NOVELIC

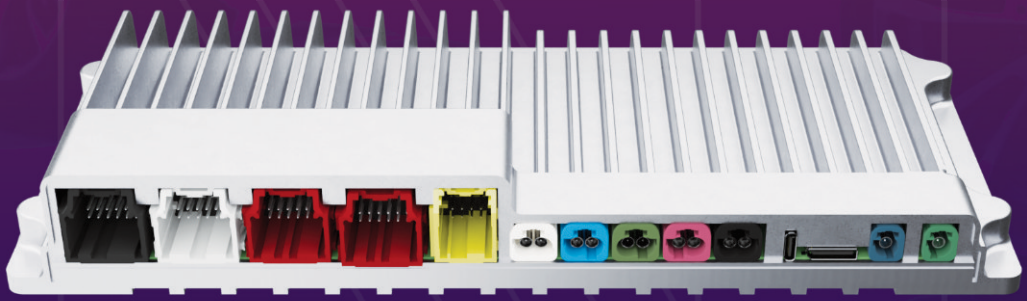
CASE STUDY
ADAS Domain Control Unit

THE TASK

Our client, a leading Tier 1 automotive supplier, required a robust ADAS domain control unit, or **ADAS domain controller ECU,** that would manage all the processing, drivers and control for various sensors and systems expected in contemporary vehicles. The solution needed to be catered to specific requirements yet general in purpose to outfit a range of different vehicles. The unit processes multiple different camera inputs, radar and ultrasonic sensor inputs, several debug interface options, control signals and communication with vehicles various systems as well as a robust power supply. It also needs to fulfill all relevant reliability standards for the European and US markets.

OUR SOLUTION

Our engineers designed a simple, yet robust, design based on an ARM automotive system-on-a-chip (SoC), with a myriad of input and output options to suit all the required systems and sensors.



