# ARYAN BUDUKH

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I am a highly motivated computer science student with a strong foundation in Machine Learning, Deep Learning, and Computer Vision, coupled with hands-on experience in developing innovative solutions for real-world problems. With a passion for leveraging technology to enhance safety, healthcare, and industrial processes, I have worked extensively on projects involving advanced machine learning models, image processing, and web application development. My expertise spans Python, C++, Flask, TensorFlow, and EfficientNet, enabling me to build scalable systems such as fatigue detection, assembly line defect identification, and stress detection platforms. I am committed to delivering impactful solutions through cutting-edge research and technical excellence.

## EXPERIENCE

### Reinvent Design Technologies

**Intern | On-Site | Pune**
**July 2024 – October 2024**

- Developed a Flask-based application leveraging Google APIs (Slides, Drive) and OAuth 2.0 for automated Google Slides updates with dynamic image replacement and Google Sheets integration.
- Integrated ML libraries like Pandas for efficient CSV data processing and implemented error-handling mechanisms for robust operations.
- Worked with IES VE (Integrated Virtual Environment) for simulation-based building performance analysis.

### Binghamton University x VU

**Project Intern | On-Site | Pune**
**August 2024 – December 2024**

- Conducted dataset preparation, including sorting, annotation, and validation for MENDELEY research repository.
- Developed and trained deep learning models for disease detection in pea plants using convolutional neural networks for high-accuracy predictions.

### iNeuron.AI

**Machine Learning Project Intern | Online**
**June 2024 – January 2024**

- Built a deep learning model for human activity recognition capable of identifying 100+ behaviors with applications in industrial productivity and security monitoring.
- Developed an integrated portal for real-time activity tracking, enhancing operational efficiency and mitigating unauthorized activities.

## EDUCATION

VISHWAKARMA UNIVERSITY
2023 - 2027
B.Tech Computer Engineering
CGPA - 8.5 (Current)

ALLENS CAREER INSTITUTE
2021 - 2023
High School
Grade - A

## PROJECTS

### Assembly Line Defect Detection

Developed a Flask-based application for automated industrial visual inspection, employing **ORB (Oriented FAST and Rotated BRIEF)** feature matching and **homography transformation** to align reference and test images. Implemented advanced image processing techniques such as **grayscale normalization**, **Gaussian blurring**, and **adaptive thresholding** to detect anomalies in specified regions. Delivered real-time results as **base64-encoded outputs** with defect classification flags, optimized for seamless API integration in industrial automation pipelines.

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### Fatigue Detection Using EfficientNet V2 *(Paper Published)*

**Duration:** Jan 2024 – Apr 2024
Engineered a fatigue detection model using **Convolutional Neural Networks (CNNs)** integrated with **EfficientNet V2**, known for its superior efficiency in handling large-scale datasets. The model was trained on 8,000 curated images (50% web-scraped) to recognize subtle facial cues indicative of drowsiness. Implemented **real-time inference pipelines** to enhance user safety through **high-performance GPU-based deployment**.

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### Forest Fire Detection Using Machine Learning *(Paper Published)*

**Duration:** Jan 2024 – Apr 2024
Achieved the **Best Project Award** at Vishwakarma University (Capstone project )for developing a forest fire detection system using advanced **supervised machine learning algorithms**. Utilized **decision trees**, **random forests**, and **support vector machines (SVMs)** to accurately classify fire risks from spatiotemporal environmental data. Optimized the model for low-latency detection in resource-constrained environments.

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### Ulcerative Colitis Detection and Prevention Using ML & DL

**Duration:** Aug 2024 – Ongoing
Designed and deployed a Flask-based web application leveraging **TensorFlow's convolutional neural network architecture** to classify ulcerative colitis indicators from medical imagery. The model utilizes **data augmentation** and **transfer learning** to enhance accuracy with limited datasets. The system processes and returns real-time diagnostic predictions with an intuitive user interface for healthcare professionals.

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### Emotion Detection Using Computer Vision *(iNeuron)*

**Duration:** Aug 2024 – Ongoing
Implemented a real-time emotion recognition system using **deep learning-based computer vision** techniques. Integrated a pre-trained **VGGNet** model for feature extraction and a custom **dense neural network (DNN)** for emotion classification. Applied **OpenCV** for facial landmark detection and optimized the pipeline for deployment on edge devices.

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### Stress Detection and Solutions for Gamers and Streamers

**Duration:** Oct 2024 – Ongoing
Developed a sophisticated stress detection framework utilizing **machine learning** and **psychophysiological analysis** to assess stress levels in gamers and streamers. Leveraged **facial action coding systems (FACS)** and emotion classification models to provide personalized stress mitigation strategies. Integrated the system with **real-time video analytics pipelines**, enabling seamless monitoring during gameplay.

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# TECHNICAL SKILLS

### Programming and Scripting Languages

- **Proficient** : Python, JavaScript, C++
- **Familiar** : SQL, Bash scripting

### Frameworks and Libraries

- **Machine Learning & Deep Learning :** TensorFlow, PyTorch, Keras, Scikit-learn
- **Web Development :** Flask, FastAPI
- **Computer Vision :** OpenCV, Mediapipe
- **Data Analysis & Visualization :** Pandas, NumPy, Matplotlib, Seaborn

### Machine Learning and Deep Learning Expertise

- **Model Development :** Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Transfer Learning, EfficientNet
- **Optimization :** Model quantization, hyperparameter tuning, and deployment for real-time inference
- **Feature Engineering :** Dimensionality reduction, data augmentation, image preprocessing

### Image Processing and Computer Vision

- Advanced feature extraction techniques: ORB, SIFT, HOG
- Homography transformations for image alignment
- Edge detection, adaptive thresholding, and contour analysis
- Proficient in designing and training classification models for medical imaging and anomaly detection

### Tools and Platforms

- **Development Tools :** Docker, Git, Jupyter Notebook, Google Colab
- **Cloud Platforms :** AWS (EC2, S3), Google Cloud Platform (GCP)
- **API Tools :** API integration , Console

### DevOps and Deployment

- **Containerization :** Docker, Docker Compose
- **Model Deployment :** Flask-based REST APIs, TensorFlow Serving
- Integration of real-time processing pipelines for scalable applications

### Soft Skills and Practices

- Strong focus on modular coding and system design principles
- Proficient in Agile methodologies and collaborative tools like Trello and Jira
- Adept at technical documentation and presentation of complex models and systems