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VIRTUAL REALITY  
HEADSETS, CONTENT AND  
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TOGETHER

TELEVISIONS  
BIGGER,  
BETTER,  
SMARTER

TOP TRENDS  
UHD, WEARABLES, MOBILITY  
AND THE INTERNET OF  
EVERYTHING

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2015 International CES

# CES2015: From Dreams to Reality

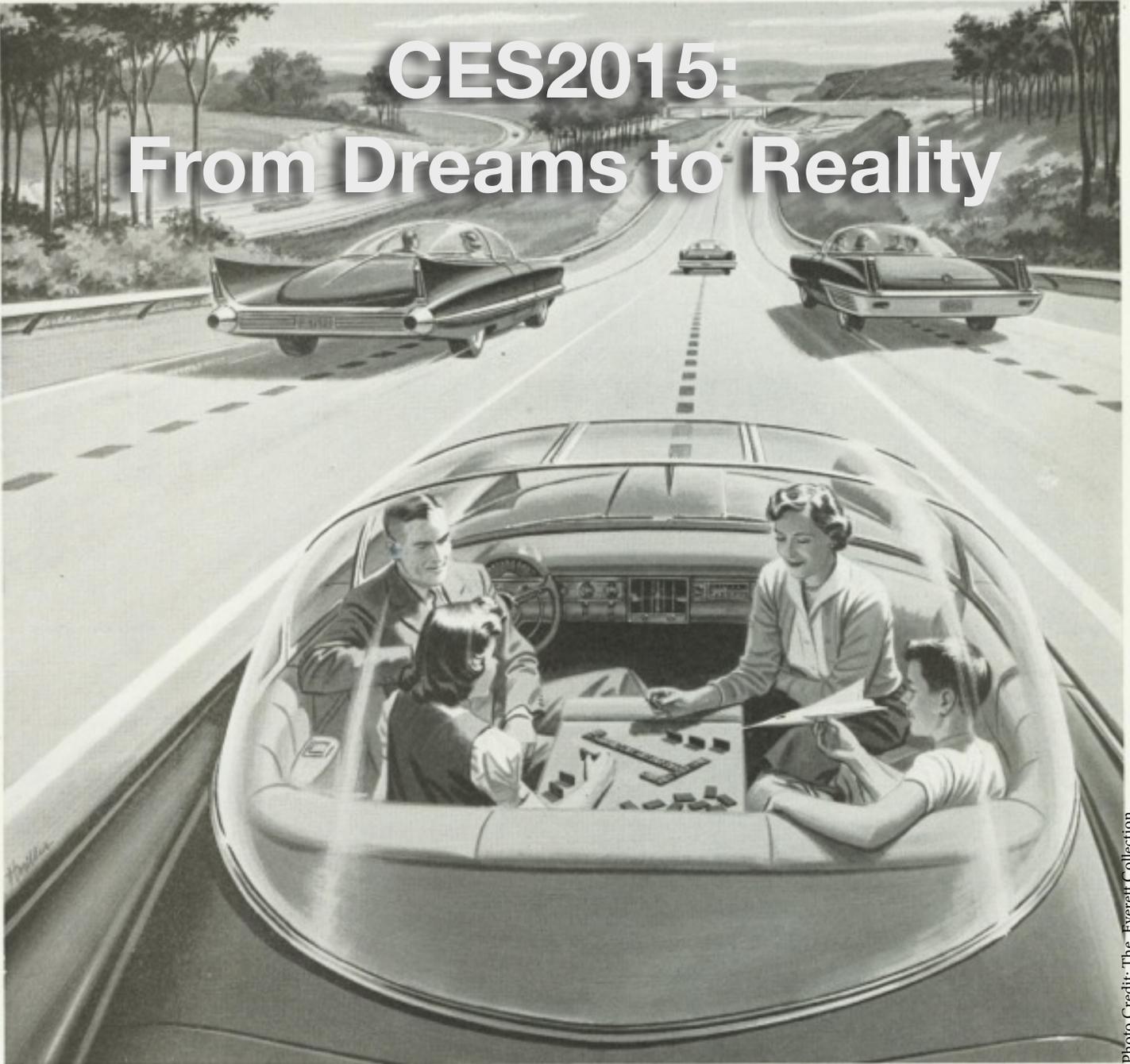


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**ELECTRICITY MAY BE THE DRIVER.** One day your car may speed along an electric super-highway, its speed and steering automatically controlled by electronic devices embedded in the road. Travel will be more enjoyable. Highways will be made safe—by electricity! No traffic jams . . . no collisions . . . no driver fatigue.

## Is the Car the New Media Center?

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THE GLOBAL STAGE FOR INNOVATION

## Covering CES

The following report is the Entertainment Technology Center's post show analysis of the 2015 International CES. Over the course of the week of January 5-9, 2015, ETC tracked the most interesting and breaking entertainment technology news coming out of this year's event. The ETC team reported on new product announcements, keynote presentations, evolving industry trends and individual demonstrations.

### Extensive Posts

ETC's coverage began before Thanksgiving with an early preshow report posted to its ETCentric.org news website. In the two weeks prior to the year-end holidays, ETCentric published a series of stories forecasting the anticipated trends and early product announcements. In total, with two daily editions of the ETCentric Daily News Brief during CES, more than 109 original posts and abstracts of articles were published.

To see all of the posts please visit <http://www.etccenter.org/ces/>

### Perspective

After spending the week with 170,000 other visitors, walking more than 2.2 million net square feet of exhibit space housing more than 3,600 exhibitors, it's time to reflect on the products, announcements and innovations we saw and add some perspective. The pages that follow highlight the key trends and categories that emerged during CES 2015 as analyzed by our team of seasoned journalists and industry experts. With so much to see, we focus on those areas that directly or indirectly impact entertainment and the interests of ETC members.

*The Entertainment Technology Center at the University of Southern California is a think tank and research center within the USC School of Cinematic Arts that brings together senior executives, innovators, thought leaders, and catalysts from the entertainment, consumer electronics, technology, and services industries along with the academic resources of USC to explore and act upon topics and issues related to the creation, distribution and consumption of entertainment content. For more information or to become a member, contact: [emeadows@etccenter.org](mailto:emeadows@etccenter.org)*



Kenneth Williams,  
Executive Director & CEO

#### EDITORIAL

Rob Scott, *ETC*entric Editor  
Don Levy, Communications & Publishing  
Manager

#### CORRESPONDENTS:

George Gerba, Consultant  
Hank Gerba, Intern  
Carolyn Giardina, Journalist  
Debra Kaufman, Journalist  
Dennis Kuba, Consultant  
Philip Lelyveld, Project Manager  
Erick Moen, Consultant  
Erik Weaver, Project Manager  
Rochelle Winters, Consultant  
Tom Teicholz, Contributor

#### ADMINISTRATION & PRODUCTION:

Edie Meadows, CAO & Program Manager  
Eileen Zuniga, Administrative Assistant II

#### SPECIAL THANKS TO:

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## Executive Summary

### The Year of the Product

At the 2015 International CES, many of the promises made last year could be seen in a collection of innovative products and services — from UHD and VR to autonomous cars and the Internet of Everything on display across the show's more than 2 million square feet of exhibit space. In the following pages, ETC reporters provide you with a top-line summary analysis, a background on the category and brief abstracts of many of the more than 100 stories ETC@USC produced during and around this year's show.

#### The Biggest News and Key Trends:

- **Ultra HD is here**
  - Standard HD fades as UHD pricing makes it a viable consumer choice
  - Quantum dots technology: next big thing in television screens
- **HDR coming to market**
  - Less clear is consumer understanding of it
- **Virtual and Augmented Reality** widely in evidence, from practical industrial uses to future entertainment; but still experimental
  - Games and Marketing appear to be earliest opportunities as content creators experiment
- **Cars, autonomous and connected, create a new living, entertainment and social space**
  - Car Tech embodies mobility, connectivity, the Internet of Everything, Augmented and Virtual Reality, high resolution audio, video, and infotainment
  - OTT Announcements by Sling and Dish present significant alternative for cord-cutters
- **Smartphone and Tablet prices drop as low-cost Asian manufacturers produce for mass market**
- **The Internet of Everything (IoT/loE)**
  - IoT/loE projected to be a \$7 trillion market by 2020
  - More than a diffusion of connected things, connection becomes meaningful when part of whole systems
  - Countries and Cities begin to embrace loE with digital infrastructure upgrades
- **High Resolution Audio gaining interest**
- **Policymakers address Open Internet and privacy concerns over IoT**

When Daimler Chairman and Mercedes-Benz President Dieter Zetsche debuted the Mercedes' F015 self-driving concept car, he prefaced it with the 1950s era illustration on our cover to demonstrate the years we've imagined this future. A self-driving car with passengers playing Scrabble helped Zetsche make his point, but his keynote didn't include all the innovations imagined in the original electric company trade association ad from which it came.

"One day your car may speed along an electric highway, its speed and steering automatically controlled by electronic devices. Your food will cook in seconds instead of hours. Electricity will close your windows at the first drop of rain. Lamps will cut on and off automatically to fit the lighting needs in your rooms. Television 'screens' will hang on the walls..."

This almost perfectly captured the essence of CES this year, especially with cars, televisions, appliances, smart homes.

CES, self-described as "**the global stage for innovation**," reflects the transition from the show's roots in hardware to embrace the enabling power of software, technology, and services.

Disruptive technology impacts virtually every industry. CES is one place where both disruptors and the disrupted gather. Clear across all of CES is an expanding definition of entertainment and an increasing, even if *increasingly fragmented*, demand for entertainment.

Central Hall at the Las Vegas Convention Center was still the place to see the newest products from the major consumer electronics companies. Ultra High Definition and "smarter" televisions dominated the floor along with the latest in cameras, computers, tablets, phablets, phones and smart appliances.

The booming Digital Health & Fitness segment, the most active market for wearables, was a combination of form and fashion on the Tech West exhibit floor. This was also the place to find CEA Innovation Award winners, Kids, Family and Education Tech, Robotics, 3D Printing, Sensors, Smart Homes and more than 300 startups packed into Eureka Park to suggest the future.

Content, creativity, technology, brand marketing, influencers and the consumer were the subject of the newest area, C Space, "the official CES destination for creative communicators, brand marketers, advertising agencies, digital publishers and social networks."



## Keynotes Go Well Beyond Typical Hardware and Devices

The showpiece keynote sessions at the 2015 International CES underscore the scope of industry and breadth of innovation that gathered in Las Vegas.

Of this year's four featured keynote speakers, two represent leading automobile manufacturers, one is the CEO of a leading tech giant, and only Samsung's Boo-Keun Yoon, opening the show on Monday night,

represented what would be considered a typical CES keynote highlighting consumer electronics devices.

CES also featured an extensive conference program that gathered a vast array of senior luminaries from some of the most recognized companies in the world



### SAMSUNG

Samsung CEO B.K. Yoon spoke extensively about the Internet of Things and announced an Open Ecosystem for development. Yoon projected that by 2017, 90 percent of all Samsung products will be IoT devices, including televisions and mobile. Samsung also announced Milk, a daily stream of 360% VR content for the new Gear VR Virtual Reality headset. Their commitment to UHD and HDR was demonstrated through an array of televisions, including an extensive line of curved displays, and participation in the newly formed UHD Alliance. High resolution audio is also on Samsung's radar with establishment of the LA-based Samsung Audio.



### MERCEDES BENZ

"Luxury in motion" was the singular focus of the Mercedes-Benz keynote presentation during which Chairman Dieter Zetsche unveiled the futuristic F015 concept car. As he showed off the features of a car that at once resembled a lounge and the cockpit of a private jet, he suggested that the autonomous vehicle will transform cars from "a mere means of transport" to "become a mobile living space". Zetsche compared the luxury and privacy of the F015 to the way the residential bathroom has evolved from a purely functional space to a luxurious private retreat. With that freedom, the experience of driving fundamentally changes and brings exciting human opportunities.



### FORD

Ford Chairman Mark Fields introduced Ford Smart Mobility, "a multi-decade vision for how we can do our part for how we can make a better world." The plan, which brings together mobility, big data and "the best the industry has to offer," was developed after Ford recognized key global trends and issues including urbanization, a doubling of the middle class, and air quality. The program already has some 25 experimental projects in place around the world, from a parking space spotter to data driven insurance. Fields also showed Sync 3, an extensive update to the program that originally brought him to the CES stage as part of a Bill Gates keynote in 2007.

## INTEL



A flying camera, an invisible piano keyboard that can be played, sensors that help the visually impaired navigate the world... these are just some of the technologies that will make 2015 a watershed year.

"It's the beginning of the next consumer technology wave," said Intel CEO Brian Krzanich in his CES keynote address. "The last time we saw a wave of change this big was 20 years ago today, in 1995, with a revolution in consumer computing with the Pentium processor and first commercial browsers."

"We're going from a two-dimensional world to a three-dimensional world, which will change how we experience computing," he added, naming three aspects of the 2015 wave of change: computing unleashed, intelligence everywhere and the wearable revolution.

