VISHAQ JAYAKUMAR

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EDUCATION

Northeastern University, Boston *Jan 2023 - May 2025*
Master of Science in Computer Science *GPA: 3.7*

Sri Sivasubramaniya Nadar College of Engineering, Chennai *Aug 2018 - Apr 2022*
B.Tech, Information Technology *GPA: 3.7*

WORK EXPERIENCE

Aura Intelligent Systems, Boston Sept 2024 – Dec 2024
Machine Learning Intern

- Streamlined **nuScenes** dataset access using **Python** APIs, improving model training speed for perception systems.
- Scaled training with **PyTorch DDP** across **GPUs**; enabled mixed precision and gradient accumulation to cut wall-clock time.
- Reduced real-time object-detection latency 25% by optimizing a lightweight detector for **AMD Versal AI Engine (Python, C++)**.
- Converted raw **TI AWR1243** radar data to point clouds using **Python and MATLAB** for perception and sensor fusion.
- Developed radar preprocessing filters and clustering algorithms to enhance **ADAS** object detection.
- Implemented radar–vision synchronization; reduced skew and jitter, boosting multi-sensor tracking reliability.

LARSEN & TOUBRO (L&T), Chennai Apr 2021 – May 2021
Computer Vision Intern

- Built a real-time RGB pipeline with **C++**, CUDA, and OpenCV; achieved 3× lower per-frame latency.
- Wrote CUDA kernels (Gaussian/Sobel, morphology); tuned shared memory, coalesced loads, streams; profiled in **Nsight**.
- Integrated **TensorRT** detector with OpenCV **CUDA** preprocess; sustained 30–60 FPS via zero-copy GpuMat/pinned memory.
- Calibrated cameras and solvePnP pose; validated alignment under motion/lighting; packaged with **CMake** and tests.

Verzeo, Bangalore Jan 2020 - Feb 2020
Machine Learning Intern

- Built a non-invasive **MGMT methylation** predictor from imaging features with **normalization**, **augmentation**, and clean splits.
- Re-implemented the classifier in **PyTorch** with transfer learning; achieved **85%** under **5-fold CV** with **stratified** splits.
- Accelerated training with **Distributed Data Parallel** on **GPUs** and **mixed precision**; tuned **DataLoader**, prefetching, and pin_memory.

PROJECTS

Computer Vision System for Camera Calibration and Augmented Reality **GitHub**

- Implemented Harris and chessboard corner detection for pose estimation using **OpenCV (C++/CUDA)**. .
- Calibrated camera; estimated pose with `findChessboardCorners`/`solvePnP`; accelerated preprocessing with **OpenCV CUDA**.
- Built a utility to generate 3D world points and project them to images; rendered axes/cubes for AR using **OpenCV** draw APIs.

Video Special Effects Library **GitHub**

- Implemented classic CV effects in **C++/OpenCV**: greyscale, sepia, negative, color-pop, cartoonize, and sketch.
- Developed custom convolution filters: 5×5 blur (direct/separable), **Sobel** X/Y, gradient magnitude, emboss, and quantization.
- Optimized pixel-level ops with pointer access and `saturate_cast`; validated results on diverse inputs with visual comparisons.

Deep Learning based Spatio-Temporal Anomaly Detection in Videos **GitHub**

- Built a **3D CNN** video classifier (14 classes) in **TensorFlow/Keras**; set up frame sampling, windowed clips, and clean splits.
- Handled class imbalance with **class weights** and online **augmentation**; added **early stopping** and **ReduceLROnPlateau**.
- Processed **16,000+** surveillance clips with `tf.data` and **OpenCV**; optimized caching, prefetch, and generators.

SKILLS

Programming Languages:	C/C++, Python, CUDA C++, MATLAB, JavaScript, C#, SQL
Computer Vision/ML:	OpenCV, TensorFlow, PyTorch, Keras, TensorRT, YOLO, Detectron2, NumPy, SciPy
GPU Computing:	CUDA, cuDNN, cuBLAS, Thrust, OpenCL, NVIDIA Docker, OpenVINO
Databases & Tools:	MySQL, PostgreSQL, MongoDB, Redis, Git, Docker, AWS, Matplotlib

RESEARCH PUBLICATION

Covid-19 detection using chest X-rays: CNN as a classifier vs CNN as a feature extractor | **GitHub** | **Paper**