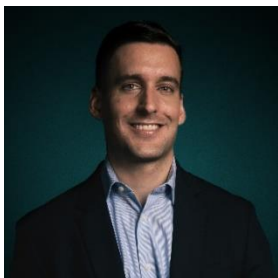


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# CES 2023 Recap – Electric Mobility and the Metaverse Make the Leap

Macroeconomic headwinds couldn't dampen the enthusiasm for the latest developments in disruptive technology at CES 2023. We found sentiment particularly high with innovation offering the promise of increased efficiency, reduced costs, and unlocked profits. Among the highlights, electric mobility's inevitability became more apparent, helped by momentum in autonomous driving and the first-ever solar car. Platforms using artificial intelligence (AI) and digital twin technology to gain insights through data are finding new efficiencies across industries, including in defense. Immersive technology hardware and platforms that can make the Metaverse more accessible ruled the show on the consumer side.

In this piece, we share our CES highlights, and we lay out how these trends can shape technology in 2023 and beyond.

**Key Takeaways**

- CES 2023 showed again that electric mobility is inevitable, and it's not just cars ushering in the paradigm shift. Autonomous vehicle technology is closer than ever, with its use cases expanding beyond the roadways into segments like agriculture.
- Software platforms are learning from data and helping users make data-driven decisions, and digital twin technology's ability to replicate real-life systems has varied use cases, from immersive entertainment to customer service and communications.
- The Metaverse and immersive technologies showed tangible progress in hardware, platforms, and end use cases. In our view, the adoption of immersive technology has strong parallels with the early days of the smartphone era, further strengthening our conviction in the theme's inevitability.

**Autonomous Driving Tech Closer, Solar Seeks to Shine**

CES made it clear that electrification is taking over transportation, which appears likely to turn increasingly autonomous. Many car companies, including Stellantis, Mercedes, and BMW, showcased their latest electric vehicles (EV). Even consumer electronics company Sony, in partnership with Honda, has a new line of electric vehicles (EVs) called Afeela. But the takeover is not only cars, it's also trucks, boats, and seemingly every other form of transportation.

We met with Mobileye's management to discuss their advanced driver assistance systems (ADAS) and autonomous driving technology. Their main product is a camera-based system that uses computer vision and machine learning to interpret data from the vehicle's surroundings and provide real-time alerts to the driver. This technology, known as EyeQ, can detect and recognize other vehicles, pedestrians, and traffic signals, among other objects, and it can assist with tasks such as lane keeping, adaptive cruise control, and automatic emergency braking. The company expects a complete hands-off driving experience by 2025 and forecasts an ADAS revenue pipeline of more than \$17 billion through 2030.

John Deere put their autonomous farm equipment and battery-powered heavy-duty vehicles on display. Fully autonomous vehicles and precise application technologies can increase farming efficiency and sustainability by reducing the amount of fertilizer needed by more than 60%.



We also saw the world's first solar electric car from Dutch company Lightyear. The Lightyear 0 uses solar panels on the roof and hood to generate electricity and power the car's electric motor while on the go. The car features lightweight construction, aerodynamic design, and low rolling resistance tires to further reduce energy consumption. While Lightyear 0 is expected to come at a premium price point of around \$200,000, the company also has Lightyear 2, a budget segment vehicle with almost 500 miles of range. The company would like to make Lightyear 2 available at under \$40,000.

## **AI Fuels New Data Insights and Efficiencies**

The accelerated digital transformation has enterprises sitting on copious amounts of data. So, platforms that help companies find productivity gains and operate safely online by leveraging real-time data and AI received significant attention. We believe applications powered by data and system-derived insights will drive tremendous efficiency for businesses, invaluable in the current economic conditions, further boosting consumption of AI and cloud software in the long run.

Palantir, the cyber intelligence and data platform company, displayed a diverse suite of use cases powered by its flagship platform Foundry. Following the outbreak of war in Ukraine, Palantir began servicing defense organizations, not only with software subscriptions to their data capture and processing platforms, but also with specialized end devices that can make the data capture to response process more efficient. For example, at CES, Palantir modeled a proprietary mobile military command center that integrates with its software. It's designed to make real-time decision-making simpler for troops on the ground. Palantir highlighted that government buyers want more comprehensive solutions so that they don't have to buy from multiple vendors and stitch them together.

