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TRANSFORMATIONAL GROWTH LEADERSHIP

From Edge AI to Intelligent Healthcare: How Ambiq is Enabling the Next Generation of Connected Medical Devices

Fumihide Esaka

Chief Executive Officer, Ambiq

in conversation with

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The convergence of Edge computing, artificial intelligence (AI), and healthcare is redefining how medical data is collected, analyzed, and acted upon. Devices that were once designed for fitness and consumer applications are increasingly evolving into sophisticated health monitoring systems capable of delivering real-time insights and proactive care.

In this Transformational Growth Leadership discussion, Fumihide Esaka, CEO of Ambiq, shares how ultra-low-power semiconductor innovation and Edge AI are enabling a new generation of intelligent healthcare devices. He discusses how advancements in battery efficiency, data security, and on-device intelligence are transforming patient monitoring, reducing healthcare system burden, and improving quality of life, particularly for aging populations.

> “Devices are evolving from simple data collection tools into intelligent systems that can learn from individuals, provide real-time alerts, and even guide when medical intervention is needed.”
>
> — Fumihide Esaka, CEO, Ambiq

The Shift from Consumer Devices to Healthcare Applications

Greg Caressi: *If we go back a few years, Ambiq was more focused on smart devices. How did healthcare become such an important area?*

Fumihide Esaka: We started with a unique ultra-low-power technology platform. It allowed devices like smartwatches, smart bands, and other IoT (Internet of Things) devices to run five to ten times more efficiently. That was really our initial focus.

About three to four years ago, we began focusing more on Edge AI. At that time, customers knew AI was coming, but they couldn't clearly define what they wanted to do with it.

Then things started to change. Customers began asking for very specific use cases, heart rate monitoring, glucose monitoring, and remote patient monitoring. What we are seeing now is a convergence. Devices that were originally consumer devices are becoming healthcare devices, and medical device companies are also adopting capabilities from IoT and Edge AI.

Elevating Security and Privacy in Healthcare Devices

Greg Caressi: *As these devices move into healthcare, what becomes more important?*

Fumihide Esaka: Accuracy is important, of course, but privacy and security become even more critical.

If health data is exposed to someone who should not have access to it, that is a serious issue. So, we focus heavily on making sure that data is protected.

Our processors include strong security features, and we also support secure data transmission. Typically, data goes from the device to the cloud and then to healthcare providers. That means compression and encryption become very important to ensure that the data remains secure throughout that process.

Balancing Performance with Ultra-low Power Efficiency

Greg Caressi: *Healthcare devices need continuous monitoring. How do you balance computation power with battery life?*

Fumihide Esaka: That is one of the biggest challenges. Healthcare requires accurate and continuous computation, but at the same time, devices cannot require frequent charging.

In the past, devices might last a couple of days. Now we are seeing devices that can last several weeks, even up to six weeks in some cases.

This is important because you don't want patients thinking about charging all the time. Ideally, between doctor visits, they should not have to worry about it at all.

Enabling Personalized Healthcare Through Edge AI

Greg Caressi: ***Where does Edge AI really make a difference in healthcare?***

Fumihide Esaka: Edge AI allows devices to learn about each individual. Every person is different. What is normal for one person may not be normal for another. So, devices need to understand each person's baseline and detect when something is wrong.

It is not just about sending data to doctors. Devices can also alert patients directly. In some cases, they can recommend immediate action, like contacting a doctor or even emergency services.

That kind of real-time, personalized response is where Edge AI becomes very powerful.

Advancing Continuous Health Monitoring with Edge AI

Greg Caressi: ***You mentioned real-time monitoring. What challenges still exist there?***

Fumihide Esaka: One big issue has been charging. Many people take devices off to charge them, often at night. But a lot of important health events happen during sleep. If the device is not being worn, you lose that data and that protection.

With longer battery life, devices can now stay on continuously, and even charging can be done quickly, maybe 30 minutes every couple of weeks. That reduces risk significantly, especially for older users.

Supporting Innovation Through Integrated Hardware and AI Tools

Greg Caressi: ***Every device manufacturer wants to differentiate. How do you support that?***

Fumihide Esaka: We don't just provide hardware. We also provide software and AI development tools.

Each customer has different requirements, so we give them the ability to build their own feature set and AI functionality more easily.

This combination of hardware and software is very important because it allows customers to innovate without having to start from scratch.

Driving Value Across the Healthcare Ecosystem

Greg Caressi: ***Where else does your technology create impact beyond the device itself?***

Fumihide Esaka: One important area is data efficiency.

Transmitting and storing data in the cloud is expensive, and data centers consume a lot of energy. By compressing data intelligently, we reduce both storage requirements and transmission costs.

This benefits everyone: patients, providers, and device manufacturers. It also helps reduce overall energy consumption.

