

Cool Vendors in Personal Devices

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Technology product management leaders must exploit the disruptive force of AI-driven technologies, such as computer vision, NLP and analytics, to reshape user interactions with personal devices and create stronger contextualized use cases.

Key Findings

- Device categories, such as connected home cameras, are evolving beyond security to enable a critical shift from sensing "occupancy" (someone in the home) to elaborating "presence" (specific user and context).
- Artificial intelligence (AI) technologies and analytics combined with computer vision (CV) enable products, such as drones, to be more personalized, autonomous and used as productive business tools.
- The democratization of AI, natural-language processing (NLP) and translation cloud services lower the barrier to entry for a new class of wearable translator products.

Recommendations

Technology product management leaders wanting to maximize personal technology to evolve the product portfolio should:

- Evolve connected home camera portfolios beyond security features by evaluating CV solutions with 3D sensing and virtual assistants that create new levels of conversational interactions and user personalization.
- Add intelligence to products by using low-power inferencing platforms on imaging-enabled devices (such as drones and robots). This enables visual recognition and geospatial mapping features that open further opportunities in adjacent areas such as immersive tech.
- Expand into addressable global markets and multilingual user communities by either implementing translation services or partnering to create multilingual speech interfaces.

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Strategic Planning Assumptions

By 2020, 50% of sales of new premium personal technology video products, including smartphones, will include advanced image analysis functions.

By 2021, 10% of wearables users will have changed their lifestyles, thereby extending the user's life span by an average of six months.

By 2022, 20% of all smart home appliances shipped by the top five consumer electronics manufacturers will be enabled by machine vision technology.

By 2020, 95% of video/image content will never be viewed by humans, but instead will be vetted by machines that can provide some degree of automated analysis.

Analysis

This research does not constitute an exhaustive list of vendors in any given technology area, but rather is designed to highlight interesting, new and innovative vendors, products and services. Gartner disclaims all warranties, express or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.

What You Need to Know

Technology product management leaders at technology and service providers (TSPs) are challenged to keep pace with a new wave of business transformation. The device market is undergoing changes with new product categories and technologies, such as AI and analytics, promising more personalized device experiences. The Cool Vendors highlighted in this report have been selected for their use of AI technologies and analytics to deliver enhanced value around new product categories. These new products include drones (DroneBase and Skydio), connected home cameras (Lighthouse), and a new class of dedicated personal translation devices leveraging NLP capabilities (Travis).

These vendors illustrate some of the trends shaping new dynamics and value within the device marketplace in 2018 and beyond.

Computer Vision (CV) Integration — Gartner predicts that, by 2020, 50% of sales of new premium personal technology video products, including smartphones, will include advanced image analysis functions. Improvements in 3D sensing, increased availability of miniature modules and falling prices of image sensors mean CV applications are expanding beyond traditional industrial use cases. Computer vision is being increasingly integrated in more devices, driving new value propositions and service opportunities:

- 3D sensing and CV augment the capabilities of traditional connected home security cameras. New products are emerging that go beyond security and add a deeper understanding of the home dwellers' context. These new products will enable a critical shift from sensing "occupancy" (someone in the home) to elaborating "presence" (specific user and context) in the shift from connected home to intelligent home. Home cameras are also being embedded with virtual personal assistants to enhance functionality.
- Advanced vision capabilities in devices such as drones have the potential to transform a number of business operations in vertical markets. Adding AI technologies to specific devices in the form of visual recognition and geospatial mapping drives further value for products by opening up market opportunities in adjacent technology areas, such as immersive (augmented, mixed and virtual reality) technologies.

Emergence of the Wearable Translator Market — A number of players are coming to market with dedicated wearable translators that perform near-real-time translation using speech inputs. Different form factors are emerging, such as pendants or in-ear smart buds. These single-purpose devices leverage speech recognition and NLP, and don't rely exclusively on AI in the cloud or need an internet connection to operate. However, opportunities beyond the consumer markets for these dedicated devices will be eroded by the big players and integration into smartphones. For example, Google recently introduced its Pixel Buds, which perform real-time translation by leveraging Google Assistant and Google Translate.

Nonetheless, dedicated wearable translators can open business opportunities in the B2B and B2B2C markets for the travel industry, hotels, military, transportation, government and consumer-facing companies by being embedded as a feature in the wider service proposition. As an example, Fujitsu, the University of Tokyo Hospital, and the National Institute of Information and Communications Technology (NICT) have partnered and are conducting trials with hospitals and clinics, providing a wearable clip-on translator device for clinicians.

DroneBase

Santa Monica, California (www.dronebase.com)

Analysis by Marty Resnick

Why Cool: DroneBase's platform enables businesses to connect with pilots for commercial drone mapping, aerial photography and videography jobs. The platform (available on both mobile and the

web) is used to support pilots' training and acceptance of commercial requests with a guaranteed payout and stock image royalty opportunities (that is, Getty Images). Within the DroneBase Pilot App, DroneBase displays available missions and mission details for their tens of thousands of pilots to consider and accept. This marketplace approach is very similar to app-based driving services (such as Uber and Lyft).

