Karan Shah

I connect dots and tell stories.

(+49) 0178-8888-2547 | karan.shah@tum.de
Avenariusstrasse 15, 81243 München
GitHub: https://github.com/karanfc

EXPERIENCE

Research Assistant - Autonomous Driving
TUM - Chair of Traffic Engineering and Control
09/2022 – present — Munich, BY, DE

- Researching and operationalizing the construction of a digital twin of the city of Ingolstadt, BY, DE using ArcGIS CityEngine and Unity3D
- Ran procedural tests on a landscape of approx 30 sq. km. with an aim to answer the questions in the domains of traffic efficiency, safety, ecology and social acceptance of autonomous vehicles and published results.

Internship - Data Analyst
Quantum Diamonds
04/2022 - 10/2022 — Munich, BY, DE

- Modeled Rabi and Electron Spin Resonance (ESR) data using techniques like Gaussian Process, CMA-ES and a custom Auto-Encoder to better understand and streamline the process of creation of Diamonds with Nitrogen Vacancies and their properties.

Internship - Business Analyst
BMW Group
03/2022 – 07/2022 — Munich, BY, DE

- Worked on handling customer feedback processing as a Big Data application within the Global Customer and Dealer Satisfaction Team at BMW. Prototyped a Document Clustering pipeline using SBERT and Doc2Vec.
- Led the process management pipeline during the market launch of the new-7 series (2022) in the European and North American Markets

Research Assistant - Reinforcement Learning
TUM - Chair of Modelling and Simulation
03/2021 – 03/2022 — Munich, BY, DE

- Learnt local & global navigation behaviors via multimodal interaction in real world 3D environments using Unity ML Agents and Open AI Gym
- Matched benchmark OpenAI benchmarks, and devised connectors to run OpenAI algorithms on packaged Unity environments.

Business Analyst
Quantiphi Analytics
07/2019 - 02/2020 — Mumbai, MH, IN

- Worked with a decision-science team on multiple use cases in Machine Learning & Computer Vision.
- Led decision-making conversations using market trends, user behavior findings, price & market constraints and data visualizations.

EDUCATION

M.Sc. Informatics
Technische Universität München — 2020 - Present
Computer Vision, Machine Learning, Motion Planning for Autonomous Vehicles,
Crowd Modelling & Simulation, Autonomous Driving, Math for Imaging and Visualization

B.E. Computer Engineering
Mumbai University — 2015 - 2019
Analysis of Algorithms, Data Structures, Machine Learning, Structured Programming Approach,
Software Engineering, Operations Research, Artificial Intelligence, Cloud Computing

Karan Shah

I connect dots and tell stories.

(+49) 0178-8888-2547 | karan.shah@tum.de
Avenariusstrasse 15, 81243 München
GitHub: https://github.com/karanfc

PROJECTS

Master-Thesis: Unraveling Topology of Dynamic Neural Networks
Keywords: Control Theory, Differential Calculus, Deep Learning, PyTorch, Python

- Conceptualize Dynamic Neural Networks (DNNs) to represent a system of nonlinear differential equations whose parameters are to be tuned. These equations represent the state space of any LTI system.
- Introduce a mapping from the state space matrices to the topology of the DNNs and to train the network using reverse mode differentiation

Crowd Modelling and Simulation of the extended SIR model using OpenAI and Unity3D
Keywords: Unity3D, Dynamical Systems, Linear Algebra, C#, Reinforcement Learning, OpenAI, Gym

- Created a compartmental model in Unity3D implementing an extended SIR model (with vital dynamics + biological factors)
- Modeled different urban environments and simulated movement of population in different scenarios
- Used OpenAI Gym to train a RL-model to get the agents in the environment to learn social distancing

Trajectory Extraction and Pose Estimation of moving traffic using Detectron2 (Meta)
Keywords: Object Detection, Tracking, Computer Vision, Python, Detectron2, Trajectory Extraction

- Configured and Trained a deep learning model (detectron v2) for object detection and tracking (trajectories of cars, buses, trucks, motorcycles, bicycles and unknown objects)
- Ran benchmark tests on the Munich Highlight Tower Dataset with state-of-the-art accuracy
- Added a trailer/double-detection processor to improve generated trajectories for vehicles with trailers and container cargo based on relative position and velocity.

.

PUBLICATIONS

P. Sonawane, K. Shah, P. Patel, S. Shah and J. Shah, "Speech To Indian Sign Language (ISL) Translation System," 2021 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), Greater Noida, India, 2021, pp. 92-96, doi: 10.1109/ICCCIS51004.2021.9397097.

SKILLS

Product Design, Storytelling, Prototyping, Modelling & Simulation, Optimization, Pattern Matching, Reinforcement Learning

RESEARCH INTERESTS

Dynamical Systems, Chaos Theory, Number Theory, Theoretical Computer Science