Computers will interact in three-dimensional space, see and hear, and become wire-free, according to Krzanich. The new 3D Dell Venue 8, an Android tablet priced at \$399, uses Intel's RealSense cameras. In another demo, a chef controlled a video recipe with gestures and voice command.

## FAST INNOVATION



The Internet of Things is only meaningful when it really encompasses everything. This was the key refrain throughout the CES keynote panel "Fast Innovation: Disrupt or be Disrupted" featuring John Chambers, Cisco chairman and CEO; Neil Smit, president and CEO of Comcast Cable; and Werner Struth, member, board of management, Robert Bosch GmbH. David Kirkpatrick, founder, host and CEO of Techonomy, moderated the discussion on the evolution of the connections between people, data, business and innovation.

"The Internet of Everything must look at the whole system," Chambers said.

Smit, with Comcast's Brian Roberts, redefined their approach to data and connectivity when they recognized that, according to Smit, "It is not just about random data. It is about connecting data and making it relevant."

A key, said Chambers, is connectivity to all, but cautioned that this necessity only becomes a reality when there is a balance between government cooperation and economic incentives.

Bosch's Struth noted German Chancellor Angela Merkel's characterization of Industry 4.0, a broad vision where digitization and the Internet of Everything drives economic growth.

## BRAND MATTERS



In the Brand Matters keynote conversation, Michael Kassan, chairman and CEO of MediaLink and CBS Television President and CEO Les Moonves discussed the media landscape. Moonves explained his network's digital distribution strategy. "I don't care where you watch our shows, just watch them," he said. Moonves credited his interactive team for convincing him over the span of 18 months to launch an OTT service to reach super fans, cord cutters and cord nevers.



In response to a question about Walt Disney Company's future acquisition plans, Jay Rasulo (right) said that Disney "feels good" about the content they currently have, but he "wouldn't be surprised if future acquisitions focused on distribution and technology."

## Virtual and Augmented Reality: A Work in Progress



*A CES attendee immerses himself in virtual reality content with the Samsung Gear VR headset. He's in the Marvel-themed Samsung Galaxy booth.*

On a panel addressing the future of Virtual and Augmented Reality, Razer CEO Min-Liang Tan voiced the opinion that VR is 24 months away from going mainstream. A rush to a consumer product, he said, will not do justice to either the consumer or the VR community. The dilemma they face is trying to build a product without knowing what the final deliverable that will succeed in the marketplace should be.

This was the undercurrent throughout the show, as most vendors described their VR and AR products as 'works in progress' or prototypes. They each hope to engage the developer and creative communities in fleshing out a full experience ecosystem around their product before making a major marketing push.

There are two types of VR HMDs (Head Mounted Displays); fully integrated HMDs and HMD cases into which you insert a mobile phone or tablet.

Oculus, the highest visibility player in the integrated HMD VR space, had the most impressive immersive demo at the show. Oculus tightly controls all public demonstrations of their technology by developers. Razer is taking the opposite approach to Oculus by announcing at CES that they are open sourcing everything about their gear. They want the world to

experiment with their current prototype. Avegant avoided the issue entirely by positioning their Glyph HMD as a music and movie player. Fove showed an HMD with built-in eye tracking, a feature that could speed up the industry's understanding of what makes an effective VR experience. The Sony Morpheus HMD was notably absent from the Sony booth.

Of the many HMD cases on view at CES, the Samsung Gear VR was the only one being positioned as having an ecosystem growing around it. The live-action "Wild" VR experience, starring Reese Witherspoon and Laura Dern, and a CGI first person shooter space game demo, showed off both the full-surround video and the power of directional audio well. The demo also showed a weakness of the mobile device approach to VR; leaning forward does not bring you closer to objects.

The Augmented Reality glasses being shown at CES placed images directly in the wearer's field of view, but were not capable of mapping them onto the real world so they appeared to fit naturally into the environment. The demonstrations focused on AR in education, industrial settings, employee training, and other non-entertainment uses. Key AR glass vendors at the show included Sony, Epson, ODG, Daqri, and Antheer. Watch for major innovations in the AR space from Magic Leap, a company still in stealth mode.

## Noteworthy:

### Startup Demos New Eye Tracking Virtual Reality HMD

Japanese startup FOVE has developed a virtual reality head-mounted display with built-in eye tracking. The eye tracking enables the software to render the areas where the viewer is not looking with less precision than the area where the viewer is staring, allowing for more efficient CPU/GPU resource utilization. The rendered image was very clear, and the eye tracking worked well. When the headset goes to market, a FOVE rep expects the HMD with headtracking to sell for \$400-\$450. [Read More](#)

### ARKAMYS Demonstrates 360-Degree Audio-Visual Experience

With the rise of new headsets promising unique augmented and virtual reality experiences, many are anxiously awaiting the first killer product, while others are wondering how we will produce the compelling content — movies, games and other experiences — that will make the technology worthwhile to the public. ARKAMYS is a company that specializes in automotive audio, but at CES this year it was demonstrating how its tech can be used to create a 360-degree experience in which the user steps inside another's perspective. [Read More](#)

### 2015 CES: Razer Unveils its \$199 Open-Source VR Headset

PC game hardware manufacturer Razer may be looking to compete with virtual headsets such as the Oculus Rift and Samsung Gear VR. At CES, the company unveiled its own VR headset, the open-source OSVR Hacker Dev Kit. According to Razer, the \$199 kit is compatible with Oculus DK2 software and experimental Linux and Android VR software. Slated for June availability, the kit is tied to a new consortium that plans to offer an alternative testbed for developers interested in VR. [Read More](#)

### SmartEyeglass: Sony Demonstrates AR Glasses at APPNATION

Sony demonstrated its SmartEyeglass product during APPNATION VI at CES, held at The Cosmopolitan Hotel. The augmented reality glasses use two forward-facing projectors built into see-through glasses to overlay data at a controlled stereoscopic distance in space onto the real world. Sony will sell the glasses at “a high price point” to consumers in a few select markets starting this quarter. More importantly, they hope to interest and involve developers worldwide and build out an ecosystem of apps over time. [Read More](#)

### Allie Cameras Can Live Stream 720-Degree Virtual Reality Video

IC Real Tech showcased a consumer-friendly and affordable VR camera solution at CES. Using new video stitching technology, the Allie camera line (pronounced “All-ee,” like a “selfie” in all directions) can create a 720-degree view by combining two 360-degree camera feeds into an “all-D” image. Users have the ability to control perspectives in recorded videos and can stream live footage. IC Real Tech debuted its Allie Play, Home and Pro video cameras at CES, which will range from under \$500 to \$3,000. [Read More](#)

### Reese Witherspoon Starts in ‘Wild’ Experience for the Gear VR

Fox Searchlight has produced a virtual reality experience to promote the film “Wild” starring Reese Witherspoon. The three-minute, 360-degree sequence features Witherspoon as her character in the film as she takes a break from a hike in the woods. Fox Searchlight is showing “Wild – The Experience” at the Consumer Electronics Show and will again at the Sundance Film Festival. The immersive experience is compatible with Samsung’s Gear VR. [Read More](#)



*Sony Electronics' new augmented reality glasses superimpose information on both the left and right eyes to minimize visual fatigue. The lenses are transparent, the glasses light, and the content provided by third parties via smartphone apps.*



*Avegant's lighter and more streamlined Glyph is a portable movie viewer that deploys micromirrors and optics to transmit the picture directly onto the viewer's retina. Each eye sees 1280 x 720 and the image is perceived as 8 feet away.*



*The Fove virtual reality HMD combines eye tracking and parallax detection to enable disabled users and video game players to act with their gaze.*

## Noteworthy:

### Fox Exec Anticipates VR to Be Big News for Hollywood at CES

Mike Dunn, Fox Home Entertainment worldwide president, believes Virtual Reality will be a major story for Hollywood at this year's CES. Oculus Rift and Project Morpheus are likely to be made available this year, Samsung launched Gear VR last month, and additional VR announcements are expected from Las Vegas. Fox is bringing a VR experience to CES based on the feature "Wild." "This feels like tablets," Dunn said in *The Hollywood Reporter*. "In the fourth quarter there will be a few systems out there, and the market could reach 10 million households very quickly. If it's compelling, I think 25 million households is conceivable by 2017." [Read More.](#)

### Attendees are Blown Away by Crescent Bay Prototype Demos

While we have yet to see the killer VR product (or content/experience) that could help spark consumer interest, a number of devices demonstrated at CES are getting strong reviews. Razer unveiled its own open source headset, which is tied to the new OSVR Consortium that plans to offer a new testbed for VR developers. Another headset that has been generating a lot of press is the Crescent Bay version of the Oculus Rift, which the company says is the closest it has come to a consumer-ready version. "It was impossible not to shift around to avoid debris thrown by explosions, and virtual bullets whizzing past," *TechCrunch* reported. "The new immersive audio tech definitely helps with a sense of immersion, too, and changing the angle and orientation of your head really does change the soundscape in pretty much exactly the way you'd expect." [Read More.](#)



### Razer Debuts Android-Powered Gaming Console at 2015 CES

Gaming tech company Razer unveiled the Android-based gaming console it first announced during Google I/O last year. The \$100 Razer Forge TV, due out in Q1, is a 4x4-inch micro-console designed to serve "as a platform for hardcore PC gaming, for Android gaming, and for Android-based entertainment services via Google Play," according to *TechCrunch*. "The Forge TV will run on Razer's Cortex: Stream (out in spring 2015) and focuses on low-latency and HD resolution, which the company says will help the device cut down on some of the lags and other hiccups that have plagued other streaming services." The console features quad-core processing, a high-end graphics engine, wireless and network connectivity, and 16GB of internal storage. [Read More.](#)



### ODG Introduces Smart Glasses That Are Beefy, But Stylish

Osterhout Design Group, maker of military smart goggles, brought a pair of smart glasses to CES that look more fashionable than Google Glass and other competitors. Fashioned after the iconic Wayfarer sunglasses, ODG's smart specs weigh in at four ounces and offer a virtual 720p screen floating a few feet in front of the user's face. Controls are operated via a Bluetooth ring controller, a tiny touchpad and buttons. "Remember, though, that ODG's Android specs are intended for a different purpose than Google Glass," *Mashable* reported. "Where Glass brings you glanceable information to enhance the moment you're in, augmented reality offers near-full immersion. Of course, it all depends on the app you're running, but right now Android proper isn't exactly a glance-oriented OS." [Read More.](#)

## Background: Virtual and Augmented Reality Has a Major Presence at CES



*Nick Cannon plays virtual volleyball at 2015 International CES*

Virtual and augmented reality tools have been around for at least 40 years. In 2014 the next generation of VR and AR hardware was being energetically developed, beta tested, and discussed by the niche VR community. It was also used to create small-scale experiences as part of the marketing campaigns for other entertainment assets. Expect 2015 to be the year when hardware, software, and content companies work towards consumer adoption of VR and AR resources and experiences.

Oculus, with its Rift HMD (head-mounted display) technology, held the attention of the press and public for most of the year. Oculus was acquired by Facebook, and partnered with Samsung to develop a phone-based HMD, the Gear VR Motion tracking hardware vendor.

The Oculus Connect 2-day gathering in late September at Hollywood and Highland captured the attention of both the developer and the Hollywood community and gave the Oculus senior management team a platform for building excitement among the developer community.

Not to be outdone, Google invested in Magic Leap, a company with an extensive portfolio of patents related to augmented reality. Magic Leap is still in stealth mode, but its prototype demos are rumored to be amazing. And their mount adds hand gesture recognition to the headset.

Beyond those headline-grabbing companies, many other startups and established companies spent the year developing new self-contained HMDs (examples: Sony Morpheus, CastAR, Avegant Glyph, AntVR, VRelia, Fove), HMD frames into which you insert mobile devices (examples: Google Cardboard, Seebright, FOV2GO, Durovis), and related controllers and peripheral devices (examples: Sixense, Virtuix Omni, Control VR).

As for content, a number of VR experiences have been created for marketing purposes, including properties for the films “Into the Storm,” “How to Train Your Dragon 2,” and “The Hobbit.” Jaunt, Vevo, and others have produced short films (“The Mission,” “Black Mass”) and concert experiences (Beck, Paul McCartney, Austin City Limits) to demonstrate the medium’s potential for live action experiences.

Looking globally, many individuals and groups have developed interesting VR experiences; such as Seattle’s The Nightmare Machine, “the world’s first VR haunted house.” And many videogames have been adapted for use with VR headsets.

A challenge going forward is developing the language of VR. What audio and visual creation and editing techniques work, and how should they be used? How does VR storytelling differ from cinema and gaming? What are the strengths of live-action VR versus



computer-generated VR? How do you bring other senses into play?

## Automotive: Driving the Future



*The interior of Mercedes F015 concept car*

Cars have always had a place at CES but never as they did this year at The 2015 International CES. Virtually all of the major themes and trends at CES, especially augmented reality, the Internet of Everything, sensors, UHD and high-resolution audio, were encapsulated in the cars on display and in visions presented by almost every automotive manufacturer and supplier.

