ANCIT– SDV Level1 Training Proposal

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ANCIT– SDV Level1 Training Proposal

Delivery Format   :   Offline in-Campus Delivery / Online
Duration   :   2 Days
Target Group   :   Embedded Engineers in AUTOMOTIVE, ECU Developers, Project Leaders
Prerequisites   :   Knowledge about basic Linux OS, Traditional Vehicle Architecture, C/C++/Python for
                            application development, knowledge on Automotive Protocols
Outcome   :   Participants will gain foundational knowledge of SDV core concepts and learn to
                            connect them with real project scenarios. By the end of the training, they'll be
                            equipped to assess their ToCs and confidently apply their understanding through
                            guided hands-on activities.

Module 1 - Introduction to Software Defined Vehicles
- Evolution of automotive electronics to SDVs
- Differences between traditional and SDV architectures
- Key Components of SDVs: Sensors, actuators, control units and communication systems
- Signal Oriented vs Service Oriented Architectures

Module 2 - Key Technologies in Software Defined Vehicles
- In-vehicle networking protocols (CAN, LIN, FlexRay, Ethernet)
- Cloud and Edge Computing for SDVs
- Role of AI and Machine Learning in SDVs

Module 3 - Software Architecture for SDVs
- SDV software stack layers
- Middleware and application layer software
- Role of microservices and containerization
- Use of service-oriented architectures (SOA) and APIs

Module 4 – Major Functional Domains in SDV
- Powertrain, ADAS (Advanced Driver Assistance Systems), and infotainment systems
- Cybersecurity and over-the-air (OTA) updates
- Data management and logging requirements

Module 5 - Introduction to HPC and POSIX
- Analysing different HPCs in the market
- Role of Hardware Accelerators in HPCs
- Introduction about S32G274a HPC Gold box
- Overview of Automotive Embedded Linux
- Yocto build project- a basic Introduction

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Module 6 - Vehicle OS and Middleware's
- Overview of Vehicle OS – POSIX Vs RTOS Vs QNX
- Middleware overview: Classic Vs Adaptive AUTOSAR
- Importance of Hypervisors in SOA Architecture
- Containerization in SDV
- Edge Vs Cloud native Computing

Module 7 - OTA & TSN overview
- Introduction to OTA
- Ethernet as Backbone
- V2X Communication Overview
- TSN Overview
- Advanced OTA Use Case: Gateway ↔ Server ↔ Client architecture

Module 8 - SDV Communication and Connectivity
- V2X communication types: V2V (vehicle-to-vehicle), V2I (vehicle-to-infrastructure), V2P (vehicle-to-pedestrian)
- Bluetooth, Wi-Fi, 5G, and emerging standards for SDVs
- Real-time communication and latency management

Module 9 - Software Development Lifecycle for SDVs
- Agile development methodologies for SDVs
- DevOps and CI/CD pipeline in automotive software
- Software verification, validation, and compliance (ISO 26262, ASPICE)

Module 10 - Autonomous Driving Software and Simulation
- Levels of vehicle autonomy
- Sensor fusion and path planning algorithms
- Role of machine learning and AI in perception and decision-making

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Module 11 -Cloud and Edge Computing in SDV
- SDV data lifecycle management
- Role of cloud in processing, storage, and remote diagnostics
- Edge computing for real-time decision making

Module 12 - Cybersecurity in Software Defined Vehicles
- Threat landscape in automotive software
- Security protocols and encryption methods
- Key management and secure boot mechanisms
- Base Platform Selection for Safety-Critical Apps
- Cybersecurity in SDV: Secure communication, IDS, Blockchain, Quantum Resilience
- Edge Security & Cloud Security Comparison
- Continuous Homologation

Module 13 - Future Trends and Innovations in SDV
- Role of AI and quantum computing
- Digital twins and predictive maintenance
- Emerging technologies: 6G, software-defined connectivity

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