated upper and lower bounds of adversarial distance through iterative attacks and certification approaches.

- Demonstrated effective adversarial attack implementation, with noted limitations in the certification method.

Design of Circularly polarized irregular octagonal shaped and dumbbell slotted planar and conformal patch antenna
SCI 2021

- The paper presents a simulation study on circularly polarized planar and conformal patch antennas with irregular octagonal and dumbbell slot shapes.

- The objective was to achieve a satisfactory impedance mismatch bandwidth and axial ratio bandwidth.

Education

MSc Electrical Engineering *Universität Stuttgart* **Stuttgart, DE** *2021-Current*
Relevant Courses: Detection and Pattern Recognition, Advanced Mathematics for Signal and Information Processing, Deep Learning, Statistical and Adaptive Signal Processing, Software Engineering for Real-Time Systems Management
Lab: MRT Hardware Design

BTech Electronics and Communication Engineering *GGSIP University (MAIT)* **Stuttgart, DE** *2017-2021*
Relevant Courses: Digital Signal Processing, Signals and Systems, Microwave Engineering

Skills

- **Programming Languages and OS:** Python, MATLAB, VBA, C++, Linux, ROS2 (Robot Operating System)

- **Software and Libraries:** Git, IBM LSF, AWS SageMaker, PyTorch, TensorFlow, Simulink, StreamLit

- **CAD and Design Tools:** Autodesk Fusion 360, SolidWorks, CubeIDE, SIMPACK, Arduino IDE

- **Data Science:** Image Processing, Object Detection, Feature Extraction, Transfer Learning, Data Augmentation

Projects

Structured Comparison of Metrics to Evaluate the Robustness of Image Classification Models. (Forschungsarbeit) github.com/forschungsarbeit

- This project focuses on metrics for image classifier robustness, such as adversarial and corruption robustness, Lipschitz continuity, and formal verification.

- It includes implementing at least two image classifiers on a chosen benchmark dataset to validate the results using Pytorch.

F450 Quadcopter (Major Project)

- The project objective was to construct a stable Quadcopter that possesses F450 traits and has the ability to transport a CO_2-containing package, such as a fire extinguisher, to the site of an emergency.

Languages

- **Hindi** [Native]

- **English** [Proficient]

- **German** [Basic] - Learning (A2)