

Tushar Awadhesh Singh

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EDUCATION

University of Maryland College Park

Masters in Machine Learning

Expected May 2026

Vidyalankar Institute of Technology, Mumbai, India

Bachelor of Engineering in Electronics Engineering; CGPA: 7.84

Aug 2017 - Jun 2021

SKILLS

Languages: Python, C++, Java, Scala, R

Technologies: Flask, Spring Boot, SQL, MongoDB, GraphQL, PySpark, Elasticsearch

Libraries: TensorFlow, OpenAI, Pandas, OpenCV, LangChain, DeepSpeed, Dask, Keras, Detectron, scikit-learn, JAX, PyTorch, PyYAML

Tools & Platforms: Git, Jenkins, Airflow, ROS, GCP, AWS, Docker, Postman, RASA, Heroku, Streamlit, Hadoop

PROFESSIONAL EXPERIENCE

Tata Consultancy Services Ltd

ML Engineer/Researcher

Mumbai, India

Jun 2021 - Aug 2024

- o Achieved precision of **0.97** in table detection and **0.94** in table extraction and F1-score of **0.97** and **0.92**, surpassing our state-of-the-art model. Effectively addressed both bordered and borderless table challenges on the Marmot dataset. The work is currently under review and was delivered as part of the **TCS Wisdom AI package**.
- o Cheque Signature Verification: Designed a CTS system, reducing EER to **2.4%** and manual intervention by **40%**, collaborating with researchers at **TCS Paceport CMU** using CNNs and image enhancement. Deployed the solution on AWS, leveraging services such as **EC2** and **S3** for scalable storage and processing.
- o Floor Plan Analysis: Automated area detection using **Masked Fast R-CNN** and **Vision Transformers**, reducing delivery time by **55%**. Converted 2D plans into 3D visualizations with **AtlasNet** and **Pix2Mesh**. Implemented Docker Compose to manage multi-container applications, facilitating seamless integration of the various components involved in area detection and 3D visualization.
- o Led the Tech FM chapter at TCS with **30,000+** members, mentoring interns and executives on AI/ML.
- o Created and maintained CI/CD pipelines using **Jenkins**, **Airflow** automating build, test, and deployment processes for reliable software releases. Led technical troubleshooting and performance tuning, enhancing system scalability and performance of the Pipeline to manage increasing transaction volumes efficiently.

Tata Proengage

AI Developer

Mumbai, India

Jul 2023 - Aug 2024

- o Worked on India's first multilingual and multimodal government scheme recommendation bot (Under Development).
- o Developed a multilingual voice-enabled solution using **Whisper** and modified **Wav2Vec** for accurate ASR across multiple languages. Utilized **mBERT** and **XLM-RoBERTa** for NLU to interpret user queries, focusing on government scheme recommendations.
- o Leveraged GPT-4 Multilingual and mT5 for personalized, context-aware recommendations in native languages and implemented **Tacotron 2** and **FastSpeech 2** for natural, multi-language TTS outputs.
- o Optimized **Wav2Vec 2.0** and **XLM-RoBERTa** to improve multilingual performance and speech recognition accuracy. Explored DQN and Policy Gradient Methods to build a dynamic recommendation engine that adapted to user feedback.
- o Enhanced the solution with **SpeechT5** for seamless handling of spoken and written inputs.
- o Taught NGO women workforce various AI tools to assist in their daily chores.

MedTourEasy Ltd

Data Analyst Intern

Noida, India

Aug 2020 - OCT 2020

- o Developed and deployed a machine learning model using advanced classification algorithms, including Random Forests and **Gradient Boosting Machines (GBM)**, resulting in a **25%** increase in donor turnout and enhanced campaign effectiveness.
- o Engineered and integrated a scalable analytics dashboard with **Tableau** for dynamic and interactive data visualization, coupled with **MongoDB** for efficient and scalable data management, enabling detailed analysis of medical facility performance metrics across multiple regions.

