THE OJO-YOSHIDA REPORT
TECHNOLOGY IN CONTEXT

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A Central-Compute SoC for SDVs? Really?

The idea of a central SoC that rules all of a car's computing is not now — and maybe never — viable in mass-market vehicles.

Looking inside future SDVs (Image: Arm)

By Junko Yoshida

What's at stake:

Consider the Volkswagen Group's desperate move to partner with Rivian in hopes of designing its future software-defined vehicle platform. Or Volvo's catastrophic software failure with its new Volvo EX90 electric car. These stories confirm the huge — and persistently unfillable — software deficit afflicting many car OEMs. So, where should carmakers go to fix their software problem?

The *Ojo-Yoshida Report* recently had Chet Babla, senior vice president, strategic marketing at Indie Semiconductor, as the guest in our latest episode podcast of "Chat with Junko and Bola". Although we didn't intend to talk with Babla about specific examples like VW and Volvo, our conversation reveals the maelstrom of change hitting the automotive industry.

Babla honed his skills at Arm and now at Indie Semiconductor. We ask him to reflect on the automotive market's past decade, picking out a pivotal moment when he saw the automotive industry's emphasis has shifted. Was it ADAS, automation, the in-cabin experience, connectivity, electrification, or maybe software-defined vehicles?

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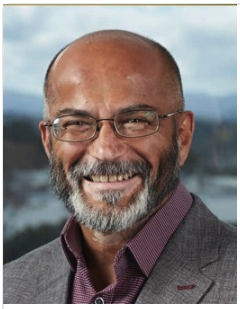
Babla dodged. He says semiconductor technology has driven "integration, cost benefits and scalability," ingredients necessary to enable transformational changes. But he points out that the emergence of in-vehicle digital infotainment systems opened the door to automakers' digital transformation. "That was actually a very big deal, and everyone raced," says Babla.

Further, it marked the beginning of more complex software infiltrating vehicles.

Indie Semiconductor is in a unique position to identify big trends among OEMs' moves to adopt various sensors. Babla cites his company's "multiple touch points." Indie processes all types of sensors – ranging from vision and ultrasound to radar and lidar.

Babla sees a “renaissance around ADAS safety” now affecting the automotive industry. Carmakers wonder if they should keep adding sensors. They want to know the sensor architecture they need and the best practices for fusing different sensor types.



How to define a whole vehicle architecture

All this questioning inevitably leads to a debate about how to design the whole vehicle architecture that carmakers want.

Amidst a lot of talk, Babla offered a reminder that not much sensor fusion is going on yet in vehicles now on the market.

Media veterans remember the industry’s excitement over the promise of an E/E architecture built around a central-compute SoC which, supposedly, could integrate all ADAS and infotainment functions. The central compute was being pitched as the destination for all the raw data from ADAS sensors.

Unfortunately, Babla flatly says, “We’re probably not really going to go there ever, from a mass market point of view.”

In his view, there are “good reasons” why this [central compute] architecture isn’t really happening.

Babla shares a recent conversation with a German OEM executive, whom he asked about the prospect of deploying ADAS and IVI (in-vehicle infotainment) fused into one chip. The answer was a resounding *“nein.”* The idea of the omnipotent chip just wouldn’t work, the OEM said. On the central compute SoC with a single software stack, while ADAS and IVI functions independently evolving “at a different pace,” how does an OEM balance the disparity?

Babla also asks: What if a carmaker decides to deploy a dumb sensor and ship raw data to this central-compute SoC?

"You've got six to eight cameras, four to six radars, 10 and more ultrasonic, and lidars are coming into the picture. This is gigabytes of real-time data. Just shipping this around the car is impractical, in terms of both data volume and interfacing technology."

It's impossible to ignore the power such data transfer consumes, not to mention the cost of wiring.

Babla adds one more wrinkle. What about "optionality and scalability"?

The perception algorithm often becomes specific to a particular sensor. Opting for the early sensor fusion might close the option of using another sensor by another vendor.

Babla concludes that "this is about the tradeoff between the value of early fusion for smarter perception algorithms and the optionality and scalability that the OEMs need across different vehicle models and platforms."

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Our conversation also moves into software-defined vehicles. Given that SDV capability isn't something that's contained in an ECU box which OEMs can buy from Tier 1's and slap onto their vehicle, every carmaker is struggling with "how-to".

Babla's definition of SDV? "It's really about the optimization of hardware resources, through software, configurability, upgradability. The goal is to deliver engaging ownership experiences for consumers, but also easier lifecycle management and services monetization for OEMs."

Babla's SDV definition works but also conveys how OEMs must thoroughly rethink vehicle architecture, because there is no single path for the SDV to work with all models and brands by all OEMs.

Bottom line:

We've heard enough claims by a handful of leading chip companies boasting that their central compute solution is bringing the SDV vision to reality. Things ain't that simple. Babla makes it clear that central-compute vehicle architecture isn't happening and it certainly isn't a be-all, end-all answer. Instead, it could only further exacerbate OEMs' software problems.

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