FUTURE VEHICLE AS A MOVING SERVER
Evolution of Vehicle Needs

- Phase I: Mechanical
- Phase II: Electronic
- Phase III: Data centric
Data Processing Needs

- The amount of software and its related data is continuously increasing, with the new features coming this will increase exponential.
Main Challenges We Face

- How can we enable all the new features requiring a lot of software with high demands on execution performance?

- What kind of solution is needed for Autonomous Vehicle when both execution performance and function safety is needed?

- This will put certain demands on the electrical & software architecture to meet future demands.
Architectural Aspects for the Future

- Complexity does not lie in the electronics, it is in the software => Focus shift needed

- Traditional embedded applications are connected to the internet (IoT) => Embedded and regular IT have to co-exist

- Shorter time to market demands increases interest for agile approaches in embedded system development
Multiple Viewpoints- Deal With Large Complex Products

Separation of Concern
To understand things, different or unrelated responsibilities within a "system" should be separated from each other.

Separation of Policy & Implementation
Modules responsible for implementation should only execute algorithms without any context/domain-sensitive decisions.
Architecture Principles

- Separating Vehicle Core Functionality from the specific functionality that deals with Vehicle Environment Management.

- These are different kinds of functionality and based on that separated into its own domains.

- Provide interfaces between different domains.
Client-Server Approach

- The Vehicle Environment Management module has capability to continuously analyze the surroundings through various means and can provide the information about surroundings. This feature makes it a Server.

- Vehicle Core Functionality needs input from a knowledge source about the surroundings to carry out its operation of vehicle movement. This need makes core functionality act as Client.
Basic Infrastructure for VEM- Server

- Faster processing of data to derive the decision → Multi core processor
- OS that support latest technologies like software deployment → Linux like OS
- Should be able to support separation of application → Virtualization through Containers/Hypervisor
- Should be able to connect to cloud services for data access → Cloud support
Vehicle Environment Management Realization

- We are looking at adaptive AUTOSAR to provide platform.
- Many functions handled by this module are supported by Adaptive AUTOSAR.
- Platform should support high performance data processing.
Vehicle Environment Management Module

- Collect information from Sensors or Cloud.
- Ensure correct understanding of a vehicle’s surrounding through data analysis.
- Provide “Service Objects” - representations of a vehicle’s environment.
System Overview

Real and Instant Environment / Surrounding Situations

Vehicle Environment Mgmt

Different concerns can be identified herein.

Wireless Communication Protocol

Truck Application System

S = Sensor
D = Detection
Analogy - News Subscription

- As a server there shall be publication organisation providing the news on different topics at different intervals.
- As a client, person interested in technical topics, can subscribe to the technical magazine and he shall get the information at regular intervals.
- The same person can also be subscribe to financial magazine as well.
- Person refers the magazine and takes the action needed.
System Features

- The key principle is that a Server shall provide one service interface for controlling a particular thing.

- Possibility of connecting multiple clients to Service interfaces enables separation of concerns between domains.

- Prioritization can be done without knowing exactly who the clients are.

- Client initiates the interaction with one or more requests, waits for replies, and processes the replies on receipt.
Conclusion

- The server entity typically both authenticate and authorizes the client and then carries out the requested service.

- Vehicle server can be extend to cloud based technologies.

- Client/Server with Publisher/Subscriber (P/S) Oriented interaction to achieve “fast” response and changeability/extendibility (and reliability)

- Higher abstraction level where some underlying communication protocols/mechanisms have been abstracted away compare to sender- receiver model.
Thank you for your attention!

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