PRAKASH DHUNGANA

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PROFESSIONAL SUMMARY

Embedded software engineer with production experience delivering safety-critical C/C++ software for autonomous driving and in-vehicle systems across bare-metal, RTOS (QNX), and embedded Linux platforms. Integrated NVIDIA DriveOS Safety Services into a production automotive middleware stack under ISO 26262, built low-level PCIe/DMA drivers for deterministic multicore SoC communication, and configured AUTOSAR Basic Software with Vector DaVinci tooling. Ph.D. in Computer Engineering (completed Aug 2026) specializing in real-time optimization and TinyML for resource-constrained edge devices. Works fluently across the hardware-software boundary and within Agile teams, with deep debugging expertise (Lauterbach TRACE32, JTAG, GDB, logic analyzers) and a track record of peer-reviewed research.

CORE COMPETENCIES

Embedded C/C++ • Kernel & Device Driver Development (PCIe, DMA, Ethernet NIC, USB, MIPI camera) • Board Bring-up & BSP • Bare-metal, RTOS (QNX), Embedded Linux (Yocto, Buildroot, systemd) • AUTOSAR Classic (MCAL, NvM, DEM, RTE; DaVinci) • ISO 26262 Functional Safety, MISRA-C/C++ • Vehicle Networks (CAN, Automotive Ethernet, SPI, I2C, UART) • Multi-threading, Concurrency & Memory Management • TinyML / Edge AI • Debugging & Profiling (TRACE32, JTAG, GDB, Logic Analyzers, VectorCAST) • Agile/Scrum, Jira, Confluence, Git/GitHub, CI/CD

PROFESSIONAL EXPERIENCE

Graduate Research Assistant – Embedded AI & Real-Time Systems Jan 2023 – Aug 2026
University of Kentucky, Lexington, KY, USA

- Architected custom integer-only inference engines in C/C++ for ARM Cortex-M MCUs, eliminating floating-point overhead to minimize latency (41 ms) and memory footprint (13.5 kB).
- Interfaced bare-metal firmware with hardware to profile and optimize quantized ML execution on constrained edge devices, applying disciplined memory management under tight resource budgets.
- Developed feature extraction pipelines using wavelet packets and custom C/C++ kernels (14 ms feature extraction, 6 ms quantized inference); implemented on-device/federated continual learning for domain-shift robustness.
- Published peer-reviewed research and presented at international conferences; managed work using Git-based version control and iterative development.

Embedded Software Engineer Jul 2021 – Dec 2022
TTTech Auto (now TrustMotion), Osijek, Croatia

- Integrated NVIDIA DriveOS Safety Services (3LSS) into the MotionWise autonomous-driving middleware platform, strictly adhering to ISO 26262 ASIL safety concepts and requirements.
- Implemented low-level C/C++ drivers for PCIe and DMA on multicore SoCs, enabling deterministic inter-processor communication between safety and performance hosts.
- Configured AUTOSAR Basic Software (MCAL, NvM, DEM) using Vector DaVinci Configurator and Generator, ensuring seamless integration with the Runtime Environment (RTE).
- Debugged complex system-level issues across middleware and low-level software using Lauterbach TRACE32, analyzing stack usage and intercore communication in an RTOS environment.
- Performed static analysis and unit testing with VectorCAST to MISRA-C/C++ standards; worked in an Agile/Scrum team, tracking tasks and defects in Jira and documenting designs in Confluence, with code managed via GitHub and CI/CD pipelines.

Graduate Student Intern – ADAS Embedded Software Nov 2019 – Jun 2021
TTTech Auto (now TrustMotion), Osijek, Croatia

- Optimized an automotive vision pipeline on TI TDA2x heterogeneous SoCs, reducing DSP execution time by 89.87% through frame-wise lookup tables.
- Implemented C/C++ image-processing pipelines for panoramic image correction, meeting strict 60 fps real-time latency constraints on automotive hardware.
- Designed and validated a real-time panoramic image correction algorithm (color and brightness adjustment) on the ALPHA development board.

Automotive Service Engineer Dec 2016 – Aug 2019
IME Motors / Goldfish International, Kathmandu, Nepal

- Diagnosed complex faults in engines and vehicle subsystems using onboard diagnostic tools and Diagnostic Trouble Codes (DTCs).
- Analyzed electrical schematics and powertrain control module logic to resolve hardware-software interface issues in commercial vehicles.

KEY PROJECTS

- **TinyML for Real-Time Audio Perception** (C/C++, Assembly) — Integer-only signal-processing and classification pipeline for keyword spotting on MCUs; real-time quantized inference under strict latency/memory constraints; on-device continual learning. Peer-reviewed at ISQED 2024.
- **Panoramic Image Correction on ADAS Platform** (C++, DSP, RTOS) — Brightness/color equalization algorithms implemented and validated on real automotive ADAS hardware for panoramic imaging.

EDUCATION

Ph.D. in Computer Engineering, University of Kentucky, Lexington, KY, USA 2023 – 2026
M.Sc. in Automotive Computing and Communications, University of Osijek, Croatia 2019 – 2021
B.E. in Mechanical Engineering, Tribhuvan University, Kathmandu, Nepal 2012 – 2016

TECHNICAL SKILLS

Programming Languages: C, C++, Python, Bash, Assembly
Operating Systems & RTOS: Embedded Linux, NVIDIA DriveOS, QNX, RTOS, Bare-metal
Embedded Linux: Buildroot, Yocto (OpenEmbedded), Cross-compilation Toolchains, Bootloaders, systemd
Embedded Platforms: NVIDIA Jetson & Xavier, ARM Cortex-M/A, Aurix TriCore
Driver & Low-Level Development: Kernel device driver development, PCIe, DMA, Ethernet NIC, USB, MIPI camera, FPGA interfaces, Board bring-up
Systems Programming: Multi-threading, Concurrency, Memory Management, System Architecture, Requirements Analysis, SDLC
Communication Protocols: CAN, Automotive Ethernet, TCP/IP, UDP, I2C, SPI, UART
Testing & Debugging: TRACE32 (JTAG/Lauterbach), GDB, QNX Momentics, Logic Analyzers, Oscilloscopes, VectorCAST, Profiling, Unit/Integration/System-level testing
Automotive Standards: ISO 26262, AUTOSAR, ASPICE, MISRA
SWE Practices & Tools: Agile/Scrum, Jira, Confluence, Git/GitHub, Bitbucket, CI/CD pipelines, Docker, Eclipse
Embedded AI / TinyML: TensorFlow Lite, Edge Inference, Integer-arithmetic Optimization, On-device Continual Learning
Autonomy & Robotics: Real-time Control, Sensor/Actuator Integration, ADAS Perception Pipelines, Computer Vision

CERTIFICATIONS

Linux Device Drivers & Kernel Programming • Automotive Software with AUTOSAR & MotionWise • Advanced C++ Programming • Deep Learning A-Z (Neural Networks, TensorFlow) • The Complete Self-Driving Car Course - Applied Deep Learning