Allen Xavier Arasan

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PROFESSIONAL SUMMARY

Versatile Software Engineer with **3+** years of expertise spanning embedded systems, machine learning, and AI development. Currently pursuing an MS in Electrical and Information Technology with a 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 Optimisation, Debugging Complex Systems, Solution Implementation

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

English: C2 (Proficient) **German:** A2 (Learning)

TECHNICAL SKILLS

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

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

Embedded Systems: ESP32, STM32, UART, I2C, I2S, SPI, CAN, MQTT, IoT, 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

Cloud Platforms: Google Cloud, AWS

EXPERIENCE

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

- Conducted application research in 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

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 the OpenCooD framework with the OPV2V dataset for collaborative vehicle perception

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 in ESP32 and STM32

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

- Developed Firmware and Device Drivers in Embedded Linux with integrated Photogrammetry capabilities for the RITA Robot system using PyTorch, LinuxArmSDK, Docker for Computer Vision

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

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

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]

PROFESSIONAL CERTIFICATIONS

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

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 optimisation 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

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