HARISH THANGARAJ

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Education

Bachelor of Technology in Computer Science — Vellore Institute of Technology, India
Aug. 2021 – Jul 2025

Research Experience

CSIR-NAL — Jan 2025 – May 2025
Research Intern, Big data Research and Super Computing Division — *Bengaluru, India*

- Faced with the limitations of static and random exploration strategies in Deep Reinforcement Learning agents, researched attention-based mechanisms to logically guide the exploration-exploitation trade-off.
- Developed a novel Deep-Q-Network algorithm incorporating attention-driven action, resulting in improved sample efficiency and action selection compared to ϵ-greedy and numerical policies.
- Addressed long training cycles by developing parallelized DL training pipelines in PyTorch, which leveraged increased CPU core utilization by **25%** to reduce end-to-end training time by **40%**.
- Achieved competitive performance across **5** sparse and dense reward classic control environments, resulting in a potential publication of this work.

Liquid Neurons Pvt. Ltd — Feb. 2024 – Feb. 2025
AI/ML researcher (part-time) — *Bengaluru, India*

- Conducted user research across **10** understaffed primary schools to identify the need for an automated attendance solutions, focusing on improving efficiency and reducing manual overhead.
- Led the development team to create a mass attendance monitoring system for a primary school that can tag **20+** faces within a single frame.
- Engineered a Full-Stack ERP system supporting **1000+** small-scale educational institutions, integrating an automated pipeline for facial recognition to seamlessly manage student, faculty, payroll, and attendance data.
- Deployed the software on a production-grade Linux server with Nginx reverse proxy and Systemd process management.
- Researched on zero-shot object detection techniques for automated pipe detection in small-scale industrial settings, improving inventory tracking accuracy by reducing manual inspection time by over **40%**.

Vellore Institute of Technology — Oct. 2024 – Dec. 2024
Undergraduate Thesis, School of Computer Science and Engineering — *Chennai, India*

- Automated pediatric glioma segmentation using a novel 3D UNet Architecture with spatial attention mechanism inspired the BraTs challenge.
- Achieved a Dice Similarity Coefficient(DSC) of **79.4%** and Hausdorff distance (HD95) of **12mm.**
- Demonstrated the effectiveness of attention integration in enhancing segmentation performance for complex pediatric brain tumor structures.

University of Pretoria — Jan. 2024 – Oct. 2024
Research Intern, Data Science for Social Impact Research Group — *Remote*

- Investigated NLP models for low resource African languages, benefiting over **165K+** users across diverse language communities.
- Performed extensive data cleaning and feature engineering on heterogeneous African language datasets, including applying Named Entity Extraction.
- Set up **200+** experiment pipelines with various hyperparameter settings to focusing on optimization of multilingual and monolingual architectures including AfriBERT, Char-CNN, and BiGRU on downstream tasks using PyTorch.
- Evaluated the model performance across transfer and catastrophic forgetting, culminating in a peer-reviewed paper.

Travellio — Oct. 2023 – Present
Founding Team (Part-time) — *Chennai, India*

- Founded an AI-driven travel application with **$15,000** in credit funding from the Microsoft for Startups program. Focused on connecting like-minded travelers, providing ML-powered itinerary recommendations, and aggregating popular trips.
- Hired and managed **20** interns across various departments working towards developing the MVP.

Vellore Institute of Technology Sep. 2023 – Jan. 2024

Undergraduate Research Assistant, School of Computer Science and Engineering (Prof. Sangeetha N) *Chennai, India*

- Executed extensive user research through surveys and interviews to identify gaps in existing academic networking systems within large universities.
- Proposed a novel hybrid recommendation engine integrating BERT-based contextual embeddings with TF-IDF filtering to enhance academic collaboration.
- Achieved **94%** top-5 recommendation accuracy on a curated dataset; deployed the solution as a cross-platform mobile application enabling real-time profile matching.
- Currently leading efforts to scale the research into a startup titled FindMate, focusing on personalized academic networking and collaboration discovery at institutional scale.

Publications and Preprints

- **Thangaraj, H.**, Nallana Mithun Babu, & Abinaya, S. (2025). AT-DQN: Attention-based exploration in deep reinforcement learning
- **Thangaraj, H.**, Katariya, D., Joshi, E., & Sangeetha, N. (2024). 3D graph attention networks for high fidelity pediatric glioma segmentation
- **Thangaraj, H.**, Chenat, A., Walia, J. S., & Marivate, V. (2024). Cross-lingual transfer of multilingual models on low resource African languages
- Sangeetha, N., **Thangaraj, H.**, Vashisht, V., Joshi, E., Verma, K., & Katariya, D. (2025). A BERT based hybrid recommendation system for academic collaboration

Technical Projects

Automated Query Handling Chatbot for VIT University 🔗: Meta LLaMA and RPA-powered chatbot leveraging Rasa framework with quantization techniques for efficient edge performance, handling over **1000+** university FAQs and queries.

Gesture Recognition System for Smart Home Automation 🔗: Curated a custom hand-sign dataset of 500+ images and developed a real-time home automation solution leveraging Google MediaPipe, achieving **95%** gesture recognition accuracy for robust control.

Color-Based Object Detection and Sorting System 🔗: Implemented a YOLOv8 architecture to detect and sort objects by RGB and HSV values with **98%** detection accuracy, simulating the system in the Webots environment and demonstrating a **30%** increase in sorting speed and enhanced quality control in industrial workflows.

Skills

Languages: Python, C++, Java, JavaScript, R, shell

Frameworks and Libraries: MERN, Scikit-learn, TensorFlow, PyTorch, Flask, NLTK, Spacy, OpenAI-gym, NumPy, Pandas, RAG, Keras.

Data and API Tools: Tableau, Excel, Roboflow, Postman, Git.

Others: A/B Testing, Data Modeling, Agile Methods, User Research, Public Speaking.

Leadership and Science Outreach

- Presented research at the ICISS - 25 conference, earning a special mention for our work.
- Served as the department Lead for IEEE Robot Automation Society student chapter at VIT.
- Hired and managed intern workflow at Liquid Neurons Pvt. Ltd as the development lead.
- Actively contributed to pitch deck development and strategic management of Travellio (startup).
- Led a user research team to drive insights and strategy for a community startup (Knowledge Ark Technologies).
- Special mention at Kavach-23 hackathon by Greater Chennai Police for innovative police personnel tracking system.
- Organized fundraising initiatives to support education for underprivileged girls at Suvidha Foundation.