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Autonomy and AI Steal the Show at CES 2024

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CES (Consumer Electronics Show) 2024 was buzzing with excitement, thanks to a number of groundbreaking advancements in technologies that seem poised to soon become part of daily life. Among the highlights were leaps in autonomous technology, particularly self-driving trucks. We noted autonomy shifting gears from mere trials and testing to potentially hitting the roads for commercial use. The commercialization of AI was a major theme with innovators moving beyond data centers to edge applications that are more user-centric and immediate. Also, immersive entertainment technologies continue to make waves, supported by the growing influence of venues like the Las Vegas Sphere and wearable devices that appeal to consumers with sleeker designs, enhanced functionality, and more wallet-friendly prices.

In this piece, we share our CES highlights, and we lay out how these trends can shape technology in 2024 and beyond.

Key Takeaways

- Autonomous technology is rapidly advancing towards commercialization, particularly in the personal transportation and trucking realms.

- AI is expanding beyond data centers, enabling innovative applications in diverse fields, including agriculture and edge computing.

- Immersive entertainment technologies are revolutionizing digital and live events, blending the physical and digital worlds seamlessly.

Autonomous Driving Is Much Closer Than It Appears

CES showed us that autonomous driving technology as a whole is at an inflection point, with advancements and declining costs bringing the tech much closer to economic feasibility. In our discussions with leading car manufacturers such as Mercedes, Sony, and Honda it was clear that they intend to integrate autonomy as a fundamental feature along with advanced connectivity and in-car entertainment. Sony and Honda's new electric vehicle (EV) venture, Afeela, is one example.

Our team also visited with EV upstarts like Turkey's Togg and Vietnam's Vin Fast, evidence that electric mobility is revving up on a global scale, beyond the biggest carmakers. New players like these are vying for attention and approval, increasingly by differentiating their wares via autonomous functionality, vehicular data platforms, and on-the-go connectivity.

Decades in the making, self-driving technology showed clear progress towards real-world deployments. While fully autonomous city driving (Level 5) remains further out, fully autonomous highway driving (Level 3) may be just around the corner. Although highway driving requires fast reaction times, it generally involves reasonably similar types of events or patterns of events. Conversely, city driving involves more types of unpredictable obstacles. Level 3 autonomy may be the next megatrend within the auto industry. It focuses on an easier, but also a more appreciated area to

automate – as long road trips or extended periods of highway driving are typically the time when drivers can really value being able to take their eyes off the road.

Hands-off and eyes-off is the key step up between Level 2 and Level 3 autonomy. The driver is the backup under a Level 2 system and is liable if something goes wrong. Level 3 technology includes redundancies between cameras, LiDAR, and radar, creating an environment where the original equipment manufacturer (OEM) is liable rather than the driver should something go wrong.

The progress in trucking is particularly notable, with leaders Aurora and Kodiak Robotics gearing up to roll out fully autonomous trucks for commercial use by year-end. Aurora is collaborating with OEMs and vehicle technology company Continental to distribute its tech, while Kodiak Robotics plans to offer its plug-and-play autonomy kits directly to trucking carriers. Both companies' business models are based on earning commissions per mile autonomously driven.

Within the farming industry, autonomous driving technology has the potential to completely shift the industry, taking the farming of certain products from a daylight activity that requires a large amount of manual labor, to a 24-hour activity where humans are only involved where necessary. While the aim is to operate 24/7, the transition hours between day and night remain the biggest challenge to camera technology. Currently, digital farming systems are in a soft launch phase, allowing users to get comfortable with the systems while full integration and use cases are built out. One of the key companies we talked with in this segment intends to launch a fully autonomous farming system by 2030.

Neural networks and SD maps have been a shift in thinking within autonomous driving technology. Rather than using HD maps that have a high level of historical data available for the system to work with, several companies mentioned shifting to the use of simpler SD maps, ensuring the sensors are truly reacting to the current data available. This can improve outcomes during road construction, where there are unexpected obstacles, or in unfavorable weather conditions, as well as potentially opening the way for use cases in offroad or less well mapped areas. Neural networks combine data across cameras, radar, and LiDAR to provide the most complete picture of current driving conditions, helping the vehicle react in a timely manner to road conditions and obstacles. Our team even got first-hand experience with semiconductor company Ambarella's Level 4 autonomous vehicle. Though still in testing, the sophistication that Ambarella achieves in this vehicle with low-cost chips and merely stereo cameras is impressive. Ambarella's systems rely on real-time road data, not high-definition maps, allowing the vehicle to respond to real-time road conditions and not pre-programmed conditions, which is a capability that could be a game-changer for achieving Level 5, or full driving automation.