RESEARCH AND PROJECTS

DC Generator | TCS Rapid Labs

Researcher (Guide: Dr. Sunil Kumar)

2023-2024

Framework to Convert Hand-Drawn POC Sketches into Deployable Websites

- Utilized **YOLOv7** for precise object detection and image segmentation, combined with **K-Nearest Neighbors (KNN)** for feature classification, to extract and align design elements from hand-drawn sketches.
- Developed an automated pipeline to convert design elements into standards-compliant HTML, CSS, and JavaScript, applying **Pix2Pix** and Semantic Segmentation for improved design fidelity.
- Integrated motion capture and procedural animation for responsive web elements, used Reinforcement Learning (**RL**) for layout optimization, and employed Neural Style Transfer for blending hand-drawn styles with modern aesthetics.
- Created reusable Web Components with CSS Animations and Transitions, and implemented an AI-driven recommendation engine for diverse design options, supported by Generative Adversarial Networks (**GANs**) for interactive prototyping.
- Applied user testing analytics and A/B Testing to continuously validate and refine designs, ensuring an optimal user experience and performance.

Calvision

Developer

2021-2023

Calorie Prediction System Using Advanced Computer Vision Techniques

<https://www.linkedin.com/feed/update/urn:li:activity:6731645057734082560/>

- Enabled instant calorie predictions by capturing images or videos of meals, eliminating manual data entry and focusing on a curated selection of foods.
- Combined **DepthNet** and **YOLOv4** for volume estimation by generating depth maps from single images and integrating bounding box data, with **MonoDepth2** for accurate depth estimation from various angles.
- Utilized **NeRF** and **DPT** for 3D reconstruction of food models from video sequences, improving volume estimation by analyzing multiple viewpoints.
- Developed weight prediction models using Support Vector Regression (SVR) and Neural Networks, extracting visual features for accurate weight estimation, complemented by advanced segmentation with **DeepLabV3+** and **Mask R-CNN**.
- Optimized the solution for mobile devices with **TinyML** and **TensorFlow Lite**, employing quantization and pruning for real-time performance, and utilized Edge TPU and NPU acceleration for enhanced inference speed.
- Created a mobile-first system for on-device inference, providing users with instant calorie predictions without cloud dependency.

Mentor Recommendation Web App Using ML

Undergraduate Thesis (Guide: Dr. Sheetal Patil)

2020-2021

- Implemented a **T5 model** (Text-To-Text Transfer Transformer) using the **RASA** framework to create an intelligent bot for initial mentorship and QA support on government policies.
- Leveraged T5's text generation capabilities to provide accurate, contextually relevant responses to user inquiries.
- Enhanced mentor recommendations by adapting Neural Matrix Factorization (**NeuralsMF**) and incorporating **DropoutNet**, achieving a **44%** improvement in top-k prediction accuracy.
- Adjusted matrix factorization algorithms and applied dropout regularization to capture user preferences better and address overfitting, improving recommendation diversity and relevance.
- Developed a hybrid recommendation engine that processes user profiles and preferences for personalized mentor suggestions, enhancing the mentoring process effectiveness.
- Designed the bot to handle a broad range of topics, providing initial guidance on government policies acting as mentor and answering specific queries with contextually appropriate responses using advanced natural language understanding.

AWARDS & ACHIEVEMENTS

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| • Tata Consultancy Services: Xcelerate Warrior Award for mentoring associates in upskilling. | 2023 |
| • Tata Proengage: Service Award for contributions to NGOs. | 2023 |
| • Tata Consultancy Services: On Spot Award for Virtuoso Delivery. | 2022 |
| • Tata Consultancy Services: Fresco Miles Award for being among the top 1% in in-house skills competition. | 2022 |
| • Smart India Hackathon: Finalist. | 2020 |

EXTRA CURRICULAR ACTIVITIES

- Tata MyPurpose (Corporate Social Wing): Organized beach cleaning drives and upskilling programs for the underprivileged; organized TCS InQuizitive 2023 (India's largest inter-school IT quiz competition).
- NSS Volunteer: Conducted blood donation and medical camps; State-level badminton player.