DroneBase continues to innovate its platform by exploring the use of emerging technologies to increase the value of drones and open up new opportunities. Recently, DroneBase released AirCraft, which provides pilots with the ability to build digital objects in the physical world via augmented reality. This will allow consumers to have some fun building their own artwork and possible obstacle courses for drone racing. Later this year, AirCraft Pro will be available for commercial use. One use case for architects, commercial construction and home builders would be to visualize new projects using 3D mock-ups of building designs in their proposed physical location without needing to physically go to the location or start any construction. AirCraft is in general release, but it has been labeled as "beta" as the company plans to add more features soon. AirCraft is currently available on the DroneBase Pilot App for iOS and is coming soon for Android.

Challenges: A number of vendors are entering the enterprise mapping, aerial data and imaging services space. DroneBase's pilot network seems unique, but as the company strives to expand into commercial services, it will need to focus on differentiation. Larger vendors in the drone services market with full-stack solutions may be preferred by enterprise customers that are concerned about the size, limitations and perceived long-term viability of the company.

Scaling the technology and team fast enough to meet demand for DroneBase's aerial services is another challenge the team faces.

Who Should Care:

- Technology strategic planners looking to acquire and test the value of drone services for imaging and video services with little investment should consider exploring commercial service opportunities through the DroneBase pilot network.
- Organizations providing architecture and construction services will find large amounts of value with the AirCraft (beta) application for visualizing plans and designs prior to construction.
- Existing enterprise drone service providers looking to enhance their portfolio of tools and product offerings may be interested in partnering with and/or acquiring the DroneBase platform.

Lighthouse

Palo Alto, California (www.light.house)

Analysis by Roberta Cozza

Why Cool: The Lighthouse AI home camera integrates a time-of-flight (ToF) 3D sensor with deep learning, enabling it to measure the environment and classify adults, kids, pets and inanimate objects. This, together with the natural-language voice assistant feature, sets the Lighthouse AI

solution apart from the competition. It positions the camera beyond security as an intelligent camera that aims to get a deeper "understanding" of everyday life in a busy household.

The 3D-sensing capability uses a custom optics module built around pmdtechnologies' ToF, depth-sensing solution. It allows Lighthouse to create alerts triggered by large 3D movements (instead of using facial recognition, which can be compromised by partial views/coverage of the face). 3D scanning helps avoid false alerts from changing light conditions, shadows or pets, unlike competing solutions in the market. In addition, the 3D sensor is capable of discerning between adults, children and pets. The solution feeds data into Lighthouse's algorithm, which uses deep-learning techniques based on training data, to classify and distinguish rapidly between children, pets, adults, inert objects, known and unknown faces, and user actions. The camera also recognizes natural gestures, such as a wave, so a user can wave at the camera and send a push notification in real time to the phone app, and the recipient can reply right back.

Lighthouse also adds an interactive "assistant" feature based on natural-language processing and understanding to offer a natural way for the user to ask for and be alerted in real-time about specific content or events the user specifically cares about. This avoids the need to check for specific events and go through hours of video footage. Using the Lighthouse phone application, the user can set up specific alerts and ask for specific searches such as, "Ping me if the kids don't get home by 4 pm." Or, "Show me what the kids did while I was away today." "What did the dog do today?" "Ping me when you see someone while invited users are away." "Summarize Monday." Guests/household employees can be invited with specific/limited privileges via the phone app. The Lighthouse camera is priced at \$299, and the company offers a \$10 monthly "AI service" or a \$200 one-time fee for lifetime service. Video history is stored for 30 days.

Challenges: The main challenges that Lighthouse faces are effectively positioning, communicating the capabilities and benefits of its solution versus the competition, and continuing to expand the solution capabilities and use cases. The solution currently can be used indoors only. Lighthouse could also improve the field of view, and in the future, further enhance its people recognition capabilities (beyond facial recognition), to add gait analysis and audio "intelligence."

Who Should Care:

- Providers of connected home devices and solutions looking to differentiate their portfolio by exploiting computer vision and 3D image sensing.
- Connected home providers developing solutions for assisted living or for implementation in B2B applications where access to key restricted rooms (such as server rooms) or restricted public spaces needs to be monitored and analyzed.

Skydio

Redwood City, California (www.skydio.com)

Analysis by Anshul Gupta and Tuong Nguyen

Why Cool: Skydio is an autonomous drone that makes innovative use of CV, simultaneous localization and mapping (SLAM), and deep neural networks (DNNs) with an accessible front-end phone app. Skydio's R1 autonomous consumer drone features an array of 13 cameras. A front-facing 4K camera captures video for the user, while the other 12 cameras are used for navigation and tracking. The image and video taken from the cameras are used to capture, process and analyze real-world images and map the environment while keeping track of the user's location within the environment. These features give the R1 autonomy for tasks such as following the user, avoiding obstacles and capturing video from different angles. The brain (inferencing engine) of the R1 is powered by Nvidia's embedded visual computing platform, Jetson TX1.

Skydio makes clever use of burgeoning technologies that are currently only applied to niche segments of the market — expanding the potential and value of drone and image-capture technology.

