Shaping Future Mobility with Power Management

Nitin Dahad (00:00):

This is the Smarter World Podcast, focusing on technology and issues behind today's connected world. I'm host, Nitin Dahad. In this episode, we'll talk about how power management can help shape future mobility. Today, I'm joined by David Lopez, who is segment director, safety power management at NXP Semiconductors. David, hello.

David Lopez (00:25):

Hello, Nitin.

Nitin Dahad (00:26):

So before we start, tell me a little bit about you and your role at NXP.

David Lopez (00:29):

I'm a segment director, which means that I'm in charge of marketing and business development, and then some application and system activity to define, develop, and sell as a power management system. And I'm in particular focusing on electrification application where our devices are doing all the power management and the functional safety monitoring.

Nitin Dahad (00:49):

In terms of power management, I'm usually thinking about low power electronics and consumer electronics and IoT and sensors and all that. But I think you're specifically focused on automotive power management. Tell me the differentiation or the context, please.

David Lopez (01:04):

First of all, NXP is playing also in this mobile IoT as you mentioned. The difference between the automotive power management and the rest of the market is really the notion of harsh environment, the notion of the 12-volt network, the power net within the car where our product are connected to. And the purpose of this device is to transform the energy from this 12-volt network, level of voltage, which is capable to be supplied for the processor, but also for the other blocks of the system. And so our first mission is to deliver the right level of energy at the right level of voltage and signals to all of the system. And so, we are enabler of system.

Nitin Dahad (01:50):

Give us some insights into how power management works in the automotive environment.

David Lopez (01:53):

There's a different application where we are designed today and we are working on, the electrification of the car because these are part of the big transformation of this car industry. So electrification, what does it mean? It means about battery management systems, inverter systems, DC-DC and onboard charging system, as well as domain controller. So typically what are we doing? We are providing the power management to the processor and the rest of the load. And we are also making the safety monitoring, the control of the functional safety of the system in order to make sure in case of failure the system is safe from a predictability standpoint. So, that's one element.

(02:34):

The second element of power management is about autonomous driving. So we are doing radar, the sensors, camera, LiDAR support and some of the sensor fusion. This application require power management and we are also delivering the right level of power for this diversity of application in addition to the functional safety. And finally speaking a third area, we are actually investing and innovating on that with a strong market presence is the connectivity. The electrical car and the autonomous car will be connected to society and the connectivity is to make sure that you have the right interaction from the driver, the passenger and the rest of the other car in the smart city. So we are developing this power management to serve the electrification, the autonomous driving, and the connectivity of the car.

Nitin Dahad (03:29):

You referenced functional safety. Maybe just explain a little bit more about the importance of functional safety and the role that power management has to play in that.

David Lopez (03:36):

Yes, thank you for this question and yes, definitely we early identified that the functional safety would be a very strong differentiation of the power management. And why, first of all, because in case the MCU is failing or is in what we call a fail safe situation, the only device which is available on the ball, which can bring in verification and puts the system in a safe place is the one connected to the battery, which is the power management. So the power management bring in case of failure, in case of critical situations, the right decision and the right predictive state of the system to make sure, I would say, the application and the consumer at the end is safe when using the car.

(04:20):

So it's about trust, it's about how you bring the technology close to the power management in term of verification and monitoring of the safety function, which are critical. And the criticality of the function depends on the application and on the use case. Electrification will be different from autonomous driving and that will be also different from connectivity. But the specificity in particular at NXP is to make sure we adapt to each of these use case and to provide the right level of safety integration inside the power management.

Nitin Dahad (04:55):

The other area, I think you mentioned it, again, very briefly just in the phrase was battery management. And I think when we talk about electrification, for example, you are talking about extending range. Now power management and battery management are pretty well interconnected, aren't they?

David Lopez (05:10):

Indeed. Power management bring, let's say, a broad element of expertise. Battery cell controller is the monitoring of the battery. So you need to be as accurate as possible in order to have the longer range. Power management bring also some motor control with gate drivers. And you need to have the highest efficiency in order to reduce the losses and increase the maximum of kilometer of range within the same battery pack. And in my case, I'm more in the business of the power supply, which is enabling the power to the rest of the system. And this is really our key purpose. And in this purpose, the notion of safety is critical, as initially mentioned, because we are bringing the value of the customer when you use this application in a trusted environment.

