Session 13 - AUTOSAR in Vehicle Telematics and HMI

AUTOSAR in Vehicle Telematics

Vehicle Telematics refers to the integrated use of telecommunications and informatics to send, receive, and store information related to remote objects (vehicles) via telecommunication devices. This includes:

- **Navigation and Location-Based Services (LBS)**
- **Emergency Services**
- **Remote Diagnostics**
- **Over-the-Air (OTA) Updates**
- **Infotainment Connectivity**
- **Fleet Management**
- **Vehicle-to-Everything (V2X) Communication**

How AUTOSAR fits into Telematics:

Telematics ECUs (often called Telematics Control Units - TCUs, or Communication Gateway Modules - CGMs) are high-performance computing platforms. They handle a mix of traditional embedded software tasks and more complex, IT-like functionalities.

- **AUTOSAR Classic Platform (CP):** While not the primary focus for *new* telematics application development, Classic AUTOSAR can still be found in certain parts of a TCU, especially for:
    - **Low-level hardware abstraction**
    - **Interfacing with the rest of the vehicle network**
    - **Diagnostic services (UDS)**
    - **Functional safety aspects**
- **AUTOSAR Adaptive Platform (AP):** This is where AUTOSAR truly shines for modern telematics. AP is designed for high-performance, multi-core processors and supports dynamic, service-oriented architectures.
    - **Operating System (POSIX-compliant)**
    - **Service-Oriented Architecture (SOA)**
    - **Dynamic Application Deployment**
    - **Cybersecurity**
    - **Inter-ECU Communication (Ethernet)**
    - **Connectivity with Cloud**

In summary for Telematics: While some traditional embedded aspects might use Classic AUTOSAR, the trend is heavily towards **AUTOSAR Adaptive Platform** for the core, high-level telematics functionalities due to its flexibility, scalability, and support for service-oriented architectures and dynamic environments.

AUTOSAR in Human-Machine Interface (HMI)

Human-Machine Interface (HMI) refers to the means by which users (drivers and passengers) interact with a vehicle's systems. This includes:

- **Visual Displays**
- **Input Devices**
- **Auditory Feedback**
- **User Experience (UX)**

How AUTOSAR fits into HMI:

HMI systems are becoming incredibly complex, merging infotainment, navigation, climate control, and vehicle status information onto sophisticated displays.

- **AUTOSAR Classic Platform (CP):**
    - **Traditional Cluster/Buttons**
    - **Interface to BSW**
    - **ASIL Compliance**
- **AUTOSAR Adaptive Platform (AP):** This is the future for highly graphical, dynamic, and interconnected HMIs, often referred to as "digital cockpits."
    - **High-Performance Graphics**
    - **Application Frameworks**
    - **Service-Oriented HMI Logic**
    - **Dynamic Updates**
    - **Connectivity**
    - **Sensor Fusion for HMI**

Convergence and Co-existence:

It's important to note that Classic and Adaptive AUTOSAR are not mutually exclusive. In a modern vehicle, you often see both platforms co-existing.

- **Classic ECUs**
- **Adaptive ECUs**
- **Gateways**