SMART CLOTHING:
THE NEXT BIG THING IN WEARABLE TECH

• We see smart clothing breaking out of their niche status this year, ultimately eclipsing the markets for all other types of wearable tech

• From intelligent T-shirts to solar-paneled jackets that can recharge our cellphones, technology will increasingly be molding itself around our bodies

• Smart clothing unites the popular lifestyle appeal of athletic wear with all the bells and whistles of a mobile device—the ultimate in wearability, fashion and utility

• Connected, Web-enabled clothing may take longer to come to fruition, however, as developers work to overcome issues of data security and privacy
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Wearable tech has gone mainstream. A veritable avalanche of these products debuted at this year’s Consumer Electronics Show (CES) and will be flooding the market over the course of the next several months. Health and fitness monitors, in particular, will be everywhere in 2015—from Walmart to Walgreens to Saks Fifth Avenue—and this market is already booming. ABI Research estimates that these activity trackers currently make up 61% of the overall wearables market and predicts that the GPS-navigation fitness watch segment alone can grow 50% this year.

The future looks bright for wearable tech as these products continue to chip away at the massive global markets for watches, sporting goods, fitness gear and medical devices. Statista pegs the overall market at $7.1 billion and sees it growing at a healthy 25% clip this year alone.

But market watchers also see obstacles that could hinder mass-market adoption. For one thing, the current generation is far too focused on the technology and not focused enough on wearability, fashion and utility. Most fitness/health monitors, for example, are bulky, stand-alone, single-purpose devices, and often uncomfortable to wear. Far too many of these devices end up in the junk drawer just months after purchase. For this market to take off, experts say, the technology will need to become invisible, seamless and personal, to disappear into products that consumers feel good about wearing even without the technology.

"We should not be trying to make tech wearable, but rather [trying to] make wearable things technology-enabled."

Mike Bell, President and General Manager of Intel’s New Devices group

Enter Smart Clothing: Taking Wearable Tech to the Next Level

Smartwatches and activity trackers may be the hot sellers in wearable tech today, but we believe that smart apparel is destined to become the killer application in this emerging growth area. In our view, interactive garments will become commonplace when consumers start viewing them as part of an ecosystem rather than as stand-alone products. This will require a grand collaboration across various industries. On the technology side, sensors need to get smaller and more powerful, batteries need to last longer and wearable technologies need to continue piggybacking on the functionality of smartphones and other mobile devices. But the turning point for smart clothing will come with the entry of innovators in the textile, sportswear and fashion worlds that can bring the variety, styling and fit to smart clothing that people will want to make a part of their everyday lives.

We expect consumer adoption of smart clothing to ramp up over the next several years, ultimately eclipsing all other types of wearable tech. According to research firm Gartner, shipments of smart garments will more than double, from 10 million in 2015 to 26 million in 2016, surpassing shipments of smart wristbands by roughly 7 million that same year.
Figure 1. Worldwide Wearable Electronic Fitness Devices Shipments Forecast (Millions of Units)

<table>
<thead>
<tr>
<th>Device Category</th>
<th>2013</th>
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<td>12.1</td>
<td>8</td>
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<td>Smart Garments</td>
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<td>Total Market</td>
<td>73.01</td>
<td>70.2</td>
<td>68.1</td>
<td>91.3</td>
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</table>

Source: Gartner (October 2014)

The strong growth we envision for wearable-tech apparel is premised in large part on the belief that these products can capture an increasing share of the athletic/activewear markets, which has been growing by leaps and bounds over the past several years. Industry research firm Statista expects the global sports apparel market to reach approximately $152 billion in sales this year, offering an extremely attractive opportunity to makers of wearable technology. Between 2008 and 2013, global sales of sports apparel—a category including performance, outdoor and sports-inspired clothing—grew 20%, while sports footwear advanced 23%, according to Euromonitor International. That outpaced the respective 15% and 19% growth of overall apparel and footwear sales over that same period.

