Rajkumar Vaghashiya

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Education

Saarland University March 2023 — Ongoing
Master of Science in Computer Science *Saarbruecken, DE*

- Grade: 1,3 (German grading)
- Relevant courses: ML, Human-Computer Interaction, High Level Computer Vision, Quantum AI, Quantum Information
- Saarland Scholarship Summer 2024

Pandit Deendayal Energy University Aug 2016 — Aug 2020
Bachelor of Technology in Computer Engineering *Gandhinagar, IN*

- GPA: 9.89 / 10.0 (Gold Medalist)
- Awarded Merit-cum-Means Scholarship 2016 to 2020
- Research Project: Clinical AI for Ophthalmic Disorder Prognosis (at Forus Health Pvt. Ltd.)

Experience

AIQX (AI and Data Science) Intern Sep 2024 — Feb 2025
Bayerische Motoren Werke AG (BMW Group) *Munich, DE*

- Implemented anomaly detection models for multimodal data to ensure production quality assurance and safety
- Generated significant cost savings through early error identification and reducing future servicing expenses
- Achieved reliable real-time image analysis using Vision-Language models for regulatory compliance in Component Traceability. Python, PyTorch, OpenCV, Skimage

Research Assistant (HiWi) Oct 2023 — Aug 2024
Max Planck Institute for Informatics *Saarbruecken, DE*

- Formulated the quantum equivalent of a ML model for optimization using Adiabatic Quantum Computing
- Developed and evaluated experimentation of the quantum model for 3D Vision tasks. Python, PyTorch, DWave

Freelance Developer Nov 2021 — Sep 2022

- Developed object recognition pipeline with 80% accuracy for inventory management using TensorFlow, OpenCV
- Utilized unsupervised learning for real-time object segmentation from retail shelf images with 90% accuracy
- Computed object recognition from a given unlabeled dataset via embedding similarity from a pre-trained model

Clinical AI Research Intern Jan 2021 — June 2021
Forus Health Pvt. Ltd. *Bengaluru, IN*

- Curated and clinically-verified a dataset for eye disease diagnosis
- Implemented a classification model using TensorFlow for disease severity grading with accuracy rate (AUC) 0.98
- Incorporated SHAP for explaining the influence of parameters on model predictions

Jan 2020 — July 2020

- Led team of 5 interns in developing clinician-controlled image processing pipeline for disease parameter analysis
- Achieved results within ±8% of the research benchmark SIVA in 3 months using OpenCV and TensorFlow
- Conducted review of clinical AI-based retinal imaging telecare services in India to improve care outreach

Teaching Assistant — AI for Everyone (20IC206T) Sept 2020 — Dec 2020
Pandit Deendayal Energy University *Gandhinagar, IN*

Machine Learning Intern June 2019 — July 2019
Capgemini *Gandhinagar, IN*

- Developed a semantic search tool for impact analysis in software testing with 95% accuracy
- Generated embeddings using a pre-trained language model (ELMo) for semantic mapping of test cases
- Implemented an interactive tool for visualizing the search results using Python, t-SNE, and matplotlib

Projects

GenAI for Interactive Systems Nov 2023 — Apr 2024
Human-Computer Interaction Lab, Saarland University *Saarbruecken, DE*

- Analyzed the opportunities and challenges of utility of GenAI in HCI Design phase
- Developed reproducible prompt strategies to generate conceptual designs to aid designers in product ideation
- Simulated user roles and strategies such as designer and critic for custom goal-based design evaluation
- Assessed the strategies in DALL-E, ChatGPT, and Bing Chat for controlled design diversification

3D Pose Tracking Apr 2023 — Sep 2023
Deutsches Forschungszentrum für Künstliche Intelligenz (DFKI) *Saarbruecken, DE*

- Merged and optimized codebases with near real-time 3D human pose tracking from single view camera setup
- Utilized the generated pose data for simulation of 3D virtual twin of human actors in Unity

Synthetic Data for Boosting AI Apr 2023 — Sep 2023
DFKI *Saarbruecken, DE*

- Leveraged synthetic data for robust real-time object segmentation and recognition in retail shopping carts
- Achieved 90% accuracy rate in diverse environments with a custom-trained YOLOv8 model using PyTorch

MediSinGAN July 2021 — Feb 2022
EEML Summer School *Remote*

- Adapted a deep learning model (SinGAN) model for synthetic medical image generation using a single image input
- Reduced training time by 10% using JAX to speed up the generation
- Assessed its applicability in image-to-image translation and image segmentation
- Ranked among the top 3 projects at EEML Summer School 2021

