

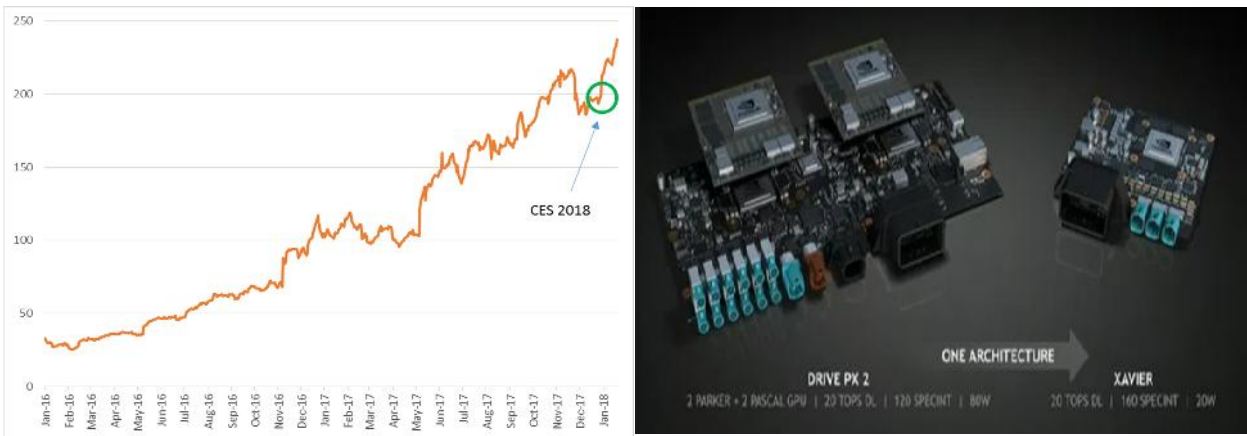
## CES 2018: Top Investing Takeaways

In January of every year, technology industry professionals gather in Las Vegas to attend the Consumer Electronics Show (CES), the largest global trade show showcasing new products and technologies in consumer electronics. This year, as with most years, analysts from AGF's equity research team attended the conference to gather key technology-related insights. In this piece, **Aurito Kundu**, AGF's technology analyst on the North American equity research team, summarizes his key takeaways.

### NVIDIA one of the big winners of CES

NVIDIA won 20 awards ranging from their DRIVE automotive artificial intelligence (AI) platform to their Big Format Gaming Displays. NVIDIA kicked off CES by announcing partnerships with Volkswagen, Uber, Baidu and more, demonstrating the increasing importance of self-driving technologies. Overall, NVIDIA now has approximately 320 different automotive partners (Tier 1's, OEMs, startups), up from 250 partnerships a year ago. Volkswagen ID Buzz will use NVIDIA DRIVE IX technology and Uber has already begun using the technology in its first fleet of Volvo XC90 SUVs. NVIDIA also unveiled the Xavier system-on-a-chip (SoC) for the AI car platform. Xavier can perform 30 trillion operations per second using only 30 watts of power. NVIDIA says that is 15 times more efficient than the previous architecture. Talks with management suggest that average selling prices (ASP) for NVIDIA could reach US\$500-\$1000 per car by 2025, with US\$1000 implying Level 5 (fully autonomous) functionality. This compares to NVIDIA's current ASP per car of US\$100-\$120, which is for infotainment, and demonstrates the considerable growth opportunity for NVIDIA in the automotive industry.

**Figure 1 – NVIDIA Stock Price (LHS) and NVIDIA Xavier Chip- 15x more efficient than previous architecture (RHS)**



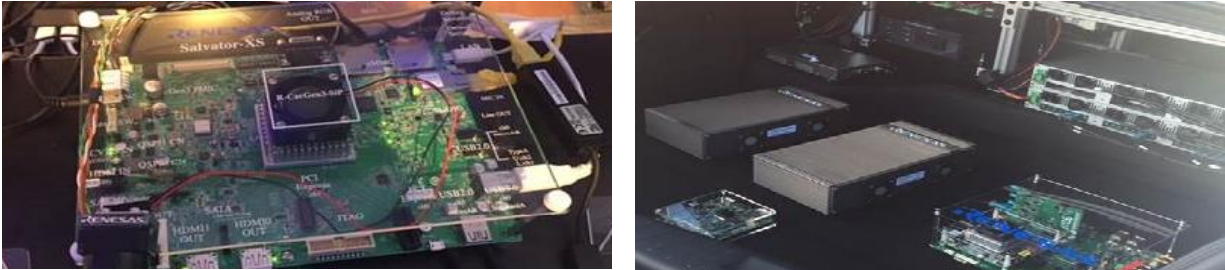
Source: Bloomberg (LHS), NVIDIA (RHS) as of January 2018

### Autonomous driving – there is room for multiple winners!

CES could change its name from the “Consumer Electronic Show” to the “Car Electronic Show” based on the amount of interest in autonomous vehicles. Self-driving cars dominated the show in our view, as they took up all

the parking lot real estate around the convention. In fact, the entire North Hall is dedicated to connected and self-driving car technologies. Aptiv, Intel, Renesas, BlackBerry, Toyota, Ford, Lyft and several other companies announced either self-driving fleets, partnerships with autonomous or ride sharing companies, or software used to power autonomous vehicles.

**Renesas R-Car platform (photo on the left) and HAD solution kit (trunk – photo on the right)**



Source: AGF Investment Management Team

**OLED TVs looked better than ever**

CES '18 showcased new OLED TV models from LG, Sony, Changhong, Konka, Haier, and already released ones from Skyworth. OLED TVs looked better than ever featuring new image processors, improved colors, and increased sharpness and depth, in our view. 2018 models were more an iteration of 2017 with a focus on both Wallpaper TV sets as well as Crystal Sound TVs (the TVs have so-called exciters that are located behind their OLED panels that produce sound by vibrating the displays). LG Display demonstrated several new OLED TV's, including a 65" Crystal Sound TV, an 88" 8K TV display, a 65" 4K roll able TV prototype, along with other OLED lighting concepts ranging from laptops, car dashboards and digital signage. Our view is that OLED is still in the early innings of adoption in smartphones, and that large screen TVs, automotive displays, gaming and digital signage offer upside over the long-term. Moreover, emerging technologies from key suppliers (such as Applied Materials and Universal Display) could bring OLED cost parity closer to LCD faster than believed, thus resulting in an inflection for OLED related products sooner rather than later.

**LG Display rollable TV full-screen and rolled-up screen (left); LG's 8K OLED TV (right)**



Source: AGF investment Management Team

**The rise of virtual assistants – Amazon Alexa and Google Assistant the next frontier of advertising**

Alexa and Assistant were enabled in virtually every consumer device such as speakers, home theatres, TVs, refrigerators, washers, dryers and smoke alarms. Connecting these gadgets to much larger ecosystems, Amazon and Google have presented a vision in which voice commands are available pretty much anywhere and can control practically any device. After a few years away from CES, Google was seemingly everywhere. With e-commerce the core of Amazon's business, we believe Amazon is a clearer winner of the customer captivity of home assistant devices. Alexa could generate US\$10 billion in revenue by 2020, according to RBC.

In summary, CES'18 was one of the biggest yet, with over 180,000 attendees. The dominant themes of autonomous vehicles, virtual assistants, artificial intelligence, and OLED left us with continued strong conviction in the companies we own in these spaces, including Amazon, NVIDIA, Sony, LG Display, and Universal Display.

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