Recent industry surveys indicate that American women ages 18–24 are by far the biggest buyers of athletic wear, although the numbers are still impressive among older women as well. There is nearly an even split between those women who buy active wear for casual and everyday use and those who buy it for athletics, sports or exercise. Cotton Incorporated’s 2014 sports apparel survey puts casual usage even higher, with more than nine in 10 respondents saying that they wear athletic wear for activities other than exercise. These data underscore the extent to which apparel for the gym has been interwoven into people’s daily lives, whether or not they have an exercise regimen.

**Smart Clothing and the Fitness Community**

Nowhere is the bond between the fitness lifestyle and smart clothing more tightly drawn than in the case of leading athletic-gear maker Under Armour. The company has built an online social network that it calls Fitness Connect, aimed at cementing stronger relationships with its customers by providing a forum where they can find and share a broad range of health, nutrition and workout information.

In February, the company acquired two popular fitness-related apps—Denmark-based Endomondo for $85 million (a free, global fitness-tracking platform with 20 million registered users, primarily in Europe, that provides users with the ability to map, record
and share their workouts) and MyFitnessPal (the leading free resource for nutritional and fitness information, with 80 million users) for $475 million. These new acquisitions augment UA’s existing suite of applications, MapMyFitness (author of MapMyRun and MapMyRide) and UA Record, a dashboard unveiled at this year’s CES, under which it hopes to unite all of its digital resources. The company will also use insights gleaned from consumers sharing data across its platform to boost its online sales efforts and to sharpen its brand-marketing decisions.

The Connected Wardrobe—A Work in Progress

In the emerging Internet of Things (IoT), everyday objects (like home alarms, refrigerators or televisions) are becoming networked so you can interact with them wherever you may be. Clothing is no exception. We expect the industry to continue its push to connect everything from shirts to shoes to the Internet in the years ahead. For this future to become reality, however, the industry needs to resolve one big stumbling block: all those connected items of clothing will generate reams of personal information that could end up in the wrong hands and/or misused. There is still a lot of work to be done to fix the major privacy and security holes on the path to full Web-enablement. The simple, low-power technologies used in smart clothing are not yet able to handle heavy encryption, or may not be able to be updated if a security flaw is discovered.

Persuading all of the manufacturers and other players involved to agree on an industry standard that will allow truly robust interconnectivity of things will also be tricky. Everyone agrees that interoperability is the key to the IoT’s long-term success—as long as it’s their version of interoperability. Expect the development of full-fledged Web-enabled wardrobes to be an evolutionary process.

The Rise of High-Performance Fabrics

Much of the growth potential we see for smart clothing rests with the extraordinary advances in so-called functional fabrics—a new generation of high-tech materials offering a wide range of useful new properties. Many of these new textiles are used in products capable of containing explosions, protecting astronauts, thwarting bacteria and even keeping buildings standing during earthquakes. But they are also finding more commonplace uses, such as keeping people cool in the heat, wicking moisture, absorbing odors, protecting against harmful bacteria and ensuring that clothes stay clean and smell fresh—all while providing improved comfort, durability and fit. The health and beauty industries are also embracing these innovations, which range from drug-releasing medical textiles to fabrics with built-in moisturizer, perfume and antiaging properties.

Manufacturers continue to work to overcome a number of technical hurdles to make smart clothing rugged and washable, yet functional and power efficient. Antimicrobial textiles reduce body odor and its attendant textile discoloration. Mosquito-repellent clothing is made by treating fabric with permethrin, a synthetic insecticide, or pyrethroid, a compound similar to a natural chrysanthemum insecticide. Water-repellent or “hydrophobic” textiles designed to prevent hyperthermia among Swiss and German
soldiers are being used to make sportswear that is more comfortable in hot weather, according to the Swiss Federal Laboratories for Materials Science and Technology, which devised the material.

