HARSHIT TIWARI | 24AG66R12

AGRICULTURAL SYSTEMS AND MANAGEMENT

EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2026	M.TECH	IIT Kharagpur	8.36 / 10
2024	B.Tech (Agricultural Engineering)	S.V.P.U.A.T., MEERUT, UP	8.398 / 10
2019	HIGHER SECONDARY	Gyan Sthali Academy, Auraiya, UP	76.4%
2017	SECONDARY	S. S. A. Vidyapeeth, Agra, UP	10 / 10

INTERNSHIPS

Generative AI Intern | Euphoria Infotech India Limited **[May 2025 –July 2025]**
Overview: Worked on AI-driven document intelligence and multilingual retrieval using LLMs, RAG pipelines, and OCR for education.
- Built an advanced multilingual **RAG chatbot** with LangChain, **HuggingFace**, **ContextualCompressionRetriever**, and **Groq LLMs**.
- Developed retrieval pipeline with **MultiQueryRetriever, LLMChainExtractor**, and **ChatMessageHistory** for contextual responses.
- Implemented efficient summarization with Groq LLM, advanced chunking techniques, and **ChromaDB** for semantic document processing.
- Designed Streamlit interface supporting **language detection, multilingual translation**, and interactive real-time chatbot responses.
- Contributed to a robust secure document scanner integrating **OCR** and AES-256 encryption for academic assessment workflows.

PROJECTS

Agentic Financial Analysis AI using LangGraph and RAG | Individual Project
- Designed autonomous financial analytics platform leveraging LangGraph orchestration and Groq LLMs for intelligent agent workflows.
- Built retrieval-augmented pipeline using LangChain, FAISS vector database, SentenceTransformer embeddings for contextual insights.
- Integrated predictive agents for stock forecasting, sentiment analytics, quantitative risk assessment using yFinance APIs effectively.
- Implemented scalable FastAPI backend with async streaming, PDF ingestion, Plotly visualizations, production-ready LLM orchestration.

Impact of Soil Quality on Crop Growth Analysis | Prof. Subhamoy Mandal
- Developed a Python-based crop recommendation system analyzing environmental factors to optimize agricultural productivity.
- Implemented K-Nearest Neighbors and K-Means clustering models to deliver accurate, data-driven crop selection recommendations.
- Conducted advanced statistical analysis effectively using hexbin and scatter plots to visualize ideal conditions for high-yield crops.
- Integrated detailed soil pH, rainfall, temperature, and humidity data to provide actionable insights for precision agriculture planning.

Intelligent Supply Chain Management Agent | Individual Project
- Developed an advanced AI-driven multi-agent system to forecast demand, optimize inventory, and streamline global supply chains.
- Integrated timeseries forecasting models with LangChain agents for dynamic demand prediction and intelligent inventory management.
- Implemented efficient logistics optimization using OR-Tools, Google Maps API, and real-time disruption detection via news feeds.
- Designed crisis mitigation agents recommending alternate suppliers and routes, reducing delays and operational inefficiencies significantly.

ML and NLP Systems for Intelligent Spam Detection | Individual Project
- Executed data preprocessing including text normalization, handling missing values, and removing duplicates for a cleaner dataset.
- Built a robust text processing pipeline with tokenization and TF-IDF features to train multiple machine learning models effectively.
- Trained Naive Bayes, Logistic Regression, and K-Nearest Neighbors models for accurate spam and non-spam classification predictions.
- Achieved 98% precision by optimizing model performance through cross-validation, hyperparameter tuning, and deployment via Streamlit.

Modelling Soil Moisture and Properties via RGB Imaging and Nix Pro Sensor Integration | Prof. Somsubhra Chakraborty
- Collecting RGB images, Nix Pro sensor readings, and SOC values continuously to develop advanced soil property prediction models.
- Building robust ML pipelines and CNN-based deep learning models for accurate moisture estimation and soil property analysis.
- Leveraging generative AI to synthesize soil images, augment datasets, and generate automated context-aware agronomic reports.
- Developing intelligent decision-support systems integrating explainable AI for actionable soil management, precision irrigation strategies.

SKILLS AND EXPERTISE

Languages: Python, SQL
AI &Machine Learning: NLP, Generative AI, Agentic AI, Machine Learning, Deep Learning, LLMs, RAG, Multi-Agent Workflow
Model Development &Optimization: LLM Fine-Tuning, PEFT, Feature Engineering, EDA, Statistics
Frameworks &Libraries: Scikit-learn, Pandas, NumPy, Hugging Face Transformers, LangChain, LangGraph, LangSmith, CrewAI, Matplotlib
Databases &Vector Stores: MySQL, FAISS, ChromaDB
Tools &Platforms: Microsoft Azure, Git, GitHub, Jupyter Notebook, Hugging Face Hub, Docker, MCP (Model Context Protocol), FastAPI
Soft Skills: Time Management, Problem Solving, Teamwork, Adaptability, Communication, Critical Thinking

COURSEWORK INFORMATION

Introduction to Programming | Geo-Informatics for Land and Water Resources | AI Applications in Agriculture | Digital Soil Mapping | Systems Approach in Agriculture

CERTIFICATIONS

Fundamentals of AI Agents Using RAG and LangChain: Coursera
Complete Data Science, Machine Learning, Deep Learning, NLP, Bootcamp: Udemy
Databases and SQL for Data Science with Python: Coursera

POSITIONS OF RESPONSIBILITY

PG Student Mentor | Student Welfare Group &Postgraduate Student's Council | IIT Kharagpur **[Sep'25-Till Date]**
Wing Representative | Pt. Madan Mohan Malaviya Hall of residence, IIT Kharagpur **[Sep'25-Till Date]**

!Self declared by the student, CDC could not verify the relevant documents