Palantir's solutions shed light on how the market for capturing and interpreting data spans sectors and industries. The company's same data platform can run heavy machinery service and distribution operations for a company like Hyundai and help with something like flight-testing for an air-taxi company.

Enterprises collecting data 24x7 creates more demand for internet of things (IoT)-based sensing equipment as well. Sensata Technologies displayed an extensive suite of IoT sensors designed specifically for construction worksite and asset monitoring use cases. Similarly, Amazon AWS flexed its capabilities and success in helping automotive customers process copious amounts of autonomous driving and testing data on the cloud.

## **Welcome the Digital Twins**

Digital twin technology was extremely popular at CES as well. This technology uses AI and real-time sensor input to build a complete 3D digital replica of any system, which can be useful for digital modeling, testing, design, operations monitoring, and a multitude of use cases. As cheaper and faster processors, faster networks, and better devices become common, we believe digital twin technology has significant promise, especially for consumer applications.

We met with engineering leaders at Unity Software, which is known for making 3D gaming engines that power games and virtual experiences. While Unity's gaming business continues to thrive, the company is finding great success in the digital twin market by helping large factories, airports, pipelines, and infrastructure heavy businesses build and test facilities in simulation.

The Unity platform renders 3D models of facilities while combining them with specific sensor data. The models provide clear insights into how facilities operate and potential cost savings, as they can help companies avoid design flaws and operational missteps. Digital twins form a tiny portion of Unity's business today, but their potential to expand beyond gaming is significant, in our view.

Another interesting early-stage company is DeepBrain AI, which builds human-like digital twins for customer service interactions. Using four hours of video footage of a human speaking, DeepBrain's platforms can generate an AI avatar that speaks, acts, and delivers facial expressions exactly like the



subject. The AI twin can then be used to answer common questions on websites, at automated kiosks, and more.

## **The Metaverse Becomes Accessible**

Immersive technology showed how far it's come and how it can bring consumers into the Metaverse. One sign of progress is that the number of augmented reality (AR), virtual reality (VR), and extended reality (XR) headsets on the market is about to increase. Oculus remains the industry leader. Sony's PS VR 2, which was on display at CES, is scheduled to launch soon. Smaller companies like Lumus and original equipment manufacturers (OEMs) like TCL and HTC pitched their own models as well. As options grow, we believe the industry is ripe for a standardized platform on which developers can build and consumers can enjoy enhanced experiences.

Beyond optic devices, more wearables are coming to the market at affordable and accessible price points. Among them, haptic body suits targeted for gamers are increasingly capable of engaging multiple human senses, available at under \$500 price points, targeting mass market buyers.

Another sign of progress for immersive technology is that device form factors, such as size and shape, are improving rapidly as companies iterate based on previous rollouts. Helping the process along is that companies are working with industrial partners on specific end uses. For example, Magic Leap, which is now selling the second generation of its AR headsets, works with industrial clients that serve customers in B2B communications, healthcare, manufacturing, and design applications. Magic Leap's strategy is to bring solutions to the market wherever the current offering can deliver value rather than waiting for the technology to improve. For these clients, expensive price points or limitations such as battery life aren't hindrances.

We expect industrial customers will play a key role in driving adoption and allowing innovation to continue, which can bring costs down further in the early days of immersive technology. Industrial uses cases are increasingly varied, and they were on display at CES. For example, Siemens pitched VR for underwater farming. Similarly, individual applications across infrastructure-heavy companies were common, unlike previous years when gaming and entertainment were the sole focus. Also, the application ecosystem continues to develop. Platforms delivering no-code environments to build immersive experiences are picking up steam.

The enthusiasm for immersive tech from small and large companies combined with major strides in consumer adoption could force a response from big tech companies. In our view, this momentum could accelerate big tech's timelines on XR device and application development to reduce competitive threats.

## **Conclusion: Innovation Undeterred**

CES 2023 showed us that innovation remains a priority for businesses of all shapes and sizes, no matter the current economic conditions. Technologies that facilitate cost savings while increasing productivity can shine in environments like this one. We expect many of the foundational technologies on display at CES, including those in AI, Big Data, and Immersive Tech, to become more prominent as they approach critical inflection points on the way to mass adoption. We also expect these foundational technologies to help boost broad economic growth by harnessing efficiencies and unlocking downstream innovation and through this decade and beyond.

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