Research firm Parks and Associates projects connected car revenues will represent \$1 billion in revenue to mobile carriers as live agent assistance, vehicle monitoring and controls, location based services, communication, and infotainment grow.

Autonomous driving – the transition from self-propelled (automobile) to self-reliant (autonomous) – certainly captured headlines and mind-share but that is only part of the story. Both the *New York Times* and even Mercedes-Benz Chairman Dr. Dieter Zetsche in his own CES keynote recalled visions of autonomous personal transportation going back to the 1939 World's Fair.

The difference between then and now is that both the technology and the regulatory hurdles are being cleared more rapidly than initially expected.

“Anyone who focuses solely on the technology has not yet grasped how autonomous driving will change our society,” Zetsche said. “The car is growing beyond its role as a mere means of transport and will ultimately become a mobile living space.”

The Mercedes concept car imagined a rolling living room that envelops passengers and augments their reality with heads up displays and video.

While the day is not far off where we could see the car become an extension of the entertainment itself, it is likely that we will see a separate operating system for the driving and safety functions and another, such as the familiar Android and Apple systems, for ever more infotainment and communications. Here, too, an epic battle for supremacy looms in Smart Car tech between Google with the Open Automotive Alliance and Apple with CarPlay.

### Among the highlights seen and heard:

**VW** – A new Golf model eliminates switches with **gesture controls** and **haptic feedback**, including actuators in the sport seats that create the feel of booming bass sound.

**General Motors** – OnStar Driver Assurance program monitors performance and “**smart**” **functionality**, such as warning of a part failure, but to deliver **4G LTE connectivity** in and around the car for streaming video, audio, voice and Internet.

**Toyota** – Showed their new Mirai, a **hydrogen-cell-powered** model that may also be configured to produce household power.

**Audi** – Followed last year’s rollout of the first production autonomous car by transporting journalists 650 miles from Silicon Valley to CES in the car. Also showed smartwatch controls.

**Jaguar/Land Rover** – Teamed with Intel and Seeing Machines to develop a dashboard mounted driver attention monitoring system that relies on **face and eye tracking** to reduce distracted and drowsy driving.

**Mercedes Benz** – Only a scale model of the Mercedes-Benz F 015 Luxury in Motion concept car could be seen in the booth, but other production models on display reflected Mercedes’ way of interpreting the terms “modern luxury”, emotion and intelligence.

**Fiat/Chrysler/Chevrolet** – Teased the new Chevy Volt ahead of the Detroit Auto Show and featured advances with their **UConnect** services including monitoring car health, driving habits and parking space location.

**Hyundai** – Remote auto parking, gesture control, a production-ready heads up display projects **augmented reality** and animated information to driver’s Heads Up Display (HUD), and a **wearable** wristband that will vibrate as a warning and also monitor driver heart rate in case of emergency, were among connected car features shown.

**Ford** – **Semi-autonomous** features now available including lane-keeping assist, adaptive cruise control, Pre-Collision Assist with Pedestrian Detection and active park assist. A Traffic Jam Assist coming. A new Sync 3 platform utilizes the Blackberry QNX platform to improve its infotainment system.

**BMW** – iConnect Mobility incorporates TV technology and Android to allow users to plan trips at home and access them inside the car. The BMW i3 can park itself and avoid obstacles and iDrive is a gesture-based control system.



### Noteworthy:

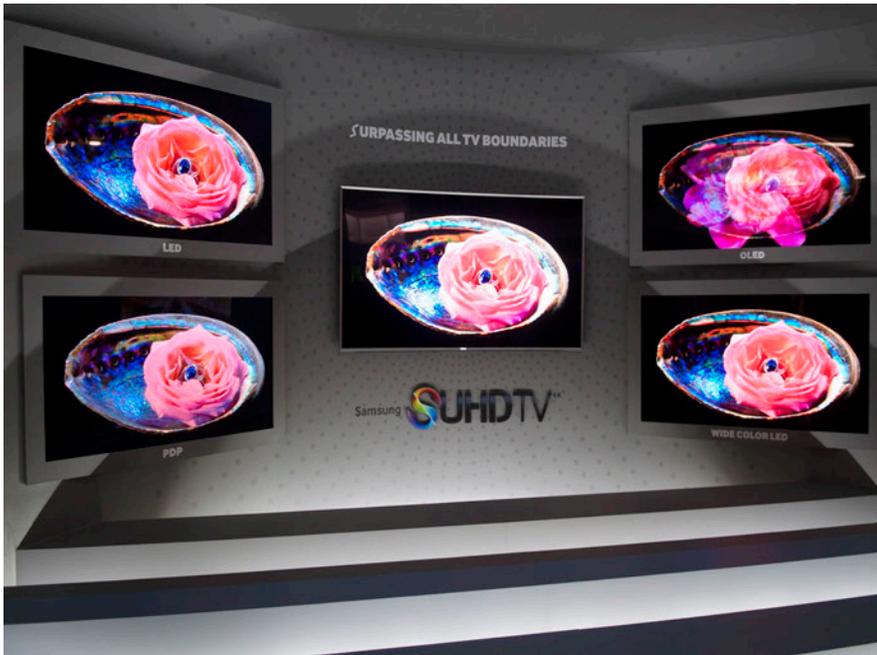
#### Auto Buyers Are Now Willing to Pay for In-Vehicle Technology

U.S. consumers may be ready for the connected cars prevalent at CES this week. According to a Harris Poll for AutoTrader.com, a majority of drivers would pay up to \$1,499 to have new entertainment and safety features in their vehicles. “Back-up cameras, USB ports and smartphone charging are among the top desires,” reports *Bloomberg*. “About 55 percent said music streaming services such as those of Pandora Media and Spotify make driving more enjoyable.” At CES, vendors demonstrated self-driving cars, curved touch screens, connection with phones and smartwatches, and more. Accenture says in-vehicle tech is now the top selling point for 39 percent of buyers, while a mere 14 percent are most concerned about horsepower and handling. [Read More.](#)

#### Mercedes Envisions Future Autonomous Luxury Vehicle

Dieter Zetsche, CEO of Mercedes parent company Daimler AG, unveiled the F 015 concept luxury vehicle earlier this week at CES. “The front seats can swivel to the rear as the steering wheel recedes into the instrument panel and the car takes control,” explains *Bloomberg*. “Sculpted open-pore walnut wood veneers and ice-white leather add to the chill-out ambiance of the interior, while six screens allow passengers to interact with the machine via touch, hand gestures and eye-tracking.” The so-called Luxury in Motion prototype, which Zetsche describes as “a mobile living space,” is part of an effort by upscale manufacturers to compete with Google’s push into self-piloted vehicles. At CES, Audi showcased an autonomous A7, which arrived in Las Vegas after a 560-mile journey. [Read More.](#)

## TELEVISION: UHD, HDR & Smart TV



High dynamic range has its momentum, but there's still plenty to address in production, display and distribution if Hollywood and the consumer electronics manufacturers are to avoid a format war. These are goals of the newly-formed UHD Alliance, as well as the Blu-ray Disc Association and standards bodies such as SMPTE and the ITU.

But consumer product rollouts have already started. Samsung's "SUHDTVs" are a new line of 4K and HDR-supported TVs scheduled to debut in March in sizes ranging from 55-88 inches. To get content ready for launch, it's working closely with the Fox Innovation Lab to create titles using an "open" HDR standard, and graded using an SUHDTV for the display. At CES, Samsung demoed the sets with Fox's "Life of Pi" and "Exodus: Gods and Kings." Titles will initially be available in HDR on M-GO.

Dolby exhibited Dolby Vision prototype TVs from Toshiba, Hisense and Philips. It also announced a deal with Warner Bros.—Warner would produce Dolby Vision content, including "The Lego Movie," "Edge of Tomorrow" and "Into The Storm." And as with 4K content, an Internet streaming service is out ahead of the industry on HDR content distribution. Netflix announced that they will stream 4K HDR content to LG 4K HDR TVs, and possibly other brands of 4K HDR TVs, this year. Netflix technology will 'talk' to your TV, and only stream HDR content to it if it responds that it is HDR-enabled.

In December 2014, *Consumer Reports* described 5 TV trends that they expected to see at CES 2015. We agree with their picks (1-5 below), plus we saw a few more that they did not anticipate.

1) Quantum Dot technology is being integrated into LCD TV panels to increase their dynamic range and color range. Even low-cost manufacturers such as TCL and Hisense showed large displays that incorporated QD technology.

2) UHD TVs are becoming mainstream. Every major manufacturer, and many lesser-known ones, showed 40" and larger 4K UHD TV displays. 55"-65" is the current market sweet spot.

3) More 4K content will hit the market and will be distributed in more ways. Beyond Internet delivery of 4K content from Netflix, Amazon, and others, the Blu-ray Disc Association confirmed that a 4K (UHD) Blu-ray format is being developed, and the Secure Content

Storage Association announced that a finalized spec for 4K movie download services is "coming soon."

4) OLED TVs remain pricey (55" LG \$3,500 msrp). LCD TVs with embedded quantum dots that will sell at a lower price point may capture much of OLED's potential market.

5) HDR (High Dynamic Range) was widely discussed at the show as the next big advance in display quality. (For more information, see the HDR section of this report)

6) Even as consumers consider the benefits of 4K UHD TV displays, and as the content, distribution, and display industries work to develop HDR specifications, a number of manufacturers were touting 8K as the next big thing. MHL (Mobile High-Definition Link), a partnership that includes Samsung, Sony, Toshiba, Silicon Image, and Nokia, has developed a standard for 8K at 120fps with 48 bit color. They demonstrated it using a stream of 8K still images.

7) Autostereoscopic (glasses-free) 3D displays have arrived in a form that consumers may adopt. Toshiba showed 4K displays (both TV and laptop), and Samsung showed an 8K display, that automatically switch between 2D and autostereoscopic 3D images, based on the incoming signal.

8) A number of products intended for the consumer market will lower the cost of professional productions. GoPro and Sony both showed small, lightweight, high quality 4K 30fps cameras at a \$500 price point. DJI demonstrated a \$5,000 drone with landing gear and a 4K camera with image stabilization. It has independent controls for a pilot and cameraman. You can now create tracking shots, starting from a stationary ground position and rising up to the clouds, at a fraction of the cost of helicopter rental.

## Background: UHD Displays Take Center Stage at January's CES



*Low price manufacturer TCL displays high value features: curves, size and 4K resolution*



*Cord cutters got good news when Sling and Dish Networks announced streaming OTT services*

Ultra HD displays are going mainstream now that 4K/UHD sets are attractively priced. Set manufacturers Vizio and Acer have already launched 4K displays for \$1,000 and under, and other manufacturers are likely to unveil similarly low-cost models. Chinese UHD display manufacturers, that have had a strong presence at recent CES events, will continue their efforts to understand the U.S. consumer and break into the U.S. market at lower price points.

What we saw at CES caps a year of robust sales for new UHD displays. NPD Group reports that display sales are up nine times year-over-year.

According to a report from DisplaySearch, sales of UHD units topped 6.4 million in 2014. NPD Group also reported that 4K UHD accounts for 7 percent of flat panel sales revenue in U.S.

Unlike 3D TVs, which never gained traction with consumers, viewers are taking a serious look at UHD screens... and they like what they see. According to a December 10, 2014 report by Strategy Analytics, "93 percent of U.S. consumers who had seen Ultra HD or 4K TV found it 'extremely' or 'somewhat' impressive."

Even more impressive is the growth in consumer awareness about UHD. The same report noted a double-digit jump from 39 percent in January 2014 to 57 percent in November. Growth in awareness and interest is likely propelled, at least in part, by the growth in

content being offered — and touted — by a variety of outlets.

In the U.S., 4K streaming services are already offering UHD content, among them Netflix, Amazon, YouTube, Sony Unlimited Video Service, M-GO and Vimeo. DirecTV is also preparing to launch a 4K video-on-demand service in 2015, to TVs compatible with 4K displays from Samsung.

Amazon has announced its own affordable plan; Prime Club members have access to UHD movies and TV at no extra charge to the \$99 annual fee. A 4K channel on YouTube is of interest to consumers who plan to shoot and post video with one of the many smartphones that feature a 4K camera.

International UHD programming includes Germany's Maxdome, Italy's Chili, U.K. and Spain's Wuaki.tv and, in Korea, CNM and T-Broad.

UHD isn't the end of the display evolution, however. At the 2015 CES, some Dolby partners showcased Dolby Vision displays with wider dynamic range and a fuller, warmer color palette. Other examples of the vendor technologies and content creation drive study by SMPTE on wider color gamut and higher dynamic range.

LG Beyond 4K showed off its prototype 8K 55-inch display, "Mabinogion." The display features a resolution of 33.2 million pixels, more than 20 display driver integrated circuits, and a brightness of 500 nits.