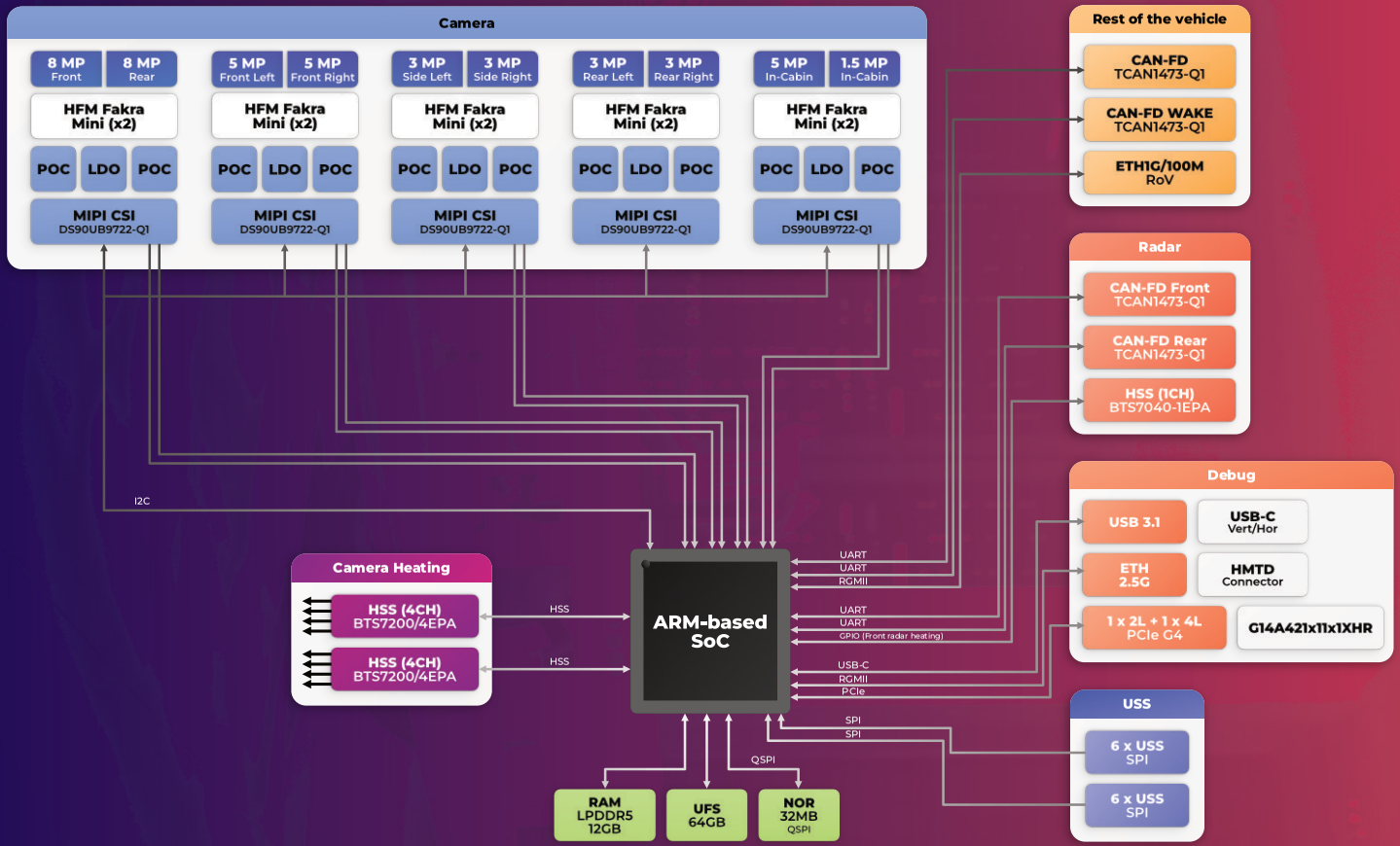


Fig 1. Block diagram of the ADAS Domain Control Unit

UNIT COOLING

The base unit is currently designed in two passive cooling variants. Passive cooling approaches rely on large heatsinks and thermal gap fillers in order to provide sufficient cooling for the ACU. This efficient thermal regulation, and the lack of moving parts, fulfills the 15-year lifespan requirement, with the expectation of 8000 active working hours.

Depending on OEM requirements, the size, shape and port locations of the unit can be changed and designed for a specific purpose.

For high performance applications, such as vehicles aiming for L2+ and L3 autonomy, we also offer variants with active air cooling and liquid cooling systems. This way, we can offer **a scalable solution** for both simple, low-power needs and complex, power-hungry processing tasks on the ACU.

CAMERA VISION

The design offers communication with camera modules over 5 HFM Fakra ports allowing for a maximum of 10 different simultaneous camera inputs, with resolutions up to 10 megapixels. The SoC is then able to stitch the exterior camera outputs to produce a 360° surround view.

RADAR SENSORS

In similar fashion, the unit is outfitted with **CAN-FD** (Controller Area Network Flexible Data-Rate) communication inputs/outputs for up to 5 different radar sensors - for in-cabin monitoring applications

(child presence detection, seat occupancy detection) as well as exterior applications - park assist, blind spot detection, lane change assistance, and adaptive cruise control. The CAN-FD connection allows for standardized communication with modern radar systems, including radar temperature control.

The system is optimized to work with NOVELIC's automotive radar solutions, such as the ACAM in-cabin monitoring radar module, and ASPER exterior short-range radar.

Fig 2. NOVELIC's ACAM 60 GHz In-Cabin Monitoring Radar

Fig 3. NOVELIC's ASPER 79 GHz Exterior Short-Range Radar

OTHER PERIPHERALS

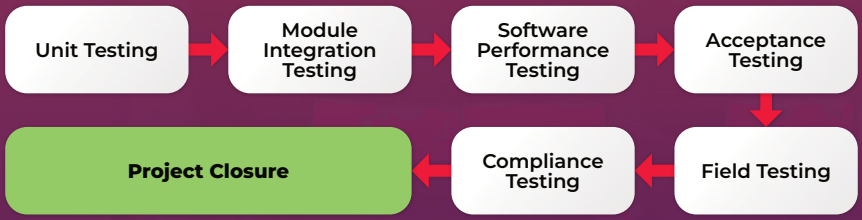
To allow for full ADAS capabilities, the unit is equipped with SPI inputs for up to 12 ultrasonic sensors, redundant CAN-FD and Ethernet connections for RoV (Rest of Vehicle) systems, as well as USB 3.1, Ethernet, and PCIe connections for manual debugging and unit control.

SOFTWARE & TESTING

Accompanying the hardware solution, NOVELIC provides an in-house developed ADAS software stack. The software architecture implements **a layered design approach** to ensure safety, maintainability, and clear separation of concerns.

For this ACU, we developed low-level MCU drivers and algorithms for all port communications, hardware interfaces, as well as the OS configuration as a base platform for further software and hardware integration.

To ensure a compliant, bug-free and reliable product, we adhere to rigorous validation and testing.



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NOVELIC committed to a **95% or higher test coverage.** as well as continuous improvements in code quality. This ensures quick issue removal and always up-to-date software. Our dedicated software team maintains an average bug fix turnaround time of <48h, a mean time to resolution of less than 5 days for all reported defects, regular release cycles and a continuous integration and deployment of CI/CD pipelines.

HIGHLIGHTS

WIDE VARIETY OF INPUTS/OUTPUTS

CUSTOMIZABLE TO CUSTOMER NEEDS

FULL ADAS IMPLEMENTATION

PASSIVE AND ACTIVE COOLING OPTIONS FOR HIGH-END CONFIGURATIONS

IN-HOUSE DEVELOPED SOFTWARE & TESTING

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ECU DEVELOPMENT SERVICES

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