# Rajkumar Anilkumar Vaghashiya

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## Education

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

- GPA: 9.89 / 10.0 (Gold Medalist)
- Awarded Merit-cum-Means Scholarship 2016 to 2020 (Top 3 in the class each semester)
- Thesis: Clinical AI for Ophthalmic Disorder Prognosis (@ Forus Health Pvt. Ltd.)

## Experience

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

- Analyzed the clinical applicability of digital retinal biomarkers in the detection of systemic disorders (such as Bipolar and Alzheimer's)
- Developed an explainable ML pipeline for the diagnosis of Diabetic Retinopathy (DR) and Hypertensive Retinopathy (HTR) using digital biomarkers extracted from the retinal vasculature. Python, OpenCV
- Achieved ROC-AUC $\sim$ 0.70 for DR detection and stage-grading; 0.98 for HTR detection; 0.89 for HTR stage-grading
- Assessed the applicability of clinical AI in retinal imaging-based teleophthalmology services in India

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

**Clinical AI Research** Jan 2020 — July 2020
*Forus Health Pvt. Ltd.* *Bengaluru, IN*

- Developed a clinician-in-the-loop AI pipeline for the extraction and quantification of retinal vascular parameters with results within $\pm$8% of the research benchmark tool SIVA. Python, OpenCV, Django
- Organized weekly brainstorming sessions for ideation, need analysis, and literature review on Dry Eye Disorder screening and anterior segment imaging
- Analyzed confounding factors in the grading criteria used by Retinopathy of Prematurity specialists and formulated a decision support system plan to address these issues

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

- Developed a test-case similarity search tool for impact analysis in software testing, with an accuracy of $\sim$ 95-98 %, that landed the first prize in Capgemini iSprint 2019 (West Division)
- Utilized NLP for tabular data processing and fine-tuned pre-trained ELMo (Embeddings from Language Models) to extract query and test-case embedding for semantic mapping
- Designed an interactive UI visualization scheme for the retrieved results using Python, t-SNE, and matplotlib

## Projects

**MediSinGAN** July 2021 — Ongoing
*Jonas Adler, EEML* *Remote*

- Implemented SinGAN architecture in JAX for the generation of realistic synthetic medical imaging data using a single training image and achieved a 20% reduction in training time
- Evaluated the model applicability in MRI cross-modality image-to-image translation, Synthetic brain tumor generation, and Medical image segmentation (Histopathology)

**Portable AI-powered Microplate Reader for Point-of-Care Applications** Sept 2020 — Nov 2020
*Dr. Abhijit Roy, Indian Institute of Science* *Remote*

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

**Intelligent Digital Inline Holographic Micrograph (DIHM) Cell Analyzer** Aug 2019 — Aug 2020
*Dr. Mohendra Roy, PDEU* *Gandhinagar, IN*

- Developed an end-to-end pipeline to: Image cell-lines via DIH; Segment cell-lines in DIH micrograph; Enhance cell-signal using CNN-based Autoencoder; Characterize cell-line using CNNs
- ROC-AUC >0.98 for RBC, WBC, and microbeads; >0.88 for cancer cells HepG2 and MCF7
- Easy accommodation of newer cell-lines using transfer learning. Python, TensorFlow, OpenCV, Flask

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

- ORSP-PDEU funded IoT project to simulate a smart university for resource usage optimization
- Deployed prototype modules in Computer Lab for Light Control, Lab Temperature Control, and Authorized Personnel Access. Raspberry Pi, Arduino, MQTT, Firebase, MongoDB, Python

## Publications

- Kamaraj, P., Annamalai, A., Vaghashiya, R., Kulkarni, M., Kazi, A., & Appaji, A. (2021). *Clinically Applicable Artificial Intelligence for Retinal Imaging based Teleophthalmology for Primary Eye Care in India: A Review.* Submitted.
- Vaghashiya, R., Chauhan, V., Kapadiya, K., Sanghavi, S., Seo, S., & Roy, M. (2021). *A smart and portable telemedicine device for auto characterization of pathological samples.* Submitted.
- 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

## Extracurricular Training

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

- Certificate of Quantum Excellence (Score: 100%)

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

- MediSinGAN selected among the top 3 Projects at the School

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

## Certifications

- IBM Certified Associate Developer - Quantum Computation using Qiskit v0.2X
- Machine Learning Engineering for Production (MLOps) (Coursera)
- Generative Adversarial Networks (Coursera)
- AI for Medicine (Coursera)

## Achievements

- IBM Quantum Challenge - Fall 2021: Advanced (Score: 100 % )
- IBM Quantum Challenge Africa 2021: Advanced (Score: 100 % )
- Hackdays Rhein-Neckar 2021: Schweickert Challenge winner
- Economic Times Campus Stars 2.0 (2018-19) winner

## Skills

**Coding**: Python, Java, C, JavaScript, HTML, CSS

**Tools/Technologies/Frameworks**: TensorFlow, Keras, OpenCV, Image processing, Computer Vision, Intel OpenVINO, Flask, PyTorch, JAX, Qiskit, Jupyter, LaTeX, Figma, Git, Ubuntu, Shell, Google Cloud Platform, Docker, Kubernetes

**Languages**: English, Gujarati, Hindi

## Academic Service & Extracurricular Activities

**Technical Head** | Encode – Coding Club of PDEU — Aug 2016 — June 2019
**Logistics & Finance Head** | Jharokha – Literary Club of PDEU — Aug 2016 — June 2019
**Technical Head** | Computer Society of India – PDEU Student Chapter — May 2017 — June 2019
**Student Coordinator** | Training and Placement Cell – PDEU — Feb 2018 — Feb 2019
**Civic Intern** | Andhjan Shikshan Mandal, Surat — June 2017 — July 2017