DRUMIL VIPUL KOTECHA

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### EDUCATION

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| **Mukesh Patel School of Technology Management & Engineering,** Mumbai, India | *2019-2025* |

*Bachelor of Technology (Integrated) in Computer Engineering*

* 3.59/4.00 CGPA
* Research Papers
  + LawGIC-AI: A Context-Aware Agent-Driven Legal AI Chatbot for Indian Legislation using LLMs, RAG, and Semantic Search with Qdrant
  + Multi-Objective Q-Learning for Adaptive Robot Cleaning
* Certifications
* Neo4j Certified Professional July 2024
* IBM Data Analysis with Python June 2023
* Accenture Virtual Experience Program Participant April 2023
* KPMG Virtual Experience Program Participant March 2023
* Tricentis Automation Specialist Level 1 March 2023
* Tricentis Automation Specialist Level 2 March 2023
* GDSC MPSTME – Basics in Kotlin January 2022
* Kaggle Python Certification October 2022

### WORK EXPERIENCE

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| **Java Developer Intern**, MyTradeZone B2B Networking, Sourcing & Search, Gujarat, India | *Dec 22 – April 23* |

* Learnt building production ready REST APIs in Spring Boot 3, JPA, Spring Security 6, JWT and MySQL.

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| **Python/Django Developer Intern**,Trackpoint GPS Private Limited, Mumbai, India | *May – July 2023* |

* Created app functionalities for “Tracking-App in South Africa” using Django.
* Experienced in working with Kafka, Prometheus, and Ubuntu.

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| **AI Cyber Lab Researcher Intern**,DeepCytes Cyber Labs (UK)   * Developed AI-driven solutions for cyber threat detection using machine learning and deep learning. * Designed LawGPT, an AI-powered tool for legal query handling, leveraging IPC data and semantic search. * Automated dark web scraping using Tor for secure data extraction and analysis. * Enhanced XSS detection accuracy by 95% and reduced reporting efforts by 50% through custom scripting. * Collaborated with OSINT and Red Team departments to innovate AI applications in cybersecurity. | *Jun – Dec 2024* |

### LEADERSHIP EXPERIENCE & SIGNIFICANT ACHIEVEMENTS

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| Member, Green Revolution programme, ICCE, India | *Aug - Dec 2019* |

* Participated in the International Centre for Culture & Education (ICCE) in association with United Nations Framework Convention on Climate Change (UNFCCC), World Bank Institute, NASA Climate Change and government agencies, Green (R)evolution to fight against Climate Change.

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| Executive, Taqneeq, Mumbai, India | *Dec 21 – Mar 22* |

* Artists and Guest Management Coordinator responsible for bringing celebrities to our Techfest event.

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| Executive, Social Impact, Mumbai, India | *Jan – Mar 2022* |

* Publicity Team Volunteer & Event Coordinator for Social Conclave.
* Engaged and brought in the highest number of participants from across Maharashtra.

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| Volunteer, Serve Out Smiles, Mumbai, India | *Mar 2022* |

* Contributed to the campaign, supporting animal care and nourishment.

### PROJECT DESCRIPTION

**Multi-Objective Q-Learning for Adaptive Robot Cleaning (2025)**

* Reinforcement Learning (RL) framework, specifically utilizing Q-learning, to train an autonomous cleaning agent capable of concurrently addressing four key objectives: path optimization, battery management, dirt detection and prioritization, and dynamic obstacle avoidance. We developed a high-fidelity simulation environment to train and evaluate the agent. Our results demonstrate significant improvements over baseline heuristic approaches, with the Q-learning agent achieving up to 28.5% reduction in path length for full coverage, a 40% increase in operational time through intelligent charging strategies, a 62% improvement in cleaning focus on high-dirt zones, and an 85% reduction in collisions with dynamic obstacles. This work highlights the potential of multi-objective RL to create more intelligent, efficient, and adaptive autonomous cleaning solutions.

**LawGIC-AI: A Context-Aware Agent-Driven Legal AI Chatbot for Indian Legislation using LLMs, RAG, and Semantic Search with Qdrant (2025)**

* A project showcasing a hybrid Retrieval-Augmented Generation strategy designed for legal applications, striking a balance between the strength of generative-AI, safety, and legal precision. We designed the system leveraging Streamlit, which offers an intuitive and easy-to-use user interface that also facilitates the deployment of our web application. Completeness of 70%, correctness of 90%, and retrieval accuracy of 80% have all been attained by our chatbot.

**Generating 3D Model from 2D Image (2025)**

* Generating point clouds with OpenAI’s Point-E and refining them into a mesh using Marching Cubes
* Using Microsoft MoGe for depth estimation.

**NewsGenius: Multilingual NLP System for Translation, Summarization, and Sentiment Analysis (2024)**

* Developed a system leveraging Python, PyTorch, and NLP libraries to translate, summarize, and analyze sentiment of articles in 7 languages, achieving high accuracy in translation, summarization, and sentiment analysis.

**Fashion MNIST GAN Implementation (2024)**

* Trained a Generative Adversarial Network (GAN) using TensorFlow and Keras to autonomously generate fashion items resembling provided data.

**Predictive Modeling of Student Dropout in Higher Education (2023)**

* Developed a logistic regression model with Scikit-learn to predict student dropout rates using demographic and academic data, enabling targeted retention strategies.

**Expense Management REST API (2023)**

* Built a production-ready REST API in Spring Boot 3, integrating JPA, Spring Security 6, JWT, and MySQL, and deployed the application.

**Power BI Report for Company Insights (2023)**

* Created and visualized interactive dashboards in Power BI to transform raw data into actionable insights.

**Threat Image Detection (2022)**

* Implemented a Python-based computer vision solution to detect and identify threat images in backgrounds using advanced libraries.

**Career Guidance Website (2022)**

* Developed a website with HTML, CSS, and JavaScript to help students explore career options with detailed field information.

**Gym Lifestyle Website (2021)**

* Designed a gym-focused website using HTML, CSS, JS, and PHP to provide exercise routines, techniques, and healthy diet plans.

**Food Management Application (2020)**

* Built a C++ application for calculating food bills, streamlining the billing process for users.