## Noteworthy:

### Comcast Launches Ultra HD VOD App for Samsung 4K TVs

Comcast is offering select television programming in Ultra HD, available for compatible 2014 Samsung 4K TVs. Comcast Xfinity customers will initially be able to stream NBC's "Chicago Fire" and USA Network's "Covert Affairs" and "Suits" to Samsung sets via the Internet. Comcast will expand its UHD offerings in 2015, including NBC's "Parks and Recreation" in February. Amazon, DirecTV, M-GO, Netflix and Sony are among those that have also launched Ultra HD video services.

[Read More.](#)

### Netflix to Introduce High Dynamic Range to its 4K Streaming

During the LG press conference at CES, Netflix announced that it plans to introduce High Dynamic Range (HDR) to its 4K UHD streaming sometime this year. While a specific timeline was not revealed, it is expected that the HDR streaming will coincide with the launch of LG's much talked about OLED TVs. Netflix support for HDR was also announced with Sony; the company's X900C ultra-thin UHD TV showcased at CES will run on the new Android TV platform and provide access to Netflix 4K. [Read More.](#)

### CES Panel Discusses HDR as Hollywood's New Creative Tool

HDR (High Dynamic Range) — which enables a greater range of luminosity that results in enhanced color and contrast — was a feature demonstrated on numerous TV displays at the 2015 CES in Las Vegas. A panel looking at "HDR: Hollywood's New Creative Tool" brought together studio execs, technologists and display manufacturers to talk about HDR's advantages and the obstacles in achieving wide adoption. Panelists discussed the new Ultra HD Alliance, the need for standards, and much more. [Read More.](#)

### Google Tool Measures How Consumers Interact with Video Ads

Google has developed a new measurement tool to determine the number of people who are watching, ignoring or skipping video advertisements. Revenue from digital video ads, although expected to grow in the coming year, still trails far behind the money generated by TV ads. Google aims to use the measurement tool as an effective way to draw marketers to the idea of digital video ads. Neal Mohan, Google's vice president of display and video advertising spoke about the new tool at CES. [Read More](#)

### Samsung Targets Google and Apple with Plans for Tizen TVs

Samsung Electronics plans to extend its Tizen operating system beyond mobile phones to its new smart TVs beginning next month. At CES, Samsung CEO BK Yoon announced that Tizen TVs would initially launch in the U.S. and Korea, followed by a rollout to additional international markets later in the year. Samsung, which has spent years developing Tizen as an alternative to Google's Android mobile operating system, is looking to better compete in software and services with OS leaders Google and Apple. [Read More.](#)

### Dish Network Unveils Over-the-Top Sling TV Service at CES

During a press event at CES, Dish Network announced its new subscription streaming service, Sling TV, which is slated to debut in the first quarter of 2015. According to Dish President and CEO Joe Clayton, the \$20/per month OTT service will offer 25-30 channels from Disney, ESPN, Scripps Networks Interactive and Turner Broadcasting, in addition to exclusive content from YouTube and Maker Studios. The bundle is targeting millennials who might not otherwise subscribe to a cable or satellite pay TV service. [Read More.](#)

### Netflix Announces Smart TV Certification Program

While Netflix participated at several CES press events in Las Vegas promoting HDR and various partnership deals, the streaming video service also announced its new smart TV certification program, Netflix Recommended TV, designed to help consumers select Netflix-friendly TV sets that are "built for a superior Internet TV experience." The recommendation program was announced during LG's press conference. Initial program participants include LG, Sharp, Sony, Vizio and Roku TV makers. [Read More.](#)

### YouTube to Support 360-Degree Videos from Giroptic 360cam

Google confirmed that it plans to add native support for 360-degree videos for its YouTube streaming video service "in the coming weeks." At the 2015 CES, French company Giroptic revealed that its soon-to-be-released \$499 360cam — a rugged, lightweight, waterproof camera looking to take on the GoPro — would be the first 360-degree camera that YouTube plans to support. The announcement could also be good news for users of new cameras such as the Bublcam, Kodak SP360, Ricoh Theta, VSN Mobil V.360 and others. [Read More.](#)

## 2015 CES: The State of Displays – Bigger and Smarter and 4K

CEA Director of Industry Analysis Steve Koenig described the evolution of displays and what to expect in 2015 and beyond. Bottom line: Consumers are going for bigger screens, smarter functions and more resolution. CEA studies show a growth in awareness of 4K/UHD among consumers, and that translates to an intent to purchase. Of the approximately 168 million U.S. adults who say they plan to buy a new TV in the next three years, 27 percent — 45 million consumers — intend to buy a 4K/UHD set. [Read More.](#)

## EPI Announces New Philips 34-Inch Curved UltraWide Display

Envision Peripherals Inc. (EPI), a North American subsidiary of TPV that brings Philips displays to market, unveiled a 34-inch curved IPS display at CES. The new Philips Brilliance Curved UltraWide LCD Display offers a “gentle curve” with “subtle immersion effect,” featuring a 21:9 panoramic aspect ratio with over one billion color depth and UltraWide QHD 3,440 x 1,440 resolution. The display also features an ultra-narrow bezel and a built-in pair of 7W DTS stereo speakers. [Read More.](#)

## Samsung Plans to Demo Tizen-Powered Smart TVs at 2015 CES

In an effort to expand the company’s software capabilities, Samsung announced that its Tizen operating system would be widely adopted in its smart TVs beginning this year. According to the company, the Tizen operating system will allow Samsung’s Internet-connected TVs to sync with other CE devices, including smartphones, via a Wi-Fi connection that enables content sharing. The Tizen-based televisions were showcased at the 2015 International CES. [Read More.](#)

## Warner Bros. and Dolby Announce New Dolby Vision Partnership

Dolby arrived at the 2015 CES with a Warner Bros. partnership that includes a slate of 4K titles mastered in the high dynamic range-supported Dolby Vision format. “Edge of Tomorrow,” “Into the Storm” and “The Lego Movie” are among the titles to be released in Dolby Vision in early 2015 in preparation for the launch of Dolby Vision-enabled TVs. “There’s a lot of HDR interest coming out of Hollywood,” writes Carolyn Giardina for *The Hollywood Reporter*. “Dolby Vision is intended to be a complete system, through which Hollywood would produce content in the format, and a delivery system would get that content to Dolby Vision supported TV.” [Read More.](#)

## CES Press Event: Panasonic Emphasizes Commitment to UHD

During its CES press conference, Panasonic placed a spotlight on Ultra HD by emphasizing its part in the newly announced UHD Alliance, and illustrating its commitment to its line of 4K CE devices and professional 4K broadcast cameras. Among its announcements, the company unveiled a new 4K Blu-ray player, nine new UHD 4K TVs, and two 4K-capable palm-size camcorders. “Panasonic also plans to show a prototype 8K display, notable as Japan’s NHK is looking to leapfrog 4K and go directly to 8K, which it intends to have ready for the 2020 Tokyo Olympics,” according to *The Hollywood Reporter*. [Read More.](#)

## 2015 CES: Hollywood and CE Industry Launches UHD Alliance

During CES, Hollywood and the consumer electronics industry announced the formation of a coalition that plans to “set the bar for next generation video entertainment by establishing new standards to support innovation in video technologies including 4K and higher resolutions, high dynamic range, wider color gamut and immersive 3D audio.” According to Carolyn Giardina of *The Hollywood Reporter*, The UHD Alliance was formed by companies including DirecTV, Dolby, LG, Netflix, Panasonic, Samsung, Sharp, Sony Visual Product, Technicolor, The Walt Disney Studios, Twentieth Century Fox and Warner Bros. Entertainment. [Read More](#)

## CES: LG to Unveil 34-Inch Curved Ultra-Wide Screen for Gamers

LG Electronics announced that it will introduce a 21:9 “UltraWide” monitor designed specifically for gamers. The 34-inch curved-screen monitor, model 34UM67, is the company’s first 21:9 monitor created especially for graphics-intensive gaming with Advanced Micro Devices’ FreeSync technology. The AMD tech reportedly eliminates screen-tearing, an image problem that can result when the monitor and graphics card are not in sync. We expect to see LG’s new monitor on display at CES next week. [Read More.](#)

## CES: Samsung Expected to Showcase 34-Inch Curved Display

We saw many monitors join the curved bandwagon at the 2015 CES. Samsung, for example, is expected to unveil its SE790C — a 34-inch, 21:9 curved display with a 3,440 x 1,440 resolution known as “Ultra-WQHD.” The display touts about 110 pixels per inch, a maximum contrast ratio of 3000:1 and maximum brightness of 300 cd/m2. Samsung claims the wider field of view offers “a more immersive visual experience” and “creates a high 3D-like effect ratio that makes the screen seem larger.” [Read More.](#)

## **CES 2015: LG Expected to Unveil its New 55-Inch 8K Display**

According to insiders at LG, the company's new 8K display has been airlifted to Las Vegas for next month's 2015 International Consumer Electronics Show. LG Display engineers will accompany the prototype to its CES booth. Codenamed "Mabinogion," the 55-inch display features a resolution of 33.2 million pixels, more than 20 display driver integrated circuits, and a brightness of 500 nits. LG Electronics (LG Display's largest client) is rumored to be adding an 8K TV to its UHD lineup next year. [Read More.](#)

## **Connected Televisions in U.S. Households Jump to 168 Million**

According to research from Strategy Analytics, the average U.S. home with broadband service now has 1.9 connected TV devices, up 28 percent from Q3 2013, and up 5 percent from the second quarter of 2014. The report indicates there are now 168 million connected smart TVs, Blu-ray players, IP-enabled game consoles and streaming devices such as Apple TV, Roku and Google Chromecast. Samsung maintained a 35 percent share of smart TV shipments during the third quarter. [Read More.](#)

## **LG Debuts 4K OLED TVs, Including a 77-Inch Flexible Screen**

LG introduced seven new 4K OLED TVs during CES this year. Ranging in size up to 77 inches, the TVs feature the company's WRGB pixel technology (including a fourth color — white — for improved viewing angle and more vivid colors), and its "Art Slim" design (ultra-thin displays with transparent stands that make the sets appear as if they are floating). "At the top of LG's list for CES 2015 is the EG9900, a 77-inch flexible 4K OLED TV," *Digital Trends* reports. The set includes "a 100W 4.1 Channel speaker system with wireless subwoofer developed by Harman/Kardon, and deca-core processor for faster webOS performance." LG is also introducing two new 4K LCD TVs, one of which features Quantum Dot technology. [Read More.](#)

## **Samsung Wows the Crowd at CES with 105-Inch Bendable TV**

Samsung was the first to showcase a bendable TV at last year's CES, and this week the company is demonstrating a 105-inch, 21:9 screen that can expand or contract depending on how curved the viewer wants it. "For such a novel TV, Samsung put out all the stops, including 4K resolution, quantum-dot technology for improved color and its Tizen-powered smart-TV platform," reports *Mashable*. "The bendy set has features of Samsung's new SUHD line, which includes a 're-mastering engine' for improved picture quality, an extremely thin screen bezel with chamfered edges and Samsung's Tizen-powered Smart TV interface." [Read More.](#)

## **Verizon Chief Reveals Plans to Launch Internet TV Service**

Speaking at the Citi 2015 Global Internet, Media & Telecommunications Conference in Las Vegas, Verizon CEO Lowell McAdam announced that his company plans to launch an Internet pay TV service during the second half of this year. The "mobile-first" OTT service, separate from Verizon's current FiOS TV, is expected to initially roll out with 20-30 channels, and target younger consumers who are not interested in paying for cable (similar to Dish Network's planned Sling TV service announced at CES). According to *Variety*, McAdam also denied a recent report that his company is considering an AOL acquisition, although he suggested there is a potential to partner. [Read More.](#)

## **Charter Aims to One-Up its Rivals with Cloud-Based Service**

Charter Communications announced a cloud-based cable TV service called Worldbox to be backed by Cisco technology. Charter CEO Tom Rutledge unveiled the initiative at CES with Cisco CEO John Chambers. The system will allow Charter to update its services regardless of which set-top boxes are being used by its subscribers. Cisco plans to supply data center and networking equipment. "By using cloud-computing technology to deliver software updates, Charter will be able to add features and content quickly, instead of sending technicians to install new machines in homes and businesses," reports *Bloomberg*. [Read More.](#)

## **New Panasonic Ultra HD Blu-ray Player Supports 4K and HDR**

During a CES press event in Las Vegas, Panasonic showed a prototype Ultra HD Blu-ray Disc Player (the Blu-ray Disc Association is finalizing the new Ultra HD Blu-ray format standard). While a formal release date for the player was not announced, the first film titles are reportedly slated for release before the end of 2015. According to *HDTVtest*, the new standard will use the H. 265 HEVC codec and will support 3,840 x 2,160 video at up to 60 frames per second, the BT.2020 wide color gamut, and 10-bit video encoding. One of the more interesting features will be support for High Dynamic Range (HDR) video, which significantly expands the brightness peak. [Read More](#)

