Swapnil Puranik

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Education

UNIVERSITY OF MINNESOTA- TWIN CITIES, MS in Robotics — Sept 2023 – Apr 2025

- GPA: 3.7/4.0
- **Coursework:** Robotics, Control Systems, AI, Advanced AI, Machine Learning, Robot Vision, Natural Language Processing

PUNE UNIVERSITY, BE in Electronics & Telecommunications — Sept 2023 – Apr 2025

- GPA: 9.17/10.0

Skills

Languages: Python, Java, C/C++, SQL

Frameworks & Tools: ROS, Gazebo, Rviz, OpenCV, Pandas, NumPy, Scikit-Learn, MATLAB, Solidworks

Experience

Research Assistant, University of Minnesota — Mar 2024 – Present

- Spearheaded research on Avian Embryo Classification using Hyperspectral Imaging and Machine Learning techniques
- Improved data quality by 30% through advanced noise reduction and dimensionality reduction using PCA.
- Devised ML models, including Neural Networks and Random Forest classifiers, for analyzing hyperspectral datasets.

System Engineer, Tata Consultancy Services (TCS) — Oct 2021 – Apr 2023

- Developed robust backend business logic in Java using the Spring framework, supporting well over 15,000 daily requests
- Designed and implemented RESTful APIs and JDBC integration, increasing system performance by 35%, and driving a 20% increase in repeat customers
- Architected a real-time analytics dashboard with Apache Kafka and Apache Spark, processing over 100,000 events per second
- Automated workflows by decommissioning legacy applications, reducing manual effort by 75%
- Refactored legacy codebase, improving maintainability and reducing bug reports by 40%.
- Led unit and functional testing with Junit and Groovy, expanding test coverage and reducing post-deployment issues by 40%

Projects

Warehouse Automation System

- Led the development of a warehouse automation system simulation using ROS, RVIZ, MoveIT, and GAZEBO
- Orchestrated the integration of 2 UR5 robots and a conveyor belt, achieving operational productivity of 85% through color-based sorting algorithms.

LLM Hallucination Reduction Using Knowledge Graphs

- Engineered an LLM hallucination reduction system utilizing Knowledge Graph (KG) comparison, integrating AutoKG and REBEL frameworks to generate KGs from input text.
- Implemented API integration with ChatGPT, reducing hallucinations by 30% and improving accuracy in LLM responses.

Visual Cognition Assistance

- Led an engineering team to architect a navigation aid system detecting objects via JETSON Nano and translating visual data to audio cues for the visually impaired.
- Combined computer vision and neural network to achieve 80% precision in object classification and proximity detection

Authorship Attribution Using Ngram LM

- Crafted an authorship attribution system using N-gram models and NLTK, achieving 75% accuracy in identifying authors
- Improved model performance by 25% through advanced smoothing techniques.

Real-Time Gesture to Speech Conversion

- Engineered machine learning model to convert hand gestures to speech, enhancing communication for mute individuals
- Boosted algorithm efficiency by 30% through preprocessing of image frames and dataset augmentation

Image to Audio Converter

- Pioneered an AI-based system to extract texts from images in real-time using Optical Character Recognition and then translate it into audio output.