The demand for moisture-management fabrics, in particular, has been particularly strong, as the range of applications continues to expand. Generally speaking, the most effective moisture-management fabrics are high-tech synthetic materials made from polyamide or polyester microfibers, because they are lightweight and quick drying. These capabilities can be enhanced by using certain finishing processes, by varying the fabric or fiber construction, or by using a blend of fiber types. Fabrics incorporating non-absorbent biocomponent materials have proved particularly valuable because the absorbent materials on the outside draw the moisture away from the skin while the non-absorbent material keeps the skin dry. The leading manufacturer of polyester-based moisture management materials is Invista, which sells a wide range of garments for sports and outdoor activities under its CoolMax and Thermolite brands. However, the pace of development in this field has exploded in recent years, and a growing number of companies are now competing with these brands, including Nike, Patagonia, Reebok, and Nano-Tex.

Taiwanese textile manufacturers have emerged as the leaders in the field of innovative fabrics and fibers, with companies spinning out a plethora of high-tech fabrics requiring special production, dyeing, coating and lamination processes. Their new fabrics are being snatched up by US and European brands alike. In December 2013, Nike collaborated with its Taiwanese fabric supplier to experiment with a new environmentally friendly technology that uses recycled carbon dioxide rather than water in the dyeing process. This dyeing technology was used to create the recycled PET fabrics that were used in the production of polyester jerseys for two of the national teams at the 2014 World Cup. Taiwanese textile company Singtex has combined plastic bottles and coffee grounds to create an odor-absorbing fabric that has found its way into products made by Adidas, Boss, Puma, The North Face, Timberland and other international brands.

Nanotechnology is a category within smart fabrics that has considerable potential for development of new materials for the textile industry, industry experts point out. Research and development teams are already working to create military uniforms that change color to match the environment and lightweight bullet-resistant vests to monitor the wearer’s physiological data, communicate automatically and react instantly to chemical and biological agents. Smart nanomaterials that respond to injuries and deliver drugs and antibiotics, and sensors that can indicate the presence of cancer and blood clots, are also under development.

Underlying these novel materials are some unusual manufacturing techniques. There are myriad textile companies in the vanguard of the enhanced fabric movement. One such company is Kuraray, a Japanese firm, which has developed a way to harness an attribute of some polymers known as liquid crystallinity. As the name suggests, the molecules in liquid-crystal polymers (LCP) have arranged themselves to form crystals, which makes them stronger than polymers with randomly ordered molecules. An innovative manufacturing process results in a fiber that is extraordinarily strong: twist together
100,000 of them to produce a cord a bit thicker than a pencil, and it can suspend about eight tons, or the weight of four SUVs.

Global demand for smart and interactive textiles is expected to reach $3.8 billion in 2020, representing compound annual growth of 14% from 2014 levels, according to Transparency Market Research. Global demand for these textiles are dominated by the automotive market (the materials are mostly used in heated vehicle seats), which made up 40% of the total sales in 2013. Military (mainly for uniforms) made up 21%, followed closely by industrial and commercial products at 20%. The latter market includes work-wear electronics for both safety and communication for police, firefighters and construction workers, and is expected to become a major driver of demand in the future. Consumer/retail (at 14%) and medical/health care (at 5%) make up the remaining share. But analysts and other industry watchers expect demand from the two last industries to surge as the market for smart activewear and health care-related applications continues to develop over the next several years.

SMART-CLOTHING LINEUP

Shirts, Socks and Underwear

Ralph Lauren’s Polo Tech Shirt

Perhaps the highest-profile example of smart clothing came with the entry of Ralph Lauren into the arena last August, when it debuted its Polo Tech Shirt at the start of the US Open. The Polo shirt features smart silver-based thread sensors knitted right into the fabric of the shirt that read heart rate, breathing and stress levels. The fashion company pulled off this feat by partnering with biometric smartwear company OMsignal. The sensors relay information to what Ralph Lauren calls a Blackbox, or a device that snaps onto the shirt at the side, near the bicep. The compression shirt also has a sleek look in black with a signature yellow Polo Player logo. The second-skin fit enhances comfort and agility.