## **Study: Millennials Favor Netflix Over Broadcast or Cable Subs**

A joint research study by NATPE/Content First and CEA indicates that millennials now place more value on Netflix than broadcast and cable TV subscriptions. The findings were presented yesterday at CES. "The biggest takeaway was just how important streaming has become to how millennials, the generation defined as people

ages 13 to 34, consume TV content,” notes *The Hollywood Reporter*. “According to the study, 51 percent of millennials consider Netflix subscriptions very valuable, compared to 42 percent for broadcast channels and 36 percent for cable subscriptions. Young people are also more likely to stream a full-length TV program than watch it live on TV during its original air time or time-delayed on a DVR.” [Read More.](#)

### **Quantum Dots: Can LCD TVs Compete with Quality of OLED?**

It was a big year for television at the 2015 CES, with buzzwords such as 4K, HDR, OLED, contrast, color space and curved screens filling the air in Las Vegas. Another hot topic was quantum dots — tiny crystals designed to enhance color and efficiency. Manufacturers including Samsung, LG and TCL are following Sony’s lead in introducing the technology. “Quantum dots promise to solve a very fundamental problem with modern LCD TVs, which is that the range of colors on LED-backlit sets are simply not as good as the ones on plasma and OLED TVs,” reports *The Verge*. “The allure of quantum dots is that they can be added as a layer on top of an LCD TV’s LED backlight to fine tune the light that makes it through. That can dramatically improve the color gamut, and do it at about a third of the cost of producing OLED displays.” [Read More.](#)

### **All Access Internet Video Service is a Big Hit with CBS Fans**

Speaking at the Variety Entertainment Summit during CES, CBS Interactive President & CEO Jim Lanzone announced that the network’s All Access Internet TV service is a hit with super-fans, and subscribers who pay \$5.99 per month are watching twice as much content as regular broadcast viewers. While he did not reveal the number of subscribers, “Lanzone noted that about 10 million U.S. households have broadband but do not pay for cable or satellite TV,” reports *The Variety*. “Lanzone said CBS All Access has been a ‘Rorschach test’ of where industry executives believe television is going. But he maintained that all along, the broadcaster’s goal with the over-the-top service was simply to cater to an audience that wanted to access more of the Eye’s programming, on more devices.” [Read More.](#)

### **Home Entertainment: 4K for Blu-ray and Hard Drives Coming**

In addition to a flood of UHD TVs on the CES show floor this week, and some noteworthy announcements regarding streaming content, physical media fans also

have some interesting news. “The Blu-ray Disc Association has confirmed the name of its 4K format (Ultra HD Blu-ray) and many of its capabilities,” reports “while the Secure Content Storage Association has its own demo for Ultra HD movies you can download and transfer (almost) at will, with backing from Fox, Warner Bros., Samsung and others.” Panasonic demonstrated its prototype Ultra HD Blu-ray player (we could see discs by the end of this year). And like the BDA, SCSA says its finalized spec is “coming soon.” When it’s ready, the spec will be used by Samsung and M-Go to launch a 4K movie download service. [Read More.](#)

### **Sony Brings New 4K Camcorders and UHD TVs to Las Vegas**

Sony went all in on 4K this year, with compelling ways to watch and create UHD content. Its 55- and 65-inch XBR-X900C is its thinnest LCD TV to date with a unique design that makes it appear as if it is floating. To provide some context, the X900C has a miniscule depth of 7.1mm, which is thinner than LG’s 55-inch OLED TV — in fact, it’s thinner than the iPhone 6 (check it out via videos from and). Sony also introduced some affordable 4K camcorders, scheduled for February availability, including the \$500 FDR-X100V 4K Action Cam, a GoPro rival that shoots Ultra HD video at 30fps, 1080p at 120fps or 720p at 240fps. “Bigger — but not by much — is the new HDR-AX33 Handycam, which is the smallest handheld 4K camcorder Sony has released to date,” reports *Digital Trends*. The \$1,100 camera “shoots 3,840 x 2160 XAVC S video at 30p and 24p, and it has built-in Wi-Fi that enables it to live-stream footage to Ustream.” [Read More.](#)

### **CES Saw 34-Inch Curved Monitors from Samsung, LG, Philips**

A few weeks prior to CES, many reported that Samsung was expected to unveil a 34-inch, 21:9 curved monitor with Ultra-WQHD+ resolution (3,440 x 1,440) that offers “a more immersive visual experience.” Samsung delivered — and its \$1,200 display got rave reviews in Las Vegas. “We were in love with Samsung’s SE790C Curved Monitor from the moment we laid eyes on its sleek contours,” reports *Mashable*. “The wide screen gives you tons of real estate — it really feels like you have two monitors when you’re looking at it. Colors looked excellent on a few still photos that Samsung cued up as well as on a few media websites.” a 34-inch, 21:9 UltraWide curved monitor designed specifically for gamers, while its own 34-inch, curved IPS display with MultiView technology. [Read More.](#)

## The Smart Revolution & Internet of Things

IOT or TOI? Either way we need to watch...

Governments are connecting many services in an aggressive development of the "Internet of Things"(IoT) to deliver essential services better and cheaper. Most consumer objects that tout their alignment with that path probably belong in a new subset of "Things on the Internet," but soon they too will start to truly and usefully connect with many devices and yield real life value to consumers.

Perhaps we need a larger conceptual framework to view the ongoing reveal of the iceberg called the Internet of Things. Like the physical Internet that grew for many years below the radar, the building of the IOT is going on everyday all over the globe but it's largely invisible to most of us who surf, email and buy things today. It's happening on an international scale as nations, cities and companies slowly construct a connected infrastructure that will dwarf human use. From traffic lights in Los Angeles to city systems in Barcelona, this change goes largely unseen as an activity and is only experienced in a tangential way as defuse improvements in services by most folks.

Slowly many consumer systems are becoming addressable. Sensors to measure our state and activity are proliferating in our devices. And ever so slowly at the moment, software advances are being made in truly useful additions to our lives, fueled by this mega but unseen IOT force.

Why should entertainment care? Well, one day someone will figure out what consumers really want to do with this new power and rapidly the world will reconfigure at Internet speed and those who are prepared will benefit for years to come. So for now the IOT action item is to look for opportunities to innovate in this conversion from **connection** to useful **interconnection** while working on our own internal and industry IOT potentials to be ready for the next Internet storm of change to effect lives and business. It's not that far off that it can be ignored, even if it appears to be a specter, given the "state change like" pace of this next wave. Stress won't help. Vigilance will. Keep this space on your radar.

It was fitting that the booths for both Qualcomm and Intel were side by side in Central Hall at CES as they put forward their competing views for the infrastructure for the Internet of Things. Given Qualcomm's widespread usage in communication devices and Intel's processing prowess, the market share between the two companies could go a long way to determining how the IoT develops.

Intel's booth was overflowing with unique ways of taking advantage of biometrics, virtual reality (VR), and analytics. The company had Jaguar on hand to demonstrate the use of eye tracking tech to guide piloted driving and entertainment, Oculus VR paired with its RealSense depth tracking to create a unique augmented reality (AR) experience, a real-time tracking system for beer distribution and even a biometric smart dress.

Qualcomm, meanwhile, showcased how many of the most popular items at the show, including GoPros, Samsung Gear VR and Epson's BT-200, utilize their processors. Given their experience with managing bandwidth, they are uniquely suited to help solve distribution issues, especially those involving high definition video. To that end, they touted their newly released software development kit (SDK) for LTE broadcasting and augmented reality glasses. Both are optimized for their onboard processors giving them a unique advantage.

Both companies have spearheaded efforts to create an open platform for IoT protocols, but it is unclear which of their efforts will ultimately garner the most support. What is clear is that the IoT environment represents tremendous monetary potential for both chip manufacturers and the analytics associated with the big data created by such networks



## Background:

MEMS/Sensors (Micro Electro Mechanical Systems) is the technology of small machines and, as such, can be found in nearly everything in our increasingly digital lives. Smartphones have at least 10 MEMS and a car has 100. One of the applications of MEMS is to power sensors, which power the features found in small devices. The growth in wearables and the Internet of Things (IoT) make MEMS/Sensors more important than ever.

In fact, as Karen Lightman, executive director of the MEMS Industry Group (MIG) says, “You don’t have a smart IoT device until you have smart, reliable, safe, secure, interoperable MEMS and sensors.” As MEMS/sensors emerge as an important industry sector, the various vendors begin to identify common concerns. One of the issues is standards; only devices that make medical claims are vetted by the FDA for accuracy. For fitness trackers to be valuable, however, the consumer has to have confidence that its data is correct. MIG created the first standard for performance, the IEEE 2700.



In addition to standardization, the MEMS/sensors industry also examines better ways to innovate and develop new products, to learn more from successful applications (such as the Nintendo Wii and Apple iPhone), and to figure out ways to better commercialize MEMS/sensors. If the IoT will potentially give birth to billions of devices, it will be because the MEMS/sensors industry has succeeded in its mission.

As social media has become a ubiquitous medium for interacting with our closest confidants and broader audiences, we have become accustomed to digitizing all sorts of personal info, from contact lists to our current mood. The 2015 International CES showcased the evolution of this digitization process, with eyes firmly fixed on our personal surroundings. In addition to the cultural effects of the anticipated “sensorization” revolution, other tech is striving to make it a reality at home, on the road and everywhere in between.

The bulk of the sensors used in these devices, while obviously more advanced, have not changed fundamentally in quite some time. Accelerometers give the system an idea of how fast it’s moving and which way it’s oriented, radio frequency tags and GPS yield more absolute location data, while Bluetooth connects the device wirelessly to its surroundings.

The widespread availability, low price point and low power requirements of these small chips, however, have allowed for integration at an unprecedented scale. Combining this with the reality that everyone carries a networked, mobile computing hub with them wherever they go in the form of a smartphone and the stage is set for unique new solutions to daily annoyances as well as truly personalized data delivery.

Evidence in both startups and established companies, algorithms and service-based apps were a big draw this year as the race is on to make meaningful use of the mountains of data flooding in from these devices.

A couple of infrastructure spaces to watch are the delivery of connectivity and power. The G.hn protocol, which promises high-speed Internet connectivity over any line (phone, coax or even power), could provide a big boost to connected appliances.

The Paper Battery Company, on the other hand, is touting the long-gestating use of supercapacitors to augment power storage. These ultra-compact devices can charge quickly and deliver high peak power, allowing batteries to last longer and charge faster.

A few of the systems that made pre-show noise were BMW’s newest i3, with laser-guided, remote parking and Volkswagen’s new infotainment and touch control technologies. Lynx SmartGrill, meanwhile, will cook your breakfast, while Fitbug hopes to provide a fitness coach by linking to your active wearables and fridge.

As far as manufacturers go, however, Samsung grabbed opening headlines in the space by building its keynote around its ecosystem for the Internet of Things (IoT).

## Noteworthy:

### **CES Panel: Is the Internet of Things Poised to Make History?**

CEA gathered a panel of four significant leaders at CES to discuss the current state of the Internet of Things. Panelists from Cisco, Verizon, the city of Los Angeles, and the Zigbee Alliance all see momentum building for a connected world; however, at this still early stage of adoption the most significant and meaningful inroads are happening on a macro scale. As Cisco's John Chambers noted during a CES keynote panel, the Internet of Everything becomes most meaningful when there is broad participation. [Read More](#)

### **Sensors/MEMS Session: Biometric Information for Wearables**

Developers of health and fitness wearables — currently the industry's biggest segment — are challenged with providing accurate and reliable biometric information. If the consumer cannot be convinced that calories burned, steps taken, and blood pressure numbers do not reflect reality, then health and fitness wearables will never gain the traction they need to become mass market. Enter Valencell, a core technology provider for biometric information to silicon providers and OEMs. [Read More](#).

### **CES Panel: The Internet of Everything and Full Participation**

The Internet of Things is only meaningful when it really encompasses everything. This was the key refrain throughout the CES keynote panel "Fast Innovation: Disrupt or be Disrupted" featuring John Chambers, Cisco chairman and CEO, Neil Smit, president and CEO of Comcast Cable and Werner Struth, member, board of management, Robert Bosch GmbH. David Kirkpatrick, founder, host and CEO of Techonomy moderated the discussion on the evolution of the connections between people, data, business and innovation. "The Internet of Everything must look at the whole system," suggested Chambers. [Read More](#).

### **CES Keynote: Samsung Chief Anticipates Strong Future for IoT**

During his CES keynote, Samsung Electronics CEO BK Yoon addressed his vision for improving consumers' lives via the Internet of Things. "In 2015, the company will invest more than \$100 million in the development community working on connected devices," reports *USA Today*. "And it will appeal to developers and competitors to assist in open standards so that devices from different manufacturers work together." According to the CEO in an interview prior to the keynote: "A lot of the smart TVs and smartphones out there already can communicate. By 2017, our plan is to IoT-enable 90 percent of

Samsung hardware, and within five years our plan is to IoT-enable all Samsung products 100 percent." [Read More](#).