The Emergence of "Doctor on the Wrist"

Greg Caressi: *You used the phrase "doctor on the wrist." What does that look like in practice?*

Fumihide Esaka: It means that devices can provide basic health insights directly to individuals. They can tell if you are fine, if you need to be cautious, or if you should see a doctor.

This does not replace doctors, but it helps reduce unnecessary visits while ensuring that serious cases are addressed quickly. It also helps manage healthcare system capacity more effectively.

A Dual Approach to Innovation and Execution

Greg Caressi: *How do you approach innovation internally?*

Fumihide Esaka: : It is a combination of two things.

We have our own internal technology roadmap, driven by our engineering and AI teams. At the same time, we get a lot of input from customers.

We combine these two, our own innovation and customer needs, to shape our product roadmap.

I am not worried about direction. The key is execution, making sure we can build products fast enough to meet demand.

A Vision for Healthier and More Independent Aging

Greg Caressi: *Looking ahead, what excites you the most?*

Fumihide Esaka: For me, it is about improving quality of life, especially for aging populations.

Technology can help people remember better, hear better, and understand their health better. It can allow them to live more independently and actively, even as they age.

At the same time, privacy remains very important. People should have control over their own data and how it is used.

Building on a Foundation of Breakthrough Technology

Greg Caressi: *What has enabled Ambiq to succeed in this space?*

Fumihide Esaka: It really comes down to our core technology and the people behind it.

We developed a breakthrough in ultra-low-power semiconductor design that solves a very difficult physics problem.

Our company is built on that technology foundation, not just on products. That is what allows us to deliver capabilities that are difficult for others to replicate.

Closing Reflection: Toward Always-on, Intelligent Healthcare

As healthcare continues to shift toward continuous monitoring and personalized care, the role of Edge AI and ultra-low-power computing will become increasingly important.

Ambiq's approach highlights how intelligent, energy-efficient devices can enable a future where healthcare is not just reactive, but proactive, supporting better outcomes, improved efficiency, and a higher quality of life.

Fumihide Esaka | Chief Executive Officer of Ambiq

Fumihide Esaka is the **Chief Executive Officer of Ambiq**, a leader in ultra-low-power semiconductor solutions enabling edge AI and intelligent devices. With over two decades of global leadership experience in the semiconductor industry, he has held CEO roles at companies including Transphorm and Nihon Inter Electronics.

He joined Ambiq in 2015 and has since led the company's growth as a pioneer in energy-efficient computing, helping power hundreds of millions of devices worldwide.

Esaka began his career in consulting at Accenture and later held senior leadership roles at International Rectifier, building deep expertise in power efficiency and semiconductor innovation.

A graduate of the University of California, San Diego in Electrical Engineering and Computer Science, he is recognized for driving advancements in Edge AI, IoT, and ultra-low-power technologies that enable next-generation applications across healthcare, industrial, and consumer markets.

Greg Caressi | Associate Partner, Senior Vice President, and Global Client Leader at Frost & Sullivan

Greg Caressi is **Associate Partner, Senior Vice President, and Global Client Leader at Frost & Sullivan**, with over 30 years of experience in healthcare and life sciences. He holds an MBA from Dominican University and bachelor's degrees in economics and education from Miami University. Greg has led market analytics and growth consulting initiatives, overseeing hundreds of projects and authoring numerous industry studies. His expertise spans digital health, telehealth, data analytics, next-generation healthcare technologies, and international market expansion, with experience across Asia and Latin America. He also serves as Chair of the HIMSS Life Sciences Information Technology Committee and is a recognized industry speaker and thought leader.

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Annexure: Advancing Edge AI and Ultra-low-power Innovations in Healthcare

As healthcare increasingly shifts toward continuous monitoring and personalized care, edge AI and ultra-low-power semiconductor technologies are becoming critical enablers of next-generation medical devices. These capabilities allow intelligent processing directly on-device, reducing latency, enhancing privacy, and enabling real-time insights across patient monitoring and diagnostics.

At the same time, advancements in energy-efficient computing, AI-enabled wearables, and connected health ecosystems are supporting longer device lifecycles, improved patient adherence, and more scalable remote care models. The integration of hardware innovation with AI-driven intelligence is redefining how healthcare is delivered, moving from episodic care toward always-on, proactive health management.

To support organizations navigating this transformation, Frost & Sullivan provides forward-looking intelligence across Edge computing, AI in healthcare, and semiconductor-driven innovations, including:

- Sleep Management Technologies Market, Global, 2026–2031
- Frost Radar™: Medical Device Connectivity
- Pioneering a Connected, Personalized, and Sustainable Healthcare Ecosystem: The Future of MedTech, 2040
- Hemodynamic Monitoring Systems Market, Global, 2026–2030

Together, these analyses reinforce the key themes of this Transformational Growth Leadership discussion: intelligent Edge processing, energy-efficient design, and the evolution toward continuous, personalized healthcare ecosystems.

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