Cost Optimisation Leap with Centralised Radar Perception

Andreas Haefner Product Cost Engineering 26.06.2026

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ADAS System Design Questions:

1. Is it possible to ensure functional safety with camery only ?
2. Do cameras ensure the same functionality and safety at night ?
3. Are Cameras the main cost drivers for the SoC performance ?
4. How safe is the functionalty of Lidar without cleaning ?
5. How safe is the functionalty of the current front radars ?
6. Does it make sense to run low resolution corner and side radars if cameras increase performance ?
7. Is it possible to go to Next Level System Performance without changing the Software ?
8. How to make system decisions if camera says GO and radar says NO !

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Status Cameras

Driving Cams	8 MP is Standard / Tesla HW 4 uses 5 MP
Interfaces	FPD link / GMSL / Ethernet
Parking Cams	3 MP is becoming more and more Standard
Ptot < 1W	Package. Ambient Temperature
Intelligence	Centralised in Central Compute ECU
Cost Drivers	Imager/ Lens (All Glas Lenses / Hybrid Lenses Glas / Plastic)

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Status Lidar

Frequency	905 nm is Standard. 1550nm is exotic.
Position	Roof is typical for best Performance
Lidar Cleaning	Typically without cleaning in chinese cars. Very Expensive.
Ptot > 20 W (Cooling !)	Package. Ambient Temperature (105°C at roof)
Range < 150m	For small targets
Eye safety	Limits Range
Cost Drivers	Azimuth and Elevation Resolution and Accuracy

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Status Corner and Side Radars

Today	2028ff
4 TX / 4 RX Channels	6 TX /6 RX
IF Bandwidth 20 MHz	>= 40 MHz
Integrated DSP	Centralised RSP (RSP: Radar Signal Processor)
Integrated µC / Hardware Security Module	Simple µC
Ptot <= 4 W (Cooling)	Ptot like today
Range < 200m	Range > 200 m
Elevation Estimation	Elevation Measurement
Cost Drivers	Radar on Chip / Antenna / Housing

Measure, not estimate object information !

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High Performance Front Radar

>= 32 TX / 48 RX Channels	Needs excellent antenna design. Package !
IF Bandwidth > 100 MHz	Next Level Sensor Data
High Performance RSP	Update Rate and Cycle time
Ptot < 30 W (Cooling !)	Package. Ambient Temperature
Range > 150m	For small targets
Range > 300m	For cars etc.

Cost Drivers — RX and TX Chips / Radar Signal Processor / Antenna

Measure, not estimate object information !

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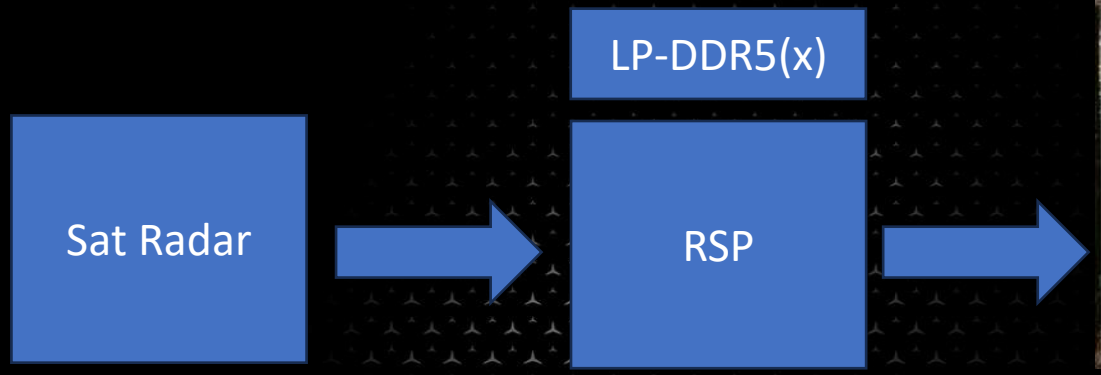
2025 versus 2030

RoC: 45 nm to 28 nm
Embedded SRAM 2-4 MB

4 MB SRAM
DSP
µC
Ptot



Min. / No SRAM
1st FFT DSP / No DSP
reduced µC
reduced Ptot

RSP: 16 nm to 4 nm

1 Gbyte LP-DDR5(x)
RSP: x-times faster for same costs than DSP in 28 nm

Watercooled System

SoC: 8 nm to 4 nm

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Top 5 Take Aways

ADAS System Design	Optimised overall System Performance with Next Level Components
Sensor Set	Intelligent combination of different Sensor technologies
Central ECU	Improved Performance and Software possibilities
OTA	Less number of sensors that need OTA updates
Complexity	Reduced Radar complexity.
Cost Drivers	Same or lower costs at significant better customer experience

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Many Thanks for your interest
Questions ?