Allen Xavier Arasan

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PROFESSIONAL SUMMARY

Versatile Software Engineer with expertise spanning embedded systems, machine learning, and AI development. Currently pursuing MS in Electrical and Information Technology with research focus on Graph Neural Networks for autonomous vehicles. Proven experience in firmware development, AI system architecture, and cross-platform software solutions with published research in IEEE conferences.

CORE COMPETENCIES

Technical Leadership: Project Development, Research Innovation, System Architecture Design, Cross-functional Collaboration

Problem Solving: Algorithm Development, Performance Optimization, Debugging Complex Systems, Solution Implementation

Communication: Technical Documentation, Research Publications, Team Coordination, Knowledge Transfer

TECHNICAL SKILLS

Programming Languages: C, C++, Python, Embedded C, Assembly, Java, JavaScript

AI/ML Technologies: LLM (Fine-Tuning, QLoRA, MCP), TensorFlow, Scikit-Learn, OpenCV, PyTorch, TinyML, TensorFlow Lite, Pandas, NumPy, SciPy

Embedded Systems: Electronics, UART, I2C, I2S, SPI, CAN, MQTT, IoT, Modbus, FreeRTOS, UOS, TCP/IP, Edge Computing, MCU, Signals, Modulation

Software/Operating Systems: Eclipse, Conda, Jenkins, Keil, Linux (Arch and Debian), Microsoft Office, Google Workspace, Jupyter Notebook, GitHub, Docker, LaTeX

Web Technologies: HTML, Node.js

Cloud Platforms: Google Cloud, AWS

Research Tools: CARLA, ROS, OpenCooD, OPV2V dataset

EXPERIENCE

Research Thesis Student **Nov 2024 - May 2025**
FZI, Karlsruhe, Germany

- Developing dynamic **Agent Perception** systems for **Autonomous Vehicles** using **Graph Neural Networks** and **Mixture of Experts**
- Conducting **Simulation** research in **OpenCooD** framework with **OPV2V dataset** for collaborative vehicle perception

Research Assistant **Mar 2024 - Present**
FZI, Karlsruhe, Germany

- Conducted application research in **Multi Modal LLM** training refinement, **MCP** server development, and **AI** system architecture design
- Developed **Graph Neural Networks** and **Gaussian Process Models** for **Pathogen Detection** and **Outbreak Prevention** in Project Pathobot

Software Developer **Feb 2023 - Mar 2024**
Vanory, Karlsruhe, Germany

- Developed **Firmware** and **Device Drivers** in **Embedded C/C++** for LIXL and LeetDesk Aura products, implementing **Edge Computing** solutions

Software Developer **Jan 2023 - Jan 2024**
RITA Project, Karlsruhe, Germany

- Developed **Firmware** and **Device Drivers** in **Embedded Linux** with integrated **Photogrammetry** capabilities for RITA Robot system

Associate Software Developer **Mar 2022 - Sep 2022**
Gupshup, Mumbai, Maharashtra

- Developed **AI Chatbots** using **Node.js** on Gupshup's custom scripting platform, implementing **Scrum** and **Agile Methodologies** for rapid deployment

Machine Learning Intern **Jan 2022 - Feb 2022**
Life Spark Technology, IIT Bombay, Maharashtra

- Analyzed data for Parkinson's disease patients and created deployable **Edge Machine Learning Models** for wearable devices to improve gait analysis

PROFESSIONAL CERTIFICATIONS

- Machine Learning Specialization
- Development of Secure Embedded Systems Specialization
- Device Based Models with TensorFlow Lite
- Introduction to Self-Driving Cars
- State Estimation and Localization for Self-Driving Cars
- Motion Planning for Self-Driving Cars

RESEARCH PUBLICATIONS & ACHIEVEMENTS

- "EffiComm: Bandwidth Efficient Multi Agent Communication", accepted for publication in *IEEE 28th International Conference on Intelligent Transportation Systems (ITSC 2025)*, Australia [To be published]
- Co-Founded SMOLEs in Student Innovation Lab at Karlsruhe Institute of Technology, winning the Best Product Award
- "Unknown Terrain Modelling Using 3D Mapping", published in *5th International Conference on Computing Methodologies and Communication (ICCMC 2021)*, Erode [DOI: 10.1109/ICCMC51019.2021.9418346]
- "Patient Monitoring & Assisting System: A Real-Life Unity3D Application", published in *IEEE International Conference on Computational Science and Technology (ICCST 22)*, Chennai, India [DOI: 10.1109/ICCST55948.2022.10040443]

EDUCATION

MS Electrical and Information Technology **2022 - 2025**
Karlsruhe Institute of Technology, Karlsruhe, Germany

B.E Electronics **2017 - 2021**
Fr. Conceicao Rodrigues College of Engineering, Mumbai, India

KEY PROJECTS

EffiComm: Bandwidth Efficient Multi Agent Communication [Thesis]
Technologies: Point Pillars, Graph Neural Network, Multihead Attention, Regressor, Classification, PyTorch
Research project on autonomous vehicle communication optimization using advanced machine learning techniques

SMOLEs - Posture Analysis and Correction System for Osteoarthritis Patients
Technologies: Embedded C/C++, AI Models, Data Analysis, Data Codec, Bluetooth, Electronics
AI-powered healthcare solution winning Best Product Award at KIT Student Innovation Lab

picoVision - AI Vision Assistant for Accessibility
Technologies: Embedded C/C++, Vision Transformer, LLM, Flask, Image Codec, I2S, Text-To-Speech, IP Tunneling, Electronics
Accessibility-focused AI system combining computer vision with language processing capabilities

Project LIXL - Smart Lighting Control System
Technologies: Embedded C/C++, STMCore, ARM, WLED, Electronics, DSA
Intelligent lighting control system with embedded processing and wireless communication

RITA Project - Robotic Intelligence and Terrain Analysis
Technologies: Embedded Linux, LinuxArmSDK, Data Analysis, Photogrammetry, Make, PyTorch, Docker, Image Processing
Robotic system for terrain analysis with integrated computer vision and machine learning capabilities

Patient Assisting and Monitoring System with Unity3D Interface
Technologies: 3D Mapping, Robotics, Data Analysis/Acquisition, Electronics
Healthcare monitoring system with 3D visualization and real-time data processing