### **FTC Chairwoman Points to the Potential Security Risks of IoT**

During her CES keynote address, Federal Trade Commission Chairwoman Edith Ramirez suggested that the growing crop of interconnected devices that make up the Internet of Things could potentially put individuals' privacy and security at risk. "Ramirez outlined several concerns including ubiquitous data collection, or the ability of sensors to collect sensitive personal information about consumers all the time and in real time; unexpected uses of consumer data, such as using individual energy use patterns to set their homeowners' insurance rates; and cybersecurity threats," reports *The Wall Street Journal*. She recommended that companies minimize the data they collect, consider encrypting sensitive information, and be more transparent about how they use personal data. [Read More](#).

### **MEMS and Sensors Power Wearables, the Internet of Things**

Wearables are powered by MEMS (Microelectrical Mechanical Systems) and sensors, and the MEMS Industry Group (MIG) is focused on addressing the issues that will help catapult wearables and the Internet of Things to become more powerful market segments. The wearable sensor market is expected to expand seven-fold in five years, to be valued at more than \$450M in 2018. At CES, MIG Executive Director Karen Lightman introduced a day-long conference devoted to MEMS and sensors. [Read More](#).

### **The Internet of Things Expected to Bring New Excitement to CES**

In recent years, CES has largely featured updated versions of existing products and services. suggests that the show has been lacking in "big excitement," despite its massive scope and media coverage each January. This is likely to change this week, thanks to a wave of new exhibitors chasing the Internet of Things. The next generation of home automation, connected CE devices, vehicle infotainment systems, smart wearables and related mobile apps could result in a CES that is "much more future-oriented," as predicted by CEA head Gary Shapiro. Research firm IDC anticipates the global IoT market will exceed \$7 trillion by 2020. [Read More](#).

## Wearables

At last year's CES, wearables – specifically fitness trackers and smartwatches -- emerged as a trend. In the 2015 CES, wearables became a full-fledged category and a dominant force at the show.

The strong showing of wearables at CES, however, does not (yet) an industry make. The numbers and revenue figures associated with this sector are a sober reminder that wearables are still a nascent industry. According to CEA Forecast reports, the wearable market was 0.5 percent of the CE industry (valued at \$1B) in 2013 and, by the end of 2015, will grow to 2.3 percent, valued at \$5.1B.

The forecast shows, however, steady growth in the future. Again, CEA Forecast reports predicts that, in 2016, wearables will be 2.7 percent of total U.S. CE shipment revenue, for a \$6B market; by 2018, it'll be 3.2 percent at \$7.6B.

Fitness trackers are still the strongest segment of the wearables category although smartwatches – which also offer fitness tracking -- are beginning to cannibalize that segment. At the 2015 CES, a huge influx of new companies showed plentiful examples of both. What's changed is the addition of fashion to formerly clunky trackers and watches, as vendors have realized that consumers consider them an expression of personal taste.

We saw some of that last year, when designer Tory Burch partnered with Fitbit, and Intel worked with Opening Ceremony to create the MICA bracelets. At the 2015 CES, this category has grown significantly, including smart jewelry (rings, bracelets, pendants) and partnerships with numerous fashion labels, including Guess, Michael Kors, Armani, Diesel, adidas, Karl Lagerfeld, and Fossil. Even Black Eyed Peas' will.i.am entered the space with his own Puls smart device, opening the idea of celebrity endorsements. One wild card is Apple's smartwatch, expected to debut in March 2015.



Fitbit teamed with designer Tory Burch to dress up their line of activity trackers.



Dutch designer and roboticist Anouk Wipprecht created an Intel Edison-powered, 3D-printed spider dress. The black sensors detect when a person moves into close proximity and captures the wearer's biometric reactions such as the rise and fall of their diaphragm. Appendages around the neck raise outward to repel the visitor, if necessary.

CEA considers smart eyewear to be the "frontier" segment of the wearables market. Even so, 2015 showed partnerships with fashion brands, including Luxottica (the world's largest eyeglass company) and sunglass maker Oakley.

One of the things that became quite clear at CES is that wearables are quickly becoming a subset of the Internet of Things: smart, connected devices that provide actionable data. Not all wearables however are as smart as they could be; expect to see evolution in their ability to connect data.

## Background: Wearables Take Many Forms at the Sands Expo



*The Misfit Shine activity tracker has a deal with upscale designer Swarovski and the unit recharges with light.*

entertainment devices, such as game consoles and streaming media devices] will be this holiday season's most popular electronic gifts." Approximately 37 percent of smartwatch sales are gifts, added Parks.

A quick look at manufacturers of wearable devices at the 2015 CES reveals that, as in 2014, devices will largely focus around watches, wristbands and eyewear. This year, for example, Intel, Jabra, Atlas and Scosche will all show earbuds, armband monitors and wristbands, all of which have licensed Valencell performance biometric data sensor technology.

The Vector MouthGuard is "the first mouth guard designed to accurately measure the linear and rotational accelerations of head impacts during sports and training activities." It provides real-time data to anticipate how an athlete absorbs impact during in-game play to maximize training and performance. Much as heart rate, power output, pitching speed and other performance data are part of broadcast sports, it is possible to imagine impact data adding another dimension to coverage.

When it comes to smart glasses, however, Juniper Research dampened enthusiasm, predicting sales of only 10 million units per year by 2017, due to lengthy time to market and lack of compelling consumer use cases.

Intel's Edison Chip, introduced last year and seen in prototypes for an infant's onesie, is beginning to make its way into grown up designs. Dressing smart won't be just a compliment.

Another futuristic look into the potential of wearables comes from SCOTTteVEST, a jacket/vest concept that includes speakers, microphones, LTE hub, fractal antenna, solar panels, sensors for health and fitness, and kinetic power generators. Whether or not SCOTTteVEST comes to market, it's not the only product looking at the future implications of wearables. In another PwC report, 82 percent of respondents were concerned that wearables would invade their privacy, in particular making them more vulnerable to data security breaches. At the same time, 75 percent of respondents said that wearables are likely to make them more productive and efficient at work.

Wearables also raise privacy concerns for employers, said global IT association ISACA, which found that "few workplaces worldwide are ready for the invasion of wearable technology and other connected devices." Of the members surveyed, 56 percent said that their "bring your own device" (BYOD) policy does not address wearables.

Wearables made a surprisingly robust showing at the 2015 International CES. The 2015 Wearables Marketplace (Sands, Level 2) gathered companies providing products from "high-tech fashion and smart jewelry to wearables that track your mood, activity and even your pets, as well as the newest augmented reality devices."

More wearables on the CES exhibit floor parallels their rising popularity in the marketplace. According to PricewaterhouseCoopers (PwC), sales of wearables could reach 130 million units by 2018. A Parks Associates report also notes that, "smartwatches [and connected CE



*Linx measures concussive force, mainly for sports and military.*

## Noteworthy:

### Firefox OS for Wearables as Alternative to Android and iOS

Mozilla is planning to take on industry leaders Apple and Google by developing a version of its Firefox operating system specifically for wearables. Firefox OS, which is starting to appear in smartphones and select TVs, will be adapted for use in smart glasses, smartwatches, and other wearable devices as an alternative to Google's Android Wear or Apple's iOS. Mozilla's ultimate goal is to provide Firefox OS as a system to easily connect appliances, mobile devices, television sets and wearables, regardless of their OS. [Read More.](#)

### Health & Fitness is Fastest Growing Category on Google Play

Google released an end-of-year rundown that measures the most popular apps on its Play Store. This year's fastest growing app category has been health and fitness, led by diet tracker MyFitnessPal. With 100,000 mobile health apps available now for Android and iOS, the global health and fitness app market is worth about \$4 billion. In other categories, Facebook topped social, Netflix was the leader in entertainment, Pandora was the most popular music app, and Flipagram led the photography category. [Read More.](#)

### CES Panelists Agree the Wearable Revolution is (Almost) Here

During a CES session on "The Wearable Revolution," panelists agreed that it is still early for the wearables category, but a revolution is right around the corner. Moderator Joanna Stern, personal technology columnist for *The Wall Street Journal*, pinpointed her main gripe: ugly, clunky watches and fitness trackers. "Will we look back at this generation and be reminded of the 25-pound laptop?" she asked. Panelists suggested the technologies that will make wearables more attractive and more effective are now being released. [Read More.](#)

### CES Session: Challenging Developers to Make It Wearable

The Internet of Things will comprise 200 billion devices by 2020, according to Steve Holmes of Intel's New Devices Group. He spoke about "Challenging Developers to Make It Wearable" during a day-long Sensors and MEMS Technology Conference at this week's CES in Las Vegas. "I want to talk to you about why I think people are under-estimating the impact of wearables, what Intel is doing and to share some of the

things we've learned about bringing products to market," he said. [Read More.](#)

### CES Conference Session: Wearables as a Market Opportunity

Emerging trends in new wearables represent the next great market opportunity, say a group of consultants and analysts who cover the field. As part of the Sensors and MEMS Technology Conference at CES, panelists took to the stage to discuss "Wearables: A Very Real Market Opportunity." Although current penetration of wearables is a mere seven percent, that number is expected to grow dramatically. "In the next five years we'll have a wearable that the majority of the population will want," said Jim Feldhan, president of Semico Research. [Read More.](#)

### The Quantified Self – Is There a Model for Making Money?

Is there a practical business model for wearables? A CES panel on "What's New in the Quantified Self" did a deep dive on that question, with panelists drawing from their own early experiences. Engaging consumers with wearables is proving to be much more difficult than anticipated, say the panelists, who report that 85 percent of wearables are abandoned after one month. Success may rely on the industry identifying models that address interaction with data and long-term consumer engagement. [Read More.](#)

### 2015 International CES Unveils Wearables Galore in Las Vegas

At CES Unveiled, the wearable manufacturers from the 2104 International CES were back... and they were joined by a dizzying number of new products. The majority of wearables are again focused on fitness and aimed at a demographic that exercises and is digitally plugged-in. At last year's CES, wearables were a major hit; this year, the rush to innovate has produced more products and solutions than the space can ever support. Today wearables galore; tomorrow, the shake-out. [Read More.](#)

### New Market: Baby Wearables Take Their First Steps at CES

Wearables with fitness and health applications dominated last year's CES. This year, manufacturers looking for new market segments have targeted new parents, a digitally savvy demographic likely to be open to wearable solutions. At this week's CES in Las Vegas, we expect to see an array of compelling new wearables for babies that track temperature, breathing, sleep positions, activity levels, and more. Early product announcements point to wearable patches and sensors, clip-on devices and smart clothing. [Read More](#)

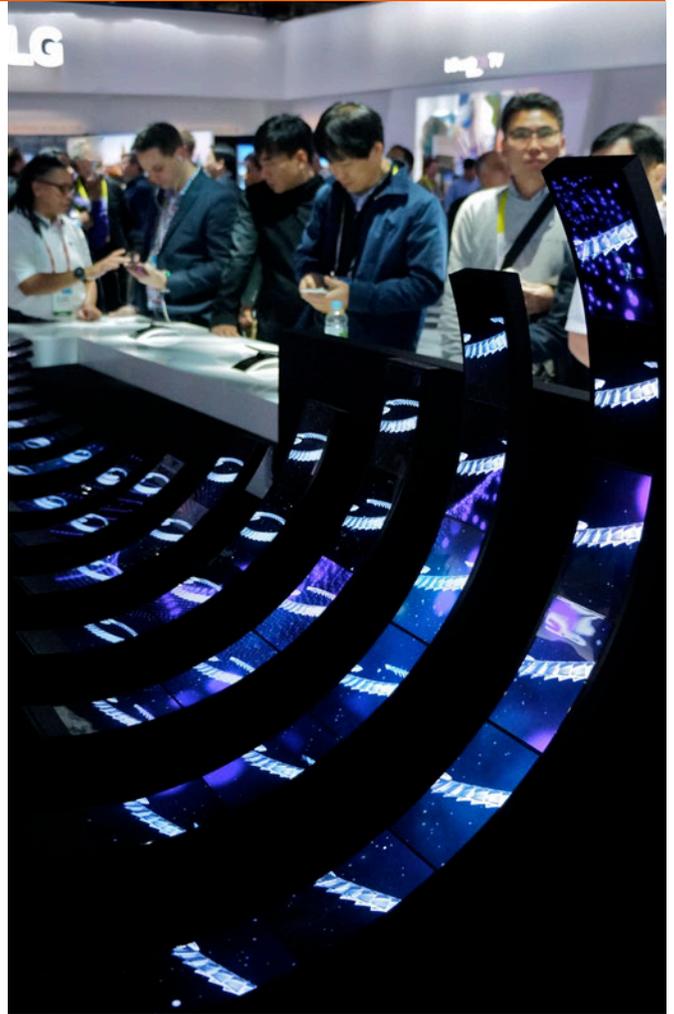
## Mobile

The big news in mobile this year is the predominance of mobile devices and a global price reduction that makes mobile access possible for almost anyone. In his CES media briefing, Steve Koenig, CEA's director of industry analysis, noted that of the just 7 Consumer Electronic Product Categories that account for 80 percent of the trillion dollar CE industry – what he called “The Magnificent 7” 46 percent of that is realized by mobile phones and tablets. Most of this surge is in Asia and India and dominated by 3 manufacturers known by few in the United States: OnePlus, Xioami, and Coolpad. As of the 2<sup>nd</sup> Quarter of 2014, Xiaomi passed Samsung as the #1 smartphone in China. Although phones made by all of these companies are cheap by global brand world market standards, they ship with robust features and sell at roughly half the price.