Intelligent Cell-Line Analyzer Aug 2019 — Feb 2022
PDEU *Gandhinagar, IN*

- Designed and implemented deep learning pipeline for medical image analysis using Python, TensorFlow, OpenCV
- Developed a custom image processing pipeline with near real-time image segmentation
- Applied data augmentation strategies to achieve balanced class distributions
- Trained a custom autoencoder for image denoising and a custom CNN for image recognition
- Achieved an accuracy rate of 0.88 for cancer cells and 0.98 for normal cells across the entire pipeline
- Maintained accuracy for newer classes using only 10% of previous samples via transfer learning

AI-powered Microplate Reader for Point-of-Care Applications Sept 2020 — Nov 2020
Indian Institute of Science (IISc), Bengaluru *Remote*

- Developed a real-time microplate image segmentation pipeline with adaptive calibration
- Implemented qualitative and quantitative colorimetric analysis of microplate wells using Python, OpenCV

SESAU: Secure and Smart University Nov 2017 — Jan 2019
PDEU *Gandhinagar, IN*

- ORSP-PDEU funded IoT project (INR 145,000) to simulate a smart university for resource optimization
- Deployed prototype modules in Computer Lab for equipment control and authorized access
- Utilized Raspberry Pi for prototyping and communicated via MQTT with the data structured in JSON objects
- Achieved 50% energy savings for light and PC usage during idle time

Skills

Coding:	**Python**, C, C++, Java
Frameworks:	**TensorFlow, Keras, PyTorch**, Qiskit, Flask, JAX
Tools and Technologies:	**Git, Linux, OpenCV, Intel OpenVINO**, NLP, Skimage
	Docker, Google Cloud Platform, HTML, CSS, Javascript
Languages:	English (C1), German (B1)
	Gujarati (C2), Hindi (C2)

Extracurricular

Google Developer Student Clubs - Campus Lead — Aug 2023 –Ongoing

- Organized (bi-)weekly technical sessions on cutting-edge technologies and developments in Computer Science, especially AI
- Organized Machine Learning Study Jam series with hands-on coding tutorials on classical ML algorithms

Eastern European Machine Learning Summer School: EEML — July 2021, 2022
Selective Admission — *Budapest, HU*

Qiskit Global Summer School on Quantum Machine Learning: QGSS — July 2021
Selective Admission — *Remote*

- Certificate of Quantum Excellence (Score: 100%)

Edge AI for IoT Developers Nanodegree: Udacity-Intel — Dec 2019 – July 2020
Selective Scholarship — *Remote*

Publications

- Vaghashiya, R., Shin, S., Chauhan, V., Kapadiya, K., Sanghavi, S., Seo, S., & Roy, M. (2022). Machine Learning Based Lens-Free Shadow Imaging Technique for Field-Portable Cytometry. *Biosensors*, *12*(3). doi:https://doi.org/10.3390/bios12030144
- Vaghashiya, R., Kapadiya, K., Nandwani, I., Thakore, R., Seo, D., Seo, S., & Roy, M. (2020). An Optimized Neural Network Architecture for Auto Characterization of Biological Cells in Digital Inline Holography Micrographs. In *2020 IEEE International Conference on Healthcare Informatics (ICHI)*. doi:10.1109/ICHI48887.2020.9374330
- Thakore, R., Vaghashiya, R., Patel, C., & Doshi, N. (2019). Blockchain - based IoT: A Survey. *Procedia Computer Science*, *155*, 704–709. doi:https://doi.org/10.1016/j.procs.2019.08.101
- Vaghashiya, R., Thakore, R., Patel, C., & Doshi, N. (2019). IoT – Principles and Paradigms. In *International Journal of Advanced Trends in Computer Science and Engineering* (Vol. 8(1.6), pp. 153–158). doi:https://doi.org/10.30534/ijatcse/2019/2481.62019

Certifications

- IBM Certified Associate Developer - Quantum Computation using Qiskit v0.2X — Feb 2022
- Machine Learning Engineering for Production (MLOps) (Coursera) — Sept 2021
- Generative Adversarial Networks (Coursera) — April 2021
- AI for Medicine (Coursera) — July 2020

Achievements

- IBM Quantum Challenge - Fall 2021: Advanced (Score: 100 %) — Nov 2021
- IBM Quantum Challenge Africa 2021: Advanced (Score: 100 %) — Sept 2021
- Winner of Schweickert Challenge in Hackdays Rhein-Neckar 2021 — March 2021
- Winner of Capgemini iSprint 2019 (West Divison) — August 2019
- Winner of Economic Times Campus Stars 2.0 (2018-19) — July 2019