Nitin Dahad (06:03):

The other thing I think we probably should just touch on is it's not just about electrification and autonomous vehicles because you've been doing this for a long time, it's a whole automotive industry and both combustion engine and electrics. So I think it's about powering up the electrics and the electronics within cars or within the automotive environment, isn't it?

David Lopez (06:21):

Exactly. And there is a transformation today. I would say the old model and the existing model of the combustion engine with a kind of flat architecture in term of connectivity, in terms of data management and energy management is being transitioned and there is a big transformation to something which is more domain based. So the car is becoming central domain, together combined, where each domain will harmonize the interaction in each of these focus area. And there is also a transformation to move to a software-defined car where the software-defined car will bring much easy platform scalability, easy, I would say, production capability, so to reduce the cost of all, and standardize the architecture, standardize the platform. In that perspective, the power management need to bring this level of scalability and this level of software easy to integrate to make sure the platform is definitely easy to design.

Nitin Dahad (07:21):

What role will power management play in future mobility? And I think there's an important aspect of sustainability, but also the fact that mobility includes not just the automotive but the whole smart environment.

David Lopez (07:33):

The future of mobility is really driven by the fact that energy will become more and more important to save. So saving energy is one of the key element of our power management. When I say saving energy, what does it mean? It means when I transform the energy from a battery line to a processor, the level of losses need to be as low as possible. In the same time when I don't need this application, like my TV and my mobile phone, you put standby mode or you stop all the power management. And this is the type of advanced strategy of low power which are required in the evolution. And this is a strong contributor to saving energy, which is one of the key pillars for sustainability.

(08:15):

But this is not the only one. We also have some direction where the goal of the electronics is also to minimize the waste of material, the waste of cables in the new architecture of the car. One of the aim is also to reduce the energy and the power flowing inside this harness and this power management will help and enable this earnest reduction and this weight reduction at the car level. So the second pillar will really be reduce the waste. And the third pillar, it's about protecting the life, protecting the people. And the fact that our devices bring safety to the rest of the system is really a fundamental element of how the sustainability play in our society and how NXP can bring value to the sustainability.

Nitin Dahad (09:09):

All very interesting insights. Before we do go, can you tell our listeners what the future demand for power management will look like and what kind of innovation do you think we can expect in power management over the next few years?

David Lopez (09:20):

This is an interesting question and this is already a question which is bringing a lot of activities ongoing today, because this transformation of the automotive industry brings a lot of new architecture evolution, which enable a lot of power management inside each of the point of loads. And this is definitely an area where the power management is growing very strongly and we see a big growth element thanks to this type of transformation. And what are the four pillars which are driving the innovations in our side as we see today? I say four pillar because we are already identified this four pillars.

(10:02):

The first one is about adding more efficiency. The evolution of the processors is moving from 16 nanometers down to five nanometers technologies. And this technology require much more power, much more accuracy and different type of techniques that bring innovation. The second element is low power strategy. It's not just low power between the MCU and the power management. It's low power at the complete system level. And we see more advanced low power strategy and techniques which bring innovation. And this is one pillar.

(10:37):

The second pillar is the scalability. When the car OEM define a platform, this is from the low end to the high end and it can cover different brands. And that's really how the scalability play an important role. Our device and our solution are becoming more and more scalable in order to enable lower power up to high power, lower safety up to higher safety. And again, some different integration at the system level.

(11:06):

The third pillar is definitely the reliability, safety and security. The safe and secure car, the key pillar for having the technology trust adoption to the consumer. Everything start by reliability, because reliability is a quality of the device that you get on the car is the foundation of the safety. And security is also an important aspect, because you don't want someone control your car when you are driving your car. There is an element about safe and secured, which is key and where NXP bring a lot of value here.

(11:43):

And the fourth element, I would say, is the software integration. So the OEM are moving into a software-defined architecture and our responsibility is to make sure the component we are defining, which are driving energy, but are easy to integrate within a software-defined architecture. So this is covering this famous scalability, but over the complete software platform in order to make system integration as easy as possible. So these are the four pillars and this is definitely driving the demand, which is very strong in term of power management.

Nitin Dahad (12:17):

Thank you very much.

David Lopez (12:18):

Thank you, Nitin.

Nitin Dahad (12:19):

Thank you for listening to the Smarter World Podcast. I'm Nitin Dahad. See you next time.