Xiaomi's popular Android Redmi phone retails for \$133 with a 4.7-inch IPS display, 1,280x720-pixel resolution, an 8-megapixel camera with panorama and HDR features, and a quad-core 1.5GHz MediaTek MT6589T processor. The latest Xiaomi Mi5, which is packed with a 5.7-inch 2560x1440 display, 64-bit quad-core Qualcomm Snapdragon 810 Adreno 430 graphics chipset, 3GB of RAM and a 20.7 megapixel camera.

Consider, too, the size of these Asian markets. China now accounts for 34 percent of the global smartphone market.

It is not that the CES floor was devoid of smartphones and tablets and other news in mobile. Samsung, Sony, LG and Huawei, among others, all displayed their latest products with dazzling image quality, multi-core processors, and true flexibility – not just by apps but literally bendable. Differentiating itself from other Smartwatches and phones, Black-Eyed Peas star will.i.am demonstrated his feature-filled PULS wristphone to widely favorable reviews.



*Xiaomi's Redmi retails for \$133.*

However, the real news in mobile is not the product but the role of mobile in our lives. “The smartphone is now the viewfinder for your digital life,” CEA Chief Economist Shawn DuBravac told the ETC in December. He considers this one of the unintended consequences of smartphones and tablets now serving as hub devices.

Today, more than 65 percent of time spent on cell phones is spent doing other activities beside a phone call. DuBravac calls this the “Post-Smartphone Era” and suggests that it is putting pressure on carriers to reconsider the legacy business model of telephony, measured in minutes and data charges, and adjust to more closely reflect customer behavior, usage and demand.

That percentage is likely to grow, as cars become rolling hotspots, wearables continue to help us quantify ourselves, more entertainment is delivered via IP and the mobile Internet, and the Internet of Everything comes to fruition.

This also raises the policy debate, as FCC Chairman Wheeler addressed Net Neutrality and the FCC's pending decision.

## Noteworthy:

### Liquid Image Ego LS to Live Stream Video Over Verizon LTE

Liquid Image, maker of camera-equipped masks and goggles, has updated its Ego LS 800 wearable action camera with plans to ship this spring. The camera features the ability to record 1080p video at 30 fps, or 720p at 60 fps, while simultaneously live broadcasting over LTE — a first for the camera category. The onboard LTE chipset has been upgraded so that it can stream video over Verizon's LTE network. The Ego LS is not the first action cam to live-stream video, but other cameras use Wi-Fi. [Read More](#)

### The Internet of Things: 5G Mobile to Enable Connected Devices

The Internet of Things (IoT) is just a pipedream if the network to connect devices and people cannot handle the traffic. 5G is the fifth generation mobile network that aims to enable the IoT, and at the 2015 CES executives from Cisco, Ericsson and Samsung discussed how the network will be created. Dramatic increases in global mobile traffic are widely anticipated, with an estimated 50 billion connected devices in play by 2020. Cisco predicts an 11-fold increase in global mobile data traffic between 2013 and 2018. [Read More](#)

### Chinese Smartphone Maker Xiaomi Wants to Go International

Xiaomi is the most popular smartphone maker in China and the third largest phone maker in the world. During the next year, the company hopes to expand its presence outside of China to developing markets in India, Brazil, and Indonesia. The company specializes in manufacturing low-cost, well-designed phones that they sell primarily online. Xiaomi is also hoping to increase profits by selling apps and entertainment for the phones, along with other electronic devices like a tablet and smart TV. [Read More](#)

### Microsoft Offers (Freemium) Office Apps for Android Tablets

Microsoft began offering a preview of its Office apps for Android tablets this week. Beta versions of Word, Excel and PowerPoint apps are now available (no invitation required) via the Google Play store. According to Microsoft's 365 Team, users need ARM-based Android tablets with KitKat or Lollipop (and 7- to 10-inch screens) to install and run the preview apps. "As expected, the apps are freemium versions, meaning you can create documents and perform basic editing. But you'll need that Office 365 subscription to do more," reports *CNET*. "The finished version of Office for Android tablets will be available in the first half of 2015." [Read More](#)

### WattUp Tech Aims to Charge CE Devices Up to 15 Feet Away

Energous claims to have a solution to the often imperfect practice of wirelessly charging our mobile devices. The company's WattUp technology — winner of this year's Best Innovation from s Best of CES — can charge up to 12 gadgets at once within a radius of 15 feet (the closer your device is to the \$300 transmitter, the faster the charge). According to *The Verge*, "Energous' vision is that your phone, wearables, and other devices will slowly charge throughout the day, preventing you from ever having to actually plug it in or worry about power level." The tech may one day appear in smartphones and wireless speakers, but in the short term you'll need to place your phone in a WattUp battery pack. [Read More.](#)



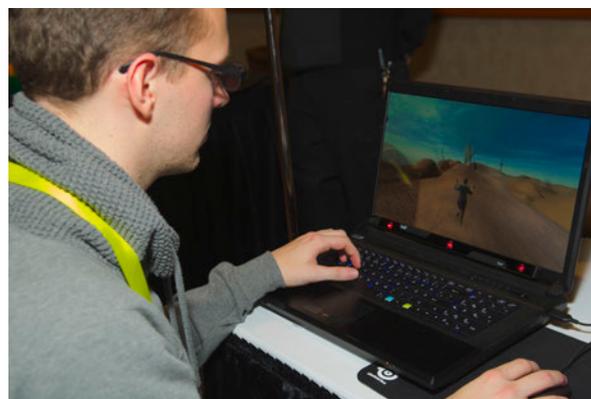
## Games

E3 might be the preeminent conference for video game news, but the renaissance of display technology, especially 3D and virtual reality (VR), put gaming front-and-center at this year's CES. Fresh off its Facebook cash injection, Oculus VR stole the show with a large presence in South Hall, but several companies touted similar headsets and a myriad of enabled devices. In addition to the multitude of VR headsets, Sony announced an expansion of its gaming network and manufacturers began incorporating nontraditional controllers we've seen pioneered in previous year's shows.

Sony began the week by announcing an agreement with Samsung that allows the TV manufacturer to access its PlayStation Now service. Owners of Samsung's smart TVs would therefore not need a console to play a library of over 200 PS3 games, just a DualShock controller and Sony's app.

The Oculus Rift, meanwhile, permeated several booths throughout the show. At its headquarters, the company showed off its mobile gaming platform, the Samsung Gear VR, and an impressive gaming demo using the Unreal Engine. The "car flip" or "Showdown" demo has been turning heads, literally and metaphorically, since it premiered in September. The Crescent Bay prototype of Oculus' head mounted display (HMD) is easily its best yet, and we look forward to a formal consumer release. Representatives would only say it is coming soon.

Not to be outdone, Razer continued its history of using CES as a stage for its advancements in PC gaming hardware. It announced its own version of a VR headset in the form of a hackable, open-source VR development kit. Razer is pricing the kit at \$200 (\$150 less than the current Oculus dev kits) and has established a number of partnerships to develop for the platform. The company also introduced an Android-based microconsole called the Forge TV. The diminutive box can support 4 controllers simultaneously, Google Cast, and streaming PC games. The box and single controller bundle are priced at \$150.



*Tobii and SteelSeries have teamed up to provide an eye-tracking device that helps gamers improve their skills and offers new creative opportunities for game developers.*

Though not groundbreaking, we've also begun to see low cost suppliers incorporating a host of nontraditional controllers. Tobii's eye tracking technology appears poised to help both VR and traditional console gaming by adding a new dimension of control. Neurosky's brain activity tracker was even used as the main gameplay controller in one case.

## Audio

Over the last few years, there has been tremendous attention paid to delivering higher quality and higher resolution images from cameras, both still and video, consumer and professional, as well as from the devices they are played on, from handheld smartphones to 4K TVs. In similar fashion, there seems to be a growing movement for higher quality sound and this year. For the first time in a long time, several new music players debuted at CES. HiFiMan's HM-700 player (\$179) to its HM-901 \$999 player; Sony's Walkman NWZ-A17SLV player (\$299); Neil Young's Pono music player (\$399); and HiFiMan are capable of playing



*Pono Music Player*

music

files at 24bit/192kHz. The growing number of players is in of itself a sign of the expanding market for high resolution audio that is being matched by a proliferation of home audio components and headphones from the inexpensive to the outrageous, directed to consumers as well as audiophiles.

In addition to players, speakers and headphones are being engineered not only to deliver high resolution sound but to deliver



*Sony's High Resolution Walkman*

that sound in service of immersive experiences. DTS debuted Headphone X last year and continues to innovate. 3D Sound Labs, an infant company less than a year old, was in the startup Eureka Park zone to herald the arrival of Neoh, an approach to personal audio that incorporates headtracking and algorithms to reproduce the audio exactly as one hears it in the real world. That real-world sound, say the founders, is particularly relevant in creating a truly immersive sonic experience in the same way that Virtual Reality addresses the visual experience. And their technology parallels the experience every listener has when they turn their head, adjusting their position from the sound source.



*3D Sound Labs Neoh Headphones*

Call it user-generated content, short video programming, or shared media, Disney's acquisition of Maker Studios and DreamWorks Animation's acquisition of AwesomenessTV, means that making short videos is big business, not only for creators, but for the entertainment industry, a fact that was acknowledged at 2015 CES by the proliferation of new technology aimed at simpler video creation. Among the innovative items were new GoPro type cameras such as the [HTC Re](#), a 16 megapixel digital camera that looks somewhat like a periscope, [Polaroid's Cube](#), a low cost choice, [Giroptic](#), billed as "the world's first full HD 360 Camera," the [iRig Mic Field](#), an HD stereo recording device for iPad and iPhone, and Cerevo's [LiveWedge](#) which allows one to broadcast live video on the Internet without a computer. Expect this category to expand as podcasting, livecasting, and video creation proliferates in 2015.



*The iRig Mic Field, HD Stereo for iPad and Phone*

## Noteworthy:

### High-Resolution Audio: Sony Unveils High-End Walkman at CES

The 2015 CES saw some interesting high-end audio products, one of which may be a surprise to those who remember playing cassettes in the 1970s-1980s. Sony has revived its iconic Walkman, but this time in digital form delivering high-quality sound. The \$1,200 portable Walkman NW-ZX2 (an update to the \$700 NW-ZX1) supports high-resolution audio files. “High-resolution audio isn’t new,” reports *The Wall Street Journal*. “However, earlier formats including DVD-Audio or Super-Audio CD, both of which were delivered on physical discs, failed to gain popularity. High-resolution audio in the form of digital files has a better chance of market success, analysts say, since they can be uploaded and downloaded over the Internet. [Read More.](#)”

### Neil Young’s High-End Pono Music Player Available Next Week

Musician Neil Young’s high quality Pono music player is slated to hit retail stores next Monday retailing at \$399. Young designed the music player to exceed the audio capabilities of any MP3 player currently on the market. The PonoPlayer will have a limited release, initially hitting about 80 locations throughout the U.S. Audio files for the Pono will be available from the PonoMusic Store that went live earlier this week. Young made his announcements in front of an enthusiastic crowd at CES in Las Vegas. [Read More](#)

### Startup Demos New Eye Tracking Virtual Reality HMD at CES

Japanese startup FOVE has developed a virtual reality head-mounted display with built-in eye tracking. The eye tracking enables the software to render the areas where the viewer is not looking with less precision than the area where the viewer is staring, allowing for more efficient CPU/GPU resource utilization. The rendered image was very clear, and the eye tracking worked well. When the headset goes to market, a FOVE rep expects the HMD with headtracking to sell for \$400-\$450. [Read More.](#)

### ONvocal Introduces its Mix360 3-Way Control Headset at CES

The ONvocal Mix360 Bluetooth headset and phone app allow you to easily balance the volume of your music player, phone, speaking voice, and the ambient noise around you. This is an elegant solution for people who spend a lot of time on the phone while on the go. According to the company, the tech allows Mix360’s “playback to rival the sound quality of a wired connection, and high-performance speakers deliver deep bass, clear vocals, and sparkling highs.” The Mix360, which worked well during its CES demo, sells for \$299. [Read More.](#)



### Startup Demos Virtual Reality Audio with Neoh Headphones

3D Sound Labs, a French company exhibiting in the Eureka Park startup area at the 2015 International CES, demonstrated new headphones that combine head tracking and software to dynamically tune sound that creates what the company describes as “the most immersive, wearable sound experience.” According to CEO and co-founder Xavier Bonjour, a former Technicolor executive, the Neoh headphones produce an experience that does for sound what virtual reality technology is producing visually. [Read More.](#)

