Vishnu Thirumurugan

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Work Experience

Backend AI Developer, Data Science **Aug 2024 – Present**

Air India *Kochi, India*

- Pioneered novel speech emotion recognition algorithm processing 1,000+ monthly calls, improving customer service efficiency by 30% through innovative feature extraction and deep learning methodologies.
- Developed proprietary risk analysis framework achieving 85% accuracy for aviation safety compliance by designing custom transformer architectures and statistical validation protocols.
- Engineered end-to-end audio processing pipeline reducing cockpit transcription analysis time by 20% through comparative evaluation of Whisper, WaveNet, and custom acoustic models.
- Implemented robust statistical data quality framework achieving 100% pipeline reliability by designing novel anomaly detection algorithms and validation protocols for aviation data systems.

Junior Research Fellow **Aug 2021 – Jun 2024**

Industrial Consultancy and Sponsored Research - IIT Madras *Chennai, India*

- Enhanced maritime safety by 20% through novel TD3-based reinforcement learning algorithm for autonomous vessel navigation with custom reward function design and simulation environment.
- Reduced vessel collision incidents by 50% by developing AI-powered obstacle avoidance system using innovative state-space representation and policy gradient optimization techniques.
- Published peer-reviewed research at ASME International Conference demonstrating breakthrough AI navigation approach with significant contributions to maritime autonomous systems literature.

Technical Skills

Programming: Python, Java, SQL, MATLAB, JavaScript (Node.js), C++
Machine Learning: TensorFlow, PyTorch, Scikit-learn, Stable Baselines3, Reinforcement Learning
Data & Analytics: NumPy, Pandas, Matplotlib, OpenCV, Statistical Analysis
Backend Frameworks: Django, FastAPI, Flask, Node.js, Express
Databases: MySQL, PostgreSQL, MongoDB, Redis
Version Control: Git, GitHub, GitLab

Projects

Maritime AI Navigation System **GitHub Link | 2021-2024**

- Achieved 20% improvement in robotic navigation safety by developing novel TD3 deep reinforcement learning algorithm with custom simulation environment and reward function optimization.
- Reduced training convergence time by 40% through innovative experience replay mechanism and hierarchical learning approach enabling real-time autonomous decision making in robotic path planning.

Neural Network Training Framework **GitHub Link | 2022-2023**

- Developed comprehensive deep learning training framework implementing multiple neural network architectures from scratch, enabling educational and research applications through modular design patterns.
- Built scalable training pipelines with advanced optimization techniques including custom backpropagation algorithms, learning rate scheduling, and regularization methods for improved model performance.

Customer Sentiment Analysis Engine **GitHub Link | 2024-2025**

- Improved customer satisfaction tracking by 25% through real-time emotion detection system using custom BERT-based architecture for airline operations optimization.

Education

Indian Institute of Technology Madras **Chennai, India**

M.S. by Research, GPA: 9.62/10.0 *May 2024*

- **Research Focus:** Deep Reinforcement Learning for autonomous systems in maritime applications with emphasis on safety-critical decision making and collision avoidance algorithms.

Research & Publications

Patent: "AI-based Autonomous Navigation System" – Complete specifications filed with novel collision avoidance methodology and safety validation framework (2024). First Examination Report (FER) received in April 2025
Publication: V. Thirumurugan et al. "Static obstacle avoidance with path following using twin delayed deep deterministic policy gradients." *ASME International Conference on Offshore Mechanics*, Vol. 87844, 2024.

Certifications and Training

In Progress: Agentic AI development (Microsoft), Deep Learning Specialization (Applied AI)
Completed: Retrieval Augmented Generation with Azure (Microsoft)