AI Moves Closer to the Edge

The AI landscape shifted dramatically in 2023, with data centers evolving to meet the soaring demand for generative AI services. CES showed that the next big trend is AI moving beyond these centralized hubs and closer to specific applications and unique use cases. For example, agricultural equipment manufacturer John Deere is integrating advanced AI systems and cutting-edge sensors across its farming hardware stack. John Deere's proprietary See & Spray technology, for example, is equipped with 36 cameras and capable of processing a staggering 1.2 billion pixels per second, utilizes Nvidia GPUs to precisely target weeds, minimizing herbicide use and promoting sustainable farming practices. Data collected can generate seed and yield maps that give farmers insights about how to make their processes more productive and efficient.

Notably, John Deere has made four major AI acquisitions since 2017. Its latest acquisition, Spark AI, joins the likes of Blue River Technologies (responsible for innovative "see and spray" technology),

Lightt (bringing expertise in AI-powered vision systems), and Bear Flag Robotics (focusing on robotic solutions for agriculture).

The widespread availability of open-source models is fostering broad experimentation, making unique edge AI applications possible. We spoke with the team from Ambarella about its flagship N1 system-on-chip (SoC) platform. Designed to run generative AI workloads right at the edge, the N1 delivers server-grade performance under 50 watts, eliminating the need to send data over the internet or to the cloud for processing. Equipped with 16 ARM Cortex central processing units (CPUs), a graphics processing unit (GPU), a vector processor, an advanced image processor, a dense stereo, and optical flow engines, this SoC can handle Internet of Things (IoT) and automation processing needs with ease.[1]

One of the N1's biggest draws is its ability to run top-tier generative AI models on-premise, bringing the benefits of AI to companies without the risks associated with cloud-based data sharing. Ambarella also showcased its CV-3 chip, a purpose-built solution for autonomous driving. This chip provides a reliable, application-specific platform that aligns with the trend of declining costs of hardware and software for autonomous applications.

Immersive Tech Is Starting to Redefine Entertainment

Our team had the privilege of a private tour of the groundbreaking Las Vegas Sphere. From the outside, the Sphere is essentially an array of tightly coupled LED units, mostly used to provide an advertising medium. The inside offers a first-of-its-kind immersive entertainment experience that blends technologies like a translucent 16k screen, segmented audio, wind blowers, and haptic seats to create a unique sensory experience for an audience of roughly 25,000.

The Sphere's technology goes beyond the show, as visitors interact with humanoid robots that respond to questions and an AI avatar system for 3D user scanning. Here, a standalone demonstration of the Sphere's segmented audio technology was particularly impressive in how it delivers different audio streams to different audience seating areas.

While the Sphere's magic is currently location-bound, expansion plans are underway. This glimpse into the future of entertainment hints at a world where live shows, movie screenings, and digital platforms like Netflix, Meta Platforms, YouTube, Amazon Prime Video, and Twitch potentially merge digital content with physical experiences.

On the personal tech front, we noted the advancements in immersive hardware, including device functionality, affordability, and design, which are all vital for mass market appeal. We tested smart eyewear from Vuzix, a brand that caters to industrial and enterprise end markets. We tested Vuzix's Z100 pair of smart glasses which feature a heads-up augmented reality-based display and allow industrial developers to build applications using IOS or Android SDKs that easily pair with a users' smartphone.

Also, the rise of smart personal devices with AI and haptic technology can't be ignored, in our view. For example, AI startup Rabbit launched its Rabbit R1 at CES, selling over 10,000 units in under a day.[2] The device, which is about half the size of an iPhone, has a touchscreen, a rotating camera, and a scroll wheel to engage the device's assistant. The device's operating system essentially provides users a universal solution that can access websites and apps for users. The device's early reception may offer a peek into the demand for post-smartphone technology.

Conclusion: Innovation Progressed

Other recent CES' whet the appetite for these technologies. What CES 2024 showed is that they're nearly ready for showtime on a broad scale. The advancements in autonomous technology signify a

shift towards cost effectiveness and efficiency. Generative AI creates opportunities for innovation via an ecosystem of chips that enable edge-based applications. Immersive entertainment technology offers consumers new adventures by blurring the lines between the digital and the physical worlds. With these technologies at or approaching critical inflection points, we believe that long-time talk about the potential for mass adoption and the broad economic growth that comes with it is starting to become real.

Footnotes

1. Ambarella. (January 8, 2024). Ambarella Brings Generative AI Capabilities to Edge Devices; Introduces N1 System-on-Chip Series for On-Premise Applications.
2. Dataconomy. (January 15, 2024). Exploring the features of the Rabbit R1 that sold out on day one.