

# VENKATKUMAR RAJAN

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## EXPERIENCE

### Business Analyst | Generative AI Engineer

Dec 2023 to present

EXL Service

Noida, India (Remote)

- Built a real-time invoice parsing system using Generative AI, implementing an end-to-end solution leveraging Azure services. Managed data ingestion through **Azure Data Factory**, utilized **Azure AI services** for document processing, stored extracted data in **Azure Blob Storage**, and deployed the project through a CI/CD pipeline. As per client requirements, I also developed a **Power Automate** pipeline to streamline and enhance workflow automation
- Led high-level healthcare analytics initiatives in collaboration with a Fortune top 5 healthcare company, driving the development of the end-to-end eAppeal agent pipeline. This involved leveraging Azure OpenAI and advanced NLP techniques for data extraction from CMS-1500 forms into flat files, designing automated functions for form filling, generating appeals for denied claims, providing comprehensive document analysis, and building robust ADF pipelines to seamlessly transfer data from Azure Blob Storage to SQL Server databases.
- Developed Generative AI-integrated proof of concepts aimed at optimizing workflow efficiency for document processing. Delivered impactful presentations on these concepts to potential clients, driving new business opportunities.
- Designed and developed data models in SQL Server Management Studio and created interactive Tableau dashboards for operational and management reporting.
- Facilitated knowledge transfer sessions on Generative AI solutions in the healthcare industry for over 10 onshore and offshore employees, enhancing their understanding of business processes and technical solutions.

### Machine Learning Engineer

Sept 2022 to Oct 2023

AUGRAY LLC

Chennai, TamilNadu, India

- **Real-Time Ball Fault Identification (Sole Contribution):** Collaborated with a sports ball manufacturing firm to develop a computer vision based ball fault detection system using Nvidia Jetson AGX. Achieved **90%** accuracy, significantly improving production efficiency.
- **Automated 3D Reconstruction using Generative AI with Photogrammetry and NeRF (Sole Contribution):** Implemented an automated 3D reconstruction pipeline using combination of traditional and Generative AI approach, achieving **95%** accuracy for non-reflective objects and **70%** for reflective objects. Explored NeRF-based algorithms to enhance reconstruction quality, reducing manual effort and improving surface detail representation.
- **Wall Segmentation with Color Schemes (Sole Contribution):** Collaborated with a leading paint manufacturing company to develop a computer vision-based wall and floor segmentation system. Designed and implemented a deep learning approach, achieving **80%** accuracy in production.
- **Foot Detection and Virtual Shoe Try-On:** Our team developed a virtual shoe try-on system using PyTorch Keypoint R-CNN, predicting foot positions and placing keypoints for accurate shoe alignment. I led the team, overseeing extensive research and processing over 10,000 images. We achieved over **79%** accuracy, enhancing the project's reliability and precision.
- **Additionally, I created a POC for Flyer generation and Face Texture Generation, Site-based Chatbot.**

## TECHNICAL SKILLS

- **Programming Languages:** Python, C++
- **Framework:** Tensorflow, PyTorch, Pytorch Lightning, Fastai, OpenCV, Kornia, Gym, pygmpy, pyspark, prophet, NetworkX, Pyg
- **Backend Deployment:** FastAPI, Flask, Docker, Kubernetes, Kubeflow, MLflow
- **Cloud platforms with AI Development:** Azure, AWS
- **Database:** MongoDB, MySQL
- **Edge device:** Nvidia Jetson AGX, Raspberry Pi
- **Data Visualization:** PowerBI, Tableau
- **Automation Development:** Power App, Power Automation
- **GenAI Framework:** Langchain, Docling, LlamaIndex, PandasAI, Groq, Ollama, Langchain, CrewAI, Ragas, LLMops, Agent development (phidata, Autogen, langflow, langgraph), TimeGPT
- **Experienced in end-to-end implementation of text, image, audio and financial data, with a strong background in deep learning, machine learning, reinforcement learning, and graph neural networks (GNN) from academic.**

## EDUCATION

### M.Tech. in Artificial Intelligence and Machine Learning

Rajasthan, India

Birla Institute of Technology and Science, Pilani

Mar 2023 - Mar 2025 | Grade - **69%**

**Coursework:** Deep Reinforcement learning, Graph Neural Network, Social Media Analytics, Video Analytics, Distributed Machine learning

