Kanchan Vinayak Bhale

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Education

MKSSS's Cummins College of Engineering for Women — Pune, Maharashtra
Bachelor of Technology in Electronics and Telecommunications, CGPA: 8.15/10; 3.511/4 — *Aug. 2018 – May 2022*
Key Courses : Engineering Mathematics [A], Programming Languages [O 10/10 grade], Data Structures [A], Signal and Image Processing [A+], Artificial Intelligence [O], Computer Networks [A], Operating Systems [A], Object-Oriented Programming [A+], Soft Computing [A], Natural Language Processing [A+], Six Sigma [White Belt], Economics [A+]

Indian Institute of Science (Credit based) — Bangalore, Karnataka
Proficiency Coursework, Grade: A — *Aug. 2023 - Dec 2023*
*S*ix-month graded certification in "Proficiency in Statistics for Data Science" including EDA Capstone. (link)

Industry Experience

Boeing India Pvt. Ltd. — Bangalore, India
Data Scientist : Level 2 *(ECFP Multi-skill Engineer)* — *May 2023 – Present*

- **[End-to-End ChatBot RAG Pipeline]** - Designed and implemented a complete Retrieval-Augmented Generation (RAG) pipeline to parse unstructured documents, store extracted information in a vector database (ChromaDB), and retrieve it using advanced search parameters. Led the development of the back-end system using Flask, ensuring robust and efficient API integrations for user creation and personalized recommendations. Collaborated closely with front-end engineers to deliver seamless APIs for filtering results based on user preferences. Fine-tuned a Sentence Transformer using an unsupervised learning algorithm to enhance retrieval accuracy, with embedding visualizations done in TensorBoard.
- **[Computer Vision for Mitigating Foreign Object Debris in Aircraft Assembly]** - Conducted a research-driven project to develop a computer vision algorithm aimed at detecting and mitigating foreign object debris (FOD) during aircraft assembly. Collected, annotated, and curated datasets of 5000+ images, then trained multiple models to evaluate accuracy and performance. Built a unified evaluation script to benchmark the accuracy of the entire system. Designed innovative pure computer vision algorithms to address challenges encountered during development. Applied advanced image processing, enhancement, and data augmentation techniques tailored to the specific problem. Deployed a real-time computer vision model on high-performance computing (HPC) infrastructure and exposed APIs for streamlined model access.
- **[Boeing Conversational AI]** - Meticulously worked in Boeing Conversational AI (code assistant project). Hands-on experience on Codestral, Ollama powered LLMs for auto-completion, embedding and re-ranking operations using LLM and generative AI.
- **Published** 2 Invention Disclosures in Deep Learning for Fault Identification in Composite Manufacturing. .

Systems Safety Engineer — *Aug. 2022 – April 2023*

- Worked on multiple safety analysis and assessments including Functional Hazard Assessment (FHA), System Requirements, Preliminary System Safety Assessment (PSSA), System Safety Assessment (SSA), Fault Tree Analysis (FTA), FMEA and Common more analysis (CMA).
- Familiar with AC/AMJ 25.1309, SAE ARP4754A, SAE ARP4761, SAE ARP5150, RTCA DO-178 and RTCA DO-254. Worked on Aircraft Systems such as Thrust Reverser, Fuels and Propulsion
- Co-authored first 777-9 Fuel System PSSA published in Boeing library.
- One of the 38 selected members (globally) for a very competitive rotation program across Boeing Enterprise, Employee Career Foundation Program (ECFP). One of the 5 selected Indian Employees.

Machine Learning Intern *- Systems Engineering* — *May 2021 – July 2021*

- Developed a predictive model for production system pipeline using Machine Learning algorithms and structured database for cycle time prediction and correction using API, natural language processing and Azure tools

Research Projects-[portfolio]

Charity Recommendation Engine Using Advanced NLP [thesis] [github]
Guides: Mrs. A. Stewart, Dr. M. Dixit, Mrs. V. Muller, Givetastic Germany, BTech. Research Thesis

- Developed a charity recommendation engine using sentiment analysis, keyword extraction, and pattern recognition, trained on the Charity Navigator dataset using Naive Bayes, Logistic Regression, and Support Vector Machines for cause prediction, achieving up to 98.3% accuracy after class balancing and fine-tuning.

