



**Politecnico
di Torino**

Master of Science in Computer Engineering
Tesi di Laurea Magistrale

Rethinking Automotive Software Development: Exploring Software Defined Vehicle and its potential

Supervisors prof.
Danilo Bazzanella
dott.sa Piera
Limonet

Candidate
Lorenzo Sciara

Anno Accademico 2023-2024

Summary

Among the current challenges in the automotive sector is the prospect of transforming the car from a hardware-focused product to a software-focused device. The technology of choice for leading software development and production companies, which is driving this change, is the Software Defined Vehicle (SDV), which is defined as a vehicle that primarily or entirely manages its operations through software, and is able to enable additional features and functionality that make the vehicle constantly up-to-date.

The use of upgradable software, supported by general-purpose hardware, brings several advantages to the vehicle: efficiency is increased by constantly improving the software, and security is enhanced by addressing any vulnerabilities in a timely manner, ensuring both the inherent security of the software and critical human safety.

The SDV concept requires a robust server infrastructure to guarantee a stable update service. Cloud technology meets these requirements, offering virtually unlimited resources to guarantee reliability and security through cost-effective payper-use services.

This thesis develops a project in collaboration with Storm Reply, focusing on the implementation of a platform based on the Software Defined Vehicle (SDV) paradigm. By analysing current technologies in the automotive software market, critical points related to time, production costs and human safety are identified. The aim of the thesis is to improve these aspects by exploiting the comprehensive services provided by Amazon Web Services (AWS), with the intention of creating a point of convergence between the edge device and the cloud environment, ensuring an advanced and secure end-user experience.

The thesis starts with an introduction on the objectives of the project and goes on to provide a broad overview of the state of the art methodologies currently used in the cloud space, specifically related to the automotive industry.

Secondly, the entire stack for the development, maintenance and deployment of software for connected vehicles is examined in detail, along with techniques for secure communication between the vehicle and the cloud.

Finally, a real-world project is examined, in which a sample infrastructure for maintaining and deploying code, as well as analysing data from the simulated vehicle, was created using AWS Cloud Services.

The results of this project provide a complete illustration of a Software Defined Vehicle Platform (SDVP), highlighting the successful integration of flexible hardware, extensible software, and secure cloud-based services. This reframing emphasises the evolving landscape of SDV technology and aligns with current trends and priorities within the automotive sector.