## PAPER PUBLICATION

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- A Generative Approach to High Fidelity 3D Reconstruction from Text Data[[Arxiv](#)]
- Advancing Audio Fingerprinting Accuracy with AI and ML: Addressing Background Noise and Distortion Challenges [[IEEE](#) ]
- Implementation of PCB Layout using CNC Machine Controlling with Wireless Communication [[IRJIET](#) ]

## CERTIFICATION AND ACCOMPLISHMENT

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- **Certification** : Nvidia AI specialist, Tensorflow Developer, Azure AI and Reinforcement learning specialization
- **Udacity Nano Degree** : Introduction to Self Driving Car, Self Driving Car Engineer
- **Accomplishment** : **Kaggle 1 x Master** (NoteBook) & **Kaggle 3 x Expert** (Competition, Dataset, Discussion)

## PERSONAL PROJECT

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- **A Generative Approach to High Fidelity 3D Reconstruction from Text Data ([Link](#))** : My research is in progress, focusing on building text or single-image-to-3D reconstruction using generative AI, deep learning, reinforcement learning, and traditional image processing approaches. The process involves converting user text input into visual representations through text-to-image generation, followed by advanced preprocessing methods like GAN-based upscaling and U2Net-based background removal to enhance image quality. User-provided images are also refined using prompts, with reinforcement learning optimizing low-light conditions and reflections. These preprocessed images are then used for single-image 3D reconstruction through neural networks, producing high-quality 3D models evaluated for real-world applicability.
- **Advanced Video Analytics for Vehicle Behavior Analysis ([Link](#))** : My final dissertation focuses on developing a robust video analytics system for vehicle behavior analysis, using the KITTI dataset for detection, tracking, and decision-making. A key aspect of this research involves analyzing car speed behavior based on distance, which introduces significant complexity to the decision-making process. By integrating advanced computer vision and machine learning techniques, this work aims to enhance the accuracy and reliability of vehicle movement prediction and behavior analysis.
- **Advanced Real-Time Video Analysis and Recruitment Tool([Link](#))** : I developed a real-time video analysis system with features like eye contact detection, emotion, age, and gender recognition, inspired by the high-accuracy Gazelle model. Building on my previous work with the Retina model and Deep Face, I enhanced the system's performance and accuracy. I plan to add dynamic candidate selection based on recorded metrics and integrate a conversational AI bot for a seamless user experience. This project aims to create an innovative and data-driven recruitment tool.
- **Food Nutrition Analysis Using Generative AI Tool ([Link](#))**: I developed a high-level prototype for food nutrition analysis using the Google Gemini model and Streamlit. This project focuses on leveraging advanced image captioning capabilities through prompt engineering and API integration. Although the model delivers impressive results, the current accuracy still requires domain-level expertise for detailed ingredient analysis, emphasizing the need for human intervention to refine the results.
- **Drag-Based Interactive Image Captioning Tool ([Link](#))**: I've enhanced my LLM-powered dragging-based image captioning tool by adding a novel feature that allows users to ask follow-up questions, with responses provided in both text and audio formats across multiple languages. This improvement makes the tool more interactive and accessible, offering practical applications in areas like manufacturing, real-time security surveillance, and drone development. By simply dragging a specific section of an image, users receive accurate and context-aware responses, and the follow-up query feature ensures even more detailed and relevant insights.
- **Generative AI-Powered RAG/CAG and Knowledge Graph System ([Link](#))**: I developed a Generative AI project focused on building a robust RAG (Retrieval-Augmented Generation), CAG (Context-Augmented Generation), and knowledge graph system. This system integrates data from diverse sources like PDFs, Excel files, databases, YouTube, and websites, enabling efficient information retrieval and context-based generation. By leveraging advanced AI models, the project enhances knowledge extraction and response generation, offering a scalable and intelligent solution for data-driven insights.
- **Face Based Attendance System using Nvidia Jetson AGX ([Link](#))**: A face-based attendance system uses facial recognition technology to identify and verify an employee's or student's facial features, automatically recording their attendance. This non-contact approach is especially effective for managing employees working remotely or out in the field.
- **Comprehensive Computer Vision Solutions ([Link](#))**: I've developed several computer vision-based projects, covering areas like object detection, tracking, and real-time video analysis. If you'd like to explore them, please check my complete project portfolio.