- Integrated the model with a Streamlit web application, enabling real-time charity recommendations based on article sentiment, leveraging APIs and scraping tools to fetch reliable charity data, and incorporating advanced classification metrics like F1 scores and confusion matrices for robust performance validation.

Deep Neural Network Pain Indicator Based on Facial Recognition [link]

Guides: Dr. A. Deshpande, Signal and Image Processing Coursework Capstone Project

- Developed ViT and EfficientNet-V2 combination model, fine-tuned using PyTorch Lightning on CUDA GPU. Optimized with SAM and LAMB, achieving 96. 7% AUROC and 93. 4% F1 score in the pain detection baseline datasets with HPC clusters accelerating training by 4x.
- Utilized advanced data augmentation (Albumentations), curriculum learning, and ensemble techniques, achieving performance with 25% lower inference latency through quantization-aware training and ONNX optimization for deployment in real-time pain assessment systems.

Prescription Classifier Using Multi-Modal Large Language Models [link]

Guides: Dr. P. Patil, NLP Coursework Capstone Mentored By Researchers From Microsoft

- Developed a predictive model for production system pipeline using Machine Learning algorithms and structured database for cycle time prediction and correction using API, natural language processing and Azure tools
- Incorporated medical domain specific sequence-to-sequence objectives and image-to-text alignment strategies, utilizing prefix tuning and dynamic token masking to enhance classification accuracy on unstructured, noisy prescription data.

Digital Audio Equalizer [link]

Guides: Dr. A. Deshpande, Pre-final Year Research Thesis

- Developed audio equalizer using MATLAB and Simulink, implemented a 10-band graphic equalizer with octave-based center frequencies and FIR bandpass filters to achieve linear phase response, leveraging frameworks like PyTorch for ML-driven filter optimization.
- Integrated unsupervised clustering and reinforcement learning, to dynamically adjust gain and filter parameters for enhanced audio personalization and frequency response accuracy across multimodal audio profiles

Publication

1. **Conceptual Design of a Mars Constellation for Global Communication Services using Small Satellites**. IAC20, D3, 2A, 2, x60635, 71st International Astronautical Congress (IAC), 12-14 October 2020. **[link]**
2. **Technical Analysis of Artificial Intelligence Assisted Swarm CubeSats for Active Debris Removal in LEO**. IAC-21,A6,5,x65873, 72nd International Astronautical Congress(IAC). **[link]**
3. **Multilingual Large Language Model Transformer for Indigenous Languages**. 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025), Vienna, Austria July 27 to August 1st, 2025 . **[link]**
4. **Ethical Considerations When Deploying ML Systems**. Forty-Second International Conference on Machine Learning (ICML 2025), 13-19 July 2025. **[under review]**

Position Of Responsibilities, Awards and Scholarships

Reviewer | *Boeing AI Enterprise Design and Ethical Practices Regulatory, Boeing* 2024 – Present
Founder | *Cummins College Satellite Club, Cummins Pune* Jul 2019 – Present
Treasurer | *Cummins College Student Panel, Cummins Pune* Jul 2021 – Jun 2022
Training Tutor and Coursework Reviewer | *Annual Boeing AI/ML and Computer Vision Training* 2024
AI/ML Technical Lead | *Google developer Student Club, Cummins College* 2021 – 2022
Bangalore City Focal | *Boeing Women Inspiring Leadership* 2024 – Present
Head of Programs | *Edinburgh Women in Space Conference, Scotland, United Kingdom* 2021
Head of Marketing | *Space Connect Conference, Paris* 2020 – 2021
Board of Directors | *Entrepreneurship cell, Cummins College, Pune* 2020 – 2021

AWARDS: 7+ Boeing Pride Awards, Cummins Excellence Award for Best Outgoing Student 2022 (nomination), Girlscript Scholarship, SWE Engineer of the Week, Smart India Hackathon 2020, One of the 35 selected students for IUCAA (TIFR) Summer Research Program from applicants across India, Academic Scholarship - Deogiri Junior College.

Technical Experience - Skills and Open Source

Programming & Web: C++, Python, Javascript, linux, Java, Bash; HTML/CSS, Django, Node.js, React.
Frameworks and Cloud: CUDA, Postman, Azure, AWS (S3), ECS, Hadoop, PyTorch, TensorFlow, Pandas, MongoDB, Android Studio, Git, ROS. **Data analysis/tools**: Apache Spark, Matlab; SQL, Solidworks, Docker.