# KESHAV BHARADWAJ VAIDYANATHAN

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## TECHNICAL SKILLS

- **Programming Languages** - Python, C/C++, R, SQL, Shell scripting, HTML
- **Software/ Tools** - AWS, Postgres, MongoDB, Docker, Elastic Search, Git, CI/CD, OpenVINO, TensorRT, Apache Spark, Kubernetes
- **Packages** - NumPy, Pandas, Flask, Tkinter, PyTorch, PyTorch-lightning, OpenCV, Keras, SciKit, NLTK, Dash, OpenGL

## WORK EXPERIENCE

**Silicon Synapse Lab** **Sep 23 – Present**

*Computer Vision Research Assistant | YOLO, AutoEncoder, Transformer, OpenVINO, TensorRT, YOSO, mask2former*

- Integrated real-time scene segmentation and object detection into the robot's perception domain. Conducted thorough data analysis, and preprocessed RGB data, achieving a **0.78** IoU for the ground class. Currently implementing instance segmentation models.
- Accelerated segmentation models by implementing network quantization for NVIDIA Jetson, resulting in a **2x** reduction in inference time and memory size.

**Abiomed Inc (Johnson & Johnson)** **Feb 23 – Sept 23**

*Data Scientist | Time-Series, LSTM, RNN, Transformer, Signal Processing, Data Visualization, Data Analysis, Regression, SQL*

- Created cardiac output prediction models for patients on mechanical circulatory support, utilizing Apache Spark to extract high-frequency time-series device data and managed to get a significant **5.2%** reduction in error rates.
- Collaborated on research and implemented a Domain-Adversarial Neural Network (DANN) to forecast aortic pressure in different patient cohorts, leveraging computer simulations to generate extensive data with a **0.82** RMSE loss.
- Analyzed and optimized the predicted probabilities of a Deep Neural Network (DNN) model for right heart failure prediction, improving the model's Brier skill score by elevating the threshold from 0.23 to 0.5, resulting in clearer classification outcomes.

**Mad Street Den** **Dec 20 – Jul 21**

*Machine Learning Engineer | Recommendation System, Docker, SQL, CNN, Classification, AWS, Elastic-search, NLP, OCR*

- Engineered ML models for tag generation in an Elastic search-driven recommendation system, fine-tuning scoring functions for optimization and achieving a **67%** match for top 1 and an **82%** match for top 5 recommendations.
- Developed and implemented advanced machine learning models, such as Seq2Seq LSTM OCR and CNN for text classification, deployed on Kubernetes, resulting in a substantial monthly cost reduction of **$10,000** for OCR operations.
- Designed and deployed data processing pipelines and tag storage across Redshift, S3, Dynamo, and Redis databases and optimized by eliminating redundant operations, resulting in a **15%** reduction in response time.

## PATENTS

**Q-CerGen** (**Quick Certificate Generator**) | *Flask, OpenCV, Tkinter, WebGL, Brython, HTML, Python* **Mar 21**

- Devised a novel application for swift generation of over **3000**+ E-certificates/ E-trophies with a user-friendly interface, and a website.

**ADAM** (***Automatic Disassemble and Assemble Machine***) | *Python, OpenGL, OpenCV, SIFT algorithm, sciKit-learn* **Jun 21**

- Directed the brainstorming, design, and development of a prototype robotic pick-and-place arm proficient in disassembling and reassembling patterns, while also crafting a user-friendly 3D interface for pattern customization.

## ACADEMIC PROJECTS

**Advanced Computer Vision** **Sept 22 - Dec 22**

*SegMask for 3D Object Detection | 3D Object detection, LiDAR data, Multimodal, Autonomous driving, PSPNet Segmentation mask*

- Pioneered a novel approach on Frustum-PointPillars by replacing Gaussian masks with segmentation masks for multi-stage sensor fusion with RGB and LiDAR data, leading to a **3%** enhancement on the KITTI-hard dataset for 3D object detection of cars.

**Natural Language Processing** **Jan 22 - Apr 22**

*Question Answering System | Large Language Model - BERT, LSTM, RNN, Natural Language Processing*

- Obtained a **63.5%** accuracy and **66.7** F1-score with the baseline Bi-Directional LSTM model on SQuAD2.0, and a **77.3%** accuracy with Distilled BERT, yielding an **85.4** F1-score for question-answering tasks.

**Deep Learning** **Jan 22 - Apr 22**

*Visual Question Answering | Transformers, LxMERT, VGG, LSTM, CNN, Multimodal*

- Achieved **57%** accuracy with the baseline LSTM Question + norm image model with VGG image embedding and **70.68%** accuracy with the transformer-based LxMERT model for visual question answering on the VQA dataset.

## EDUCATION

**Master of Science in Computer Engineering, Northeastern University** **Dec 23**

*Specialization in Computer Vision, Machine Learning and Algorithms* **GPA: 3.88**

Courses: Machine Learning, Deep Learning, Natural Language Processing, DBMS, Advanced Computer Vision, Assistive Robotics.

**Bachelor of Engineering in Electronics and Communication, Visvesvaraya Technological University** **Aug 20**

Directed Falcon's technical team, and organized project expos, technical seminars, national conferences, and workshops. **GPA: 8.43**