Rukesh Duwal
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EDUCATION

Purbanchal University **Kathmandu, Nepal**
College of Information Technology and Engineering
Bachelor's Degree of Information Technology, **CGPA: 3.5** *October 2017 - 2021*

PUBLICATIONS

Rukesh Duwal, Angel Dahal. Improved FMCG Quality Inspection through Small Object Detection using YOLOv5 and SAHI-based Image Slicing. *TechRxiv.* June 18, 2025.

PROFESSIONAL EXPERIENCE

Crimson Tech Pvt. Ltd. **Lalitpur, Nepal**
Research Engineer *June 2022 – Present*

- Spearheaded the development of real-time computer vision inspection systems using OpenCV and deep learning models (YOLOv5/v8/v11, U-Net, DeepLabV3, GANs, and OCR), achieving improvements in detection accuracy and processing speed (FPS).
- Designed and deployed end-to-end industrial vision solutions for major clients:
  - **Dabur Nepal** – Cap Defect Detection System for Real Juice; Batch Code Verification.
  - **Gorkha Brewery, Premier Organics, Yeti Distillery** – Automated Excise Code and Batch Code Scanning Systems.
  - **Unilever Nepal** – Robust Batch Code Inspection System integrated into production lines.
  - **TATA** – Sticker Imprint Verification System ensuring label integrity.
- Collaborated with hardware teams and QA engineers to ensure seamless integration and performance under production constraints.
- Contributed to model optimization, dataset augmentation, and deployment on edge devices for industrial environments.

Dot Samsara **Bhaktapur, Nepal**
Co-Founder *Oct 2023 – Present*

Founded and lead a web development company, overseeing project delivery, team coordination, and client relationships to build modern, user-centric websites and applications.

Skills

Programming Languages: Python, C/C++, Java, JavaScript, PHP
Libraries & Frameworks: OpenCV, PyTorch, TensorFlow, Keras, Scikit-learn, SciPy, NumPy, LangChain, Hugging Face Transformers, Albumentations, FastAPI
GenAI & NLP Tools: Hugging Face, LangChain, LLaMA/Ollama, Retrieval-Augmented Generation (RAG), Prompt Engineering
Computer Vision & Deep Learning: YOLO (v5/v8/v11), U-Net, DeepLabV3, GANs, PaddleOCR, Segment Anything (SAM), EfficientAD
DevOps & Tools: Linux, Git, Docker, VS Code, Jupyter, YAML, JSON, Bash
Hardware & Edge Devices: Arduino, Raspberry Pi, Jetson Nano, Machine Vision Cameras
Other Tools & Platforms: Postman, SQLite, Label Studio, Roboflow, Streamlit, CVAT

PROJECTS

AI-Powered Tablet Inspection System 💉🔗 *Crimson Tech*
Developed a deep learning system to detect surface, edge, and packaging defects in pharmaceutical tablets using high-resolution imaging and real-time analysis.

Automated Noodle Cake Quality Evaluation – Chaudhary Group 🍜🔗 *Crimson Tech*
Developed a computer vision system to evaluate noodle cake quality by detecting undercooked, overcooked, and properly cooked products in real time for food-grade quality control.

Automated O-Ring Inspection System 🛠️🔗 *Crimson Tech*
Designed and implemented a vision-based system for verifying O-ring dimensions and detecting manufacturing defects to ensure precision and consistency in industrial production.

Batch Code Inspection System – Dabur Nepal, Unilever Nepal, Surya Nepal, Gorkha Brewery & other FMCGs 🏷️🔗 *Crimson Tech*
Led the development of real-time computer vision systems to verify batch code presence, clarity, and positioning, ensuring traceability and compliance across diverse production lines.

Sticker Imprint & Object Counting System – TATA FMCG Line 🔢🔗 *Crimson Tech*
YOLO-based solution for real-time verification of sticker placement and object count compliance in automated packaging systems.

OMR System for MCQ-Based Assessments 📝🔗 *Crimson Tech*
Designed an Optical Mark Recognition tool for automating grading of answer sheets, boosting accuracy and processing speed for academic institutions.

Integrated Labeling & Augmentation Tool 🖍️🔗 *Crimson Tech*
Created a GUI-based labeling tool supporting detection/segmentation (YOLO + SAM), data augmentation (cropping, flipping), and auto-saving in training-ready formats.

RAG-Powered LLM Assistant (In Progress) 🤖🔗 *Crimson Tech*
Building a local Retrieval-Augmented Generation system using LangChain, Ollama, and FAISS for AI task assistance with modular prompt control.

Certification

🧠 Deep Learning & Neural Networks

- Neural Networks and Deep Learning – DeepLearning.AI - Coursera, 2023 [↗]
- Convolutional Neural Networks – DeepLearning.AI - Coursera, 2023 [↗]
- Generative Adversarial Networks (GANs) – DeepLearning.AI - Coursera, 2024 [↗]
- Structuring Machine Learning Projects – DeepLearning.AI - Coursera, 2023 [↗]
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization, and Optimization – DeepLearning.AI - Coursera, 2023 [↗]

🔥 PyTorch-Based Specializations

- Deep Learning with PyTorch: Neural Style Transfer – Coursera, 2023 [↗]
- Deep Learning with PyTorch: Image Segmentation – Coursera, 2023 [↗]
- Deep Learning with PyTorch: Siamese Network – Coursera, 2023 [↗]
- Facial Expression Recognition with PyTorch – Coursera, 2023 [↗]
- Aerial Image Segmentation with PyTorch – Coursera, 2023 [↗]

📊 Machine Learning & AI

- Supervised Machine Learning: Regression and Classification – DeepLearning.AI - Coursera, 2023 [↗]
- Introduction to Artificial Intelligence with Python (12 projects & 7 quizzes) – Harvard University, 2023 [↗]

👁️ Computer Vision & AR

- Introduction to Computer Vision and Image Processing – IBM - Coursera, 2023 [↗]
- Introduction to Augmented Reality and ARCore – Google - Coursera, 2023 [↗]
- Vision Language Models (VLM) Bootcamp – OpenCV University, 2025 [↗]

💬 Chatbots & Applied AI

- Create a Lead Generation Messenger Chatbot using Chatfuel – Coursera, 2023 [↗]

References

Samvandha Pathak
Co-Founder / CEO
Head of AI
Crimson Technology Pvt. Ltd.
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Sudhir Guragain
Principal, Senior Lecturer
Purbanchal University,
CITE
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