Challenges: Skydio has started shipping R1. However, it costs \$2,499, which limits its market; it targets high-performance athletes, professionals or technology enthusiasts. Skydio's R1 battery lasts for 16 minutes, which limits its usage, but it ships with a second battery at no additional cost. This technology is already available and being used in enterprise applications, so enterprise-focused vendors can come down market and crowd Skydio out of the space if and when it makes sense.

Moving from a being startup to a successful company focused on the mass market remains a challenge for Skydio, which has just started shipping R1. Skydio's solution is built on a commercially available platform (TX1); therefore, it needs a differentiating value proposition to remain competitive beyond being an early entrant.

Traditional drones and cameras already come with considerable privacy and safety concerns. A product that combines the two will increase these concerns. Moreover, such heightened fears could potentially lead to legislation that limits or prohibits the use of such devices altogether.

Who Should Care: Strategic planners should identify hardware (low-power inferencing platforms) and technologies (CV, SLAM) that enhance the value of their imaging products. This can include stand-alone devices, such as digital cameras, and any device, such as a smartphone or tablet, that contains camera sensors. Adding "smarts" to a device via visual recognition and geospatial mapping drives further value for products by opening up market opportunities in adjacent technology areas, such as immersive (augmented, mixed and virtual reality) technologies, retail, and e-commerce visualization. Technology product management leaders could look at Skydio's engine to understand how the company has used AI capability to build an autonomous flying camera.

Travis

Rotterdam, the Netherlands (www.travistranslator.com)

Analysis by Werner Goertz

Why Cool: Travis the Translator is an ultraportable translation device. While it leverages several different cloud-based language translation engines (such as Google Translate), some language pairs

can be implemented on the device, reducing latency and making it independent of internet access. The device renders a spoken translation across a variety of language pairs, currently over 80.

The device, hardly bigger than a car fob, fits easily into a trouser pocket and is therefore ultraportable. Its first-generation product, the Travis One, is touch- and push-button-enabled, and has Wi-Fi and cellular connectivity. The second product line, Travis Blue, will feature a simplified user interface with a microphone, speaker and two push-buttons, making it simple and easy to use.

The use cases start with the obvious tourist value; tourists can now converse, albeit in a simplistic way, with locals and thus bridge any language barriers. Beyond that, Travis the Translator has use cases in refugee integration and foreign language acquisition. Similar competing hardware devices are beginning to ship, such as iFLYTEK's Yibei translator. Therefore, Travis is not only cool, but it is also an early example of a new product category of ultraportable translation devices.

Challenges: While Travis' translator devices work well for simple, best-effort applications, such as tourist interactions, it must be understood that:

- Interactions are limited to short-form text.
- Translation is effected by and subject to back-end services not in Travis' domain.
- The expected result can be linguistically imperfect and sometimes ambiguous or awkward to a native speaker.

Travis is a Cool Vendor for being among the first to recognize the potential of ultraportable translation devices and the use value of real-time translation. However, other competitors and device categories are not far behind and pose a competitive threat. Samsung's Galaxy S9 phones, for instance, couple image recognition with translation, allowing street signs or restaurant menus to be instantly translated. With the democratization of AI, NLP and services such as Google Translate, the barrier to entry for competition is being lowered.

Who Should Care: Technology product management leaders should study Travis' translation architecture and decide whether to develop a similar translation fabric in-house, or to partner with Travis (or its competitors) to deliver multilingual speech interfaces for global markets or multilingual client communities. Travis is actively soliciting partnerships, especially with OEMs targeting industry verticals, such as healthcare.

Where Are They Now?

Lytro

San Francisco, California (www.lytro.com)

Analysis by Brian Blau

Profiled in "Cool Vendors in Consumer Devices, 2012"

Why Cool Then: Lytro was originally profiled as a Cool Vendor because its imaging technology (called "lightfield") meant photographers could create advanced images using computation photography techniques to produce pictures not typically possible on a smartphone or digital single-lens reflex (DSLR) camera. Refocusing, blending or animating a single picture was unique and different, and the original Lytro camera put that functionality in the hands of consumers.

Where They Are Now: Lytro released new lightfield cameras, but ultimately, the company pivoted to still using camera technology, just with a different market focus and direction. Lytro's last device was a single, large-scale lightfield camera meant for Hollywood-level productions. Its production software integrated lightfield content into content destined for virtual reality (VR) headsets or was used for sophisticated compositing. In March 2018, Lytro was acquired by Google. Lytro took \$140 million in four rounds of venture capital (VC) funding. Lytro's reported acquisition by Google was in the \$40 million range, which is a fraction of its valuation, making this far from a premium acquisition.

Who Should Care: Had Lytro remained an independent company focused on large movie, TV, video game and augmented reality (AR)/VR content, developers would be interested in Lytro's advanced camera and processing system as part of their production efforts.

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Maximize Personal Technologies to Evolve Product Portfolios Primer for 2018"

"Predicts 2018: Immersive Technologies and Devices Will Transform Personal and Business Interactions"

"Market Trends: Computer Vision Transforms Connected Home Device Portfolio Planning"

"Research Roundup: Computer Vision — Industry Trends, Use Cases and Best Practices"

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