ROSHAN PANDEY

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RESEARCH INTERESTS

I aspire to develop intelligent systems that seamlessly integrate perception, learning, and interaction. My research lies at the intersection of robotics, computer vision, machine learning, natural language processing, and human–computer interaction, with a particular focus on healthcare applications. I am especially interested in designing autonomous and assistive agents that can understand, adapt, and collaborate effectively with humans in complex real-world environments. Ultimately, my goal is to build reliable, sustainable, and human-centered AI systems that enhance clinical decision-making, improve patient outcomes, and support more accessible healthcare delivery.

EDUCATION

Tribhuwan University Expected Graduation: July 2026
Institution of Engineering, Kathmandu, Nepal
Kathmandu Engineering College
Bachelor of Electronics, Communication and Information Engineering
Percentage: 71%

High School Education Graduation: Jan2020
Radiant Higher Secondary School
Science Stream - Physics, Chemistry, Mathematics, and Computer Science

SELECTED RESEARCH PROJECT

Object Detection-Based Automated Mobile Robot (link) Jan 2025 – Nov 2025

- Designed and implemented an automated mobile robot integrating computer vision, robotics, and machine learning for autonomous pick-and-place operations.
- Developed a 4 DOF robotic arm (CAD-modeled and 3D-printed) controlled via Raspberry Pi and Arduino, integrated with YOLO-based object detection and CNN-based classification.
- Built end-to-end machine learning pipelines for dataset preparation, augmentation, annotation (CVAT), and YOLOv5/YOLOv8 model training to detect and classify colored objects.
- Implemented grid-based navigation using Dijkstra's algorithm for optimal path planning and real-time feedback-based movement control.
- Achieved successful hardware-software integration of sensors, actuators, and camera modules, demonstrating real-time autonomous object sorting and manipulation.

Explored potential applications in logistics, manufacturing, and inspection systems with future improvements planned using stereo vision and LIDAR integration.

RESEARCH EXPERIENCE

NLP Research Intern Jan 2025 – Apr 2025
NAAMII

- Conducted research on Nepali NLP with a focus on text summarization, transliteration, and text-to-speech systems.
- Curated and analyzed Nepali NLP datasets, evaluating their features and limitations across tasks such as sentiment analysis, text-to-speech, and machine translation.

Undergraduate Researcher Jan 2024 - Dec 2025
Tribhuvan University, IOE, Kathmandu Engineering College
Advisors: Prof. Anmol Ratna Bajracharya

Research Topic: Automating pick-and-place operations in industrial settings using an object detection-based mobile robot integrating computer vision, robotics, and machine learning.

- Designed and implemented a complete system architecture combining object detection (YOLO, CNN), robotic arm motion planning, and autonomous vehicle navigation with asynchronous on-device image processing using Python and Raspberry Pi.
- Developed and programmed an autonomous robotic arm (4 DOF), modeled in CAD and 3D-printed, controlled via servo motors and integrated with real-time computer vision for object manipulation and sorting.
- Built machine learning pipelines for image data collection, augmentation, annotation, and YOLOv5-based model training, achieving reliable detection and navigation through grid-based path planning and Dijkstra's algorithm.
- Integrated sensors (ultrasonic, camera), actuators, motor drivers, and microcontrollers, deploying optimized software and control algorithms for precise robotic operation in realistic industrial environments.

SELECTED PROFESSIONAL EXPERIENCE

Data Science Intern Sept 2025 – Dec 2025
F1Soft International Pvt. Ltd.

- Worked under the Data Science and Machine Learning division, contributing to the development and optimization of data-driven products used in fintech applications.
- Performed extensive data preprocessing, cleaning, and exploratory data analysis (EDA) on large financial transaction datasets using Python (Pandas, NumPy) and SQL.
- Developed predictive models for customer behavior analysis and transaction risk detection using machine learning algorithms (Random Forest, XGBoost, Logistic Regression).
- Implemented feature engineering and model evaluation pipelines with scikit-learn, focusing on improving accuracy, recall, and F1 scores.
- Collaborated with software engineers to deploy ML models into production, integrating APIs and ensuring real-time performance and reliability.
- Created data visualization dashboards using Power BI and Matplotlib to present insights to business and engineering teams for decision-making.
- Gained hands-on experience in version control (Git), team-based agile workflow, and MLOps concepts such as model tracking and reproducibility.

Backend Developer (Remote) Jan 2023 – Jun 2023

- Designed and developed backend systems for web applications, focusing on RESTful API development, database design, and server-side logic using Python (FastAPI, Flask) and Node.js (Express).
- Built and maintained secure, scalable APIs for data management and integration with frontend services, ensuring high performance and low latency.
- Worked with PostgreSQL, MySQL, and MongoDB for efficient data storage, indexing, and query optimization.
- Implemented authentication and authorization mechanisms using JWT and OAuth2, improving overall system security.
- Deployed applications on cloud platforms (AWS, Render, and Railway) with CI/CD pipelines for seamless version updates and maintenance.
- Collaborated remotely with cross-functional teams using Git, GitHub, and Agile tools (Trello, Jira) for task tracking, version control, and code reviews.
- Integrated third-party APIs (payment gateways, email services) and optimized backend performance through caching (Redis) and asynchronous task execution.

TEACHING & MENTORSHIP

Math tutor at junior school 2017 – 2018
Kathmandu District School : Homework Peer Mentor 2018– 2019
Kathmandu District School : junior School Education Volunteer 2018 – 2019

AWARDS AND HONORS

Tribhuwan University Entrance Scholarship Award 2020

TECHNICAL SKILLS

Programming Languages	Python, C++/C, Bash, MLIR, Java, Perl, Scala, x86 Assembly, HTML, Javascript
AI & Big Data	SQL, NoSQL, Tensorflow, JAX, NumPy, Pandas, MapReduce, Spark, Jupyter
Databases & Servers	DB2, MySQL, PostgreSQL, MongoDB, Neo4j, Kubernetes, Docker, Google Cloud, Azure, AWS EC2, Drogon, Python Flask
Tools	Git, Linux perf, Vim, Xcode, Android Studio

ACTIVITIES AND OTHER EXPERIENCES

Member of electronic project club 2024-2025
Member of the Robotics Club, Kathmandu Engineering College 2023 – 2024
Earthquake Disaster Relief Volunteer 2015