### Aftershokz Headphones: Stay Connected Through Your Bones

Aftershokz showed its newest version of direct bone conducting Bluetooth headphones at the 2015 International CES this week. When maintaining situational awareness is necessary, these devices allow natural sounds to travel unimpeded through your ear drums and use the alternative path of passing tiny vibrations through your cheek bones physically to your inner ear. One touch access to calling on any attached smartphone is possible along with equalization presets to maximize them to your preferences. [Read More](#)

## Noteworthy:

### **CES: DJI Unveils Handheld Mount for Inspire Drone Camera**

As a follow up to its impressive Inspire 1 drone featuring a 4K camera, DJI unveiled a new mount at CES that works using a smartphone and the detachable Inspire camera. The mount was designed for filmmakers, especially those seeking the versatility of using the Inspire to capture aerial and handheld images without excessive equipment. DJI has a reputation among filmmakers. Prior to its Phantom and Inspire drones, DJI was most known for its Ronin brushless gimbals, considered among the best in the market. [Read More.](#)

### **Intel and Ascending Show Drones That Safely Fly Themselves**

According to *Wired*, one of the most talked about demos during CES involved four men playing a game with AscTec Firefly drones in which the hovering aircraft would move whenever a body approached. This would enable players to essentially “pass” a drone to another player, which was not the result of a remote control operator, but rather the drones’ ability to “see” someone coming. The ability is enabled by “an autopilot system built by German company Ascending Technologies based in part on Intel’s RealSense 3D cameras... The AscTec Firefly pong drones are a real product from Ascending Technologies, and they will ship with the new autopilot technology later this year. Intel likes them so much, the chipmaker has bought a minority stake in Ascending.” [Read More](#)

### **GoPro Firmware Update: Six New Features for Hero4 Cameras**

GoPro’s anticipated drone may be a no-show at CES, but the company did announce some compelling new features for its Hero4 Black and Silver action cams. reports that an upcoming firmware update will include “a time-lapse video mode that will snap photos continuously and then turn them into a video in camera,” two new video capture settings — “720p resolution at 240 frames per second for HD-quality super-slow-motion video and 2.7K resolution at 60 fps,” a new “HiLight Tag feature that lets you mark the video you’re shooting” (helpful for editing), and for photos — “a slower burst mode of 30 frames in 6 seconds.” Also, a new app for the GoPro Channel will be available on LG Smart TVs this year. [Read More](#)

### **3D Printing at 2015 CES: Food, Fashion, Filaments and More**

3D Printing may have taken a back seat at this year’s CES to the Internet of Things, compelling TV news and a dizzying array of wearables, but the technology still had a strong presence of 50+ companies at the Sands Expo. The 2015 gathering saw more diverse and affordable printers, faster and more precise capabilities, a push into 3D-printed attire, 3D printing with paper and food, design applications for those who don’t want to learn CAD, and perhaps most interestingly, a new era of filaments with a shift from plastics to include wood, metal composite and carbon fiber options. has posted a slideshow with details regarding a few dozen of the more interesting products – ranging in cost from a few hundred dollars to tens of thousands of dollars. [Read More.](#)

### **CES Now a Woodstock for Marketers, Brands and Agencies?**

In today, David Carr writes of a different CES than what has generally been reported during the recent week. Carr describes an event that is no longer just about new tech, gadgets and services, but is growing into a major meeting place for deal-making between Hollywood, Madison Avenue, the tech community, and additional industries — an event that has become “a kind of Woodstock for marketers, brands, agencies and media companies.” According to Michael Kassan, founder of MediaLink: “There’s been a mash-up between chief technology officers and chief marketing officers as what they do becomes more interrelated. Now it has taken off, and it’s the place where Google talks with Unilever and Facebook gets together with Kraft.” (Thanks to community member Lee Lanselle for bringing this interesting article to our attention.) [Read More](#)

### **Biggest Trends of 2015 CES Based on Big Ideas of the Past**

“This year’s CES had the feel of a World’s Fair,” writes Molly Wood for *The New York Times*. “There were futuristic BMWs zipping around the streets surrounding the Las Vegas Convention Center, drones buzzing through the air inside and outside the convention center, and just about everywhere you looked a vision of roboticized homes that take perfect, synchronized care of their inhabitants. There was even 3D-printed food.” Wood describes an energy in the desert that has been lacking in recent years, but also offers a compelling look at how much of the tech generating buzz this past week is based on “big ideas” introduced much earlier. A home automation system was demonstrated in 1934, GM imagined an automated highway system in 1939, Morton Heilig patented the Sensorama immersive viewing system (with head-mounted display) in 1962. Wood provides some fascinating context regarding what it takes for innovation to eventually impact our lives. [Read More](#)



**FCC Chairman Tom Wheeler (r)** discusses Internet policy with CEA CEO Gary Shapiro.



**NeuroSky's EEG platform for OEMs** detects brain activity and processing for brain training, education and gaming.



**LG** was among manufacturers showing curved phones. The **G-Flex** features a QuickTheater mode when the phone is held horizontally.



**Webee** was a Eureka Park startup discovery that not only provides an intelligent interface and controller for a Smart Home but it also turns televisions into Smart TVs with full multimedia and Internet entertainment options.



**iSketchnote's** stylus and pressure sensitive pad enable you to simultaneously draw both a paper and digital image.



360 degree video goes consumer with the **360Heroes** line of cameras, stitching software and platform in the cloud. The 6K camera, pictured on the right in the display, was used to shoot the first immersive footage at Everest summit for a documentary about legendary sherpa Apa.



2015 CES Innovation Award-winner **Allie**, from **IC Real Tech**, is an immersive, real-time monitoring system comprised of a 720-degree, dual-lens camera within an inconspicuous tabletop housing and a tablet player that stitches the images together in near real-time.



**THEEYETRIBE**

A CES Innovation Award-winner, **The Eye Tribe Tracker** is the smallest eye tracking device on the market. Available for less than \$100, it can be used in a wide variety of active and passive applications. The former includes device control such as optimizing video games, activated login or hands-free typing. Passive applications include data capture of user response to content.



The **Hexo** is a high performance drone that boasts a 4K camera and the ability to travel at up to 45mph.



**Oculus** CEO and co-founder **Palmer Luckey** (left) foresees distribution challenges for virtual reality content as current Internet pricing models were not built with high resolution, 360-degree video in mind. **Jeri Ellsworth**, co-Founder and chief hardware engineer, **Technical Illusions** (right) countered that specialized compression schemes will soon ameliorate the problem.



The **360cam** is a small, durable camera that captures HD video in 3D.



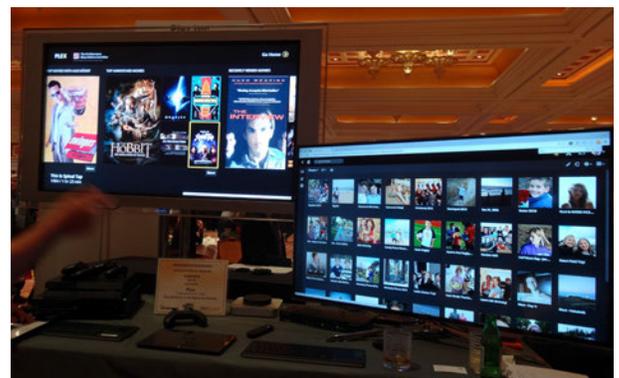
The NIRSIT PF1 by **OBELAB** is a highly portable device that can measure brain activity in the prefrontal cortex. Using a companion app, available for iOS and Android tablets, the user can monitor their brain activity in real time.



**LogoGrab** was another Eureka Park start-up of interest to marketers and brands. It instantly turns logos, title treatments into a digital media portal. Similar to what a QR code does but far more consistent brands and graphics.



**DJI** shows off its newest drone, the **Inspire 1**. Its rotors extend above the body so that the camera is completely unrestricted.



**Plex** is a rapidly growing media hub built by "media enthusiasts dedicated to bringing a more organized and enjoyable experience to media lovers around the world."



The **Ego LS** is an action cam that is capable of streaming video over Wi-Fi and 4G LTE.



Marvel character Iron Man drew attention in **Samsung's** booth, which was filled with their latest smartphones, televisions, appliances and more.

## Closing Perspective



*Every year, while the ETC@USC team fans out across Las Vegas to cover CES, Rob Scott, who edits ETCentric and our Daily News Brief, is the absolute anchor of our coverage. As CES week came to a close, he took a moment to reflect.*

I've come to learn that there's something to be said about experiencing the news coming out of CES the same way most interested consumers do – via social media, tech blogs, traditional news outlets, and streaming video of keynotes, sessions and the occasional product demo. Technology has made this practical; I could not have experienced CES the same way 10 years ago.

This month marks the eighth anniversary of Apple's first iPhone being introduced. And while I cannot come up with a single technology featured in the 20 years I've been covering CES that has impacted our lives as significantly as the smartphone and its accompanying world of apps, many reporters were talking about the 2015 CES with a renewed level of enthusiasm, one filled with the excitement of future possibilities.

It's worth noting that some pre-show reports pointed to an ailing confab that merely aims a spotlight on the next iteration of existing technologies and serves as an endless loop of marketing campaigns. However, thanks to a surprisingly fresh and exciting collection of products and services (many related to the Internet of Things and wearables), a number of reporters shifted their cynicism as the show gained momentum. This was intriguing to experience as a non-attendee.

With that being said, the following are the highlights of the 2015 International CES from one outsider's perspective:

- The Internet of Things (or Internet of Everything) and the comprehensive array of connected devices and wearables took on a new cachet this year. We've experienced a build up regarding IoT in recent years, so it should not come as a total surprise, yet this time around really felt like the philosophy behind the concept was being enthusiastically embraced on a grand scale – and, as a result, everyone from leading tech giants to hungry new startups were showcasing apps, gadgets, services and more to facilitate IoT.
- If the reports coming out of CES are accurate, 4K UHD is going to have a very big year – from more affordable Ultra HD TVs to 4K Blu-ray players, more 4K content produced by Hollywood, and more 4K support from streaming services. Big news included the formation of the UHD Alliance, the Blu-ray Disc Association's Ultra HD Blu-ray format standard, Panasonic's prototype Ultra HD Blu-ray Disc player, affordable 4K camcorders from some of the major players, and a string of new 4K TVs from just about every manufacturer.
- The top buzzwords surrounding television this year involved 4K, HDR, OLED and quantum dots. While curved screens were still referenced, they did not feel as much of a selling point as they did the previous year. And high dynamic range seemed more important (or practical and affordable) than 8K. Some of the most talked about TVs: Samsung's 105-inch bendable SUHD TV, Sony's X900C super thin LCD and unique floating design, LG's 77-inch flexible 4K OLED TV and new line of flat OLED TVs.
- Content distribution, cord-cutting and streaming services were all the rage in home video, especially with headlines involving upcoming Netflix support for HDR, the new Netflix Recommends program, TiVo's OnePass upgrade, even the cloud-powered PlayStation Vue coming soon. I don't know that anyone could have predicted that Dish's Sling TV subscription service would steal the show this year.
- Virtual Reality is alive and kicking – although probably not quite ready for your average consumer. However, techies love head-mounted displays and the idea of VR. We are getting closer to consumer-ready HMDs, and fortunately, the nausea experienced by some with earlier prototypes is reportedly dissipating. The Crescent Bay version of the Oculus Rift and Razer's new open source headset seemed to generate the most buzz this year.

- Drones were everywhere – flying around the LVCC, the Sands, demos in the desert... even braving a volcano show at The Mirage. We reported several times about DJI's Inspire 1, which had some compelling ideas for video production. But a number of other drones generated some heat, including the \$139 Bionic Bird, the \$600 Ghost (Indiegogo-funded), the \$1,500 autonomous Airdog, the \$1,150 Hexo+ controlled via smartphone app, and the \$500 Parrot Bebop with fixed camera.
- Automotive always felt like a bit of a fringe category at CES to me, a perception that has been slowly changing in recent years – not just based on the many keynote addresses and panels, but due to some of the emerging technologies. This year, however, connected and self-driving vehicles took on a presence like never before, from the Audi A7 that drove itself to the show – to the Mercedes Luxury in Motion F 015 prototype, described by Daimler CEO Dieter Zetsche as “a mobile living space.” I was really taken by the fact that more buyers today are concerned with in-vehicle tech than handling or horsepower.
- 3D printing, meanwhile, felt less about new printers (although a range of new machines were displayed) and more about new materials and filaments available for printing. There was a lot of press regarding fashion – showing female models wearing 3D-printed dresses and accessories – and, as a novelty or not, 3D-printed food. Whether 3D printing is ready for prime time is yet to be seen, but prices are coming down and practical applications are emerging.

We will continue to provide reporting throughout the year on these and other technologies that impact the entertainment media industry. As a valued member of the *ETCentric* community, we hope you find our reporting informative and helpful. Please let us know if you have any suggestions or requests regarding future CES coverage.

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