NuMetrex and Smart Threads

NuMetrex is another smart clothing brand that allows garments to work like a heart-rate monitor, developed by Textronics, a leader in the development of wearables sensors for fitness and health monitoring, which Adidas acquired in 2008. The NuMetrex line has stretchy textile sensors (or "smart threads") that look and feel like they’re part of the
clothing. The line also includes a variety of compatible accessories, including transmitters and watches.

The NuMetrex Cardio Shirt for men is constructed of an advanced wicking fabric with special sensory fibers integrated directly into the garment. The conductive fabric moves comfortably with the body, picking up the heart’s pulse and sending it to a compatible watch or cardio machine via a tiny transmitter that is snapped into a pocket on the shirt. The sleeveless style can be worn alone or as a first layer.

The company also offers a heart-sensing racer tank that features the same capabilities as the NuMetrex heart-sensing sports bra, which was introduced in 2005. The sleeveless tank top features a shelf bra where the electronic sensing technology is integrated into the fabric to monitor heart rate. A tiny transmitter snaps into a pocket in the shelf bra to send data to a compatible monitoring device. The tank top is made of quick-drying nylon Lycra with a second-skin fit that offers medium support.

**Sensoria Smart Clothing Suite**

Startup Sensoria also offers connected fitness T-shirts, sports bras, heart monitors, sensor-laden socks, and a smartphone app to monitor one’s performance and progress. Heapsylon, the company behind Sensoria, estimates that 70% of the 25 million runners in the US suffer from foot problems and that 60% percent suffer some type of injury each year, providing its own numbers to the runner’s technique debate in support of the benefits of its smart socks.

Sensoria’s smart socks combine sensor-equipped textile materials with an attachable activity tracker. The sensors in the socks track traditional data about how many steps have been taken, as well as the speed and distance. As a bonus, the Sensoria sock system includes a virtual coaching feature, providing data about running form and technique, such as weight distribution and the form of the wearer’s foot during standing, walking and running. The Sensoria tracker stores the data and allows for wireless upload to a home computer and real-time uploading to a smartphone. Once uploaded, the user can analyze the data. A sample screen on Sensoria’s website shows a variety of information organized onto a single screen, including a step counter and a sleep tracker, as well as analysis indicating over-pronation.

The socks could potentially replace multiple devices, including pedometers and GPS fitness trackers, while also offering new insight into proper technique and helping to maximize the efficacy of each workout.

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**Figure 2. Fitness T-Shirt, Sports Bra, Heart Monitor, and Sensor Socks**

OMsignal’s T-shirts and sports bras contain an embedded biometric sensor, which in turn contains a three-axis accelerometer to measure motion in terms of steps and estimated calories; they also measure breathing by respiratory rate and volume. Moreover, the accelerometer also contains a rare function for a fitness device: an electrocardiogram (ECG), which measures the electrical signature of the heart.
Another entry in this category, the Fraunhofer FitnessSHIRT, includes textile electrodes—conductive pieces of fabric—that pick up electrical activity from the cardiac muscle, as well as an elastic band around the chest that measures breathing. The shirt tracks both medical and performance measures, including heart rate, respiratory activity, arterial oxygen saturation, posture and movement. An electronic unit snaps into the shirt for monitoring and removes easily for washing. The unit houses the battery, stores data and provides for wireless transmission.

The company says that the shirt’s functions and settings can be adjusted to each person’s individual needs. Though the technology is not yet approved for medical purposes, Fraunhofer envisions it being useful for medical monitoring, monitoring emergency responders’ vital signs in dangerous environments, fitness tracking, and use in biofeedback therapy and stress management.

Jackets

The relatively large size and surface area of the jacket offers a large amount of real estate for inserting technology.

For the 2014 holiday season, designer Tommy Hilfiger introduced a solar-powered jacket for women with a $599 (now $419.99) price tag (50% of the proceeds go to the Fresh Air Fund). The jacket is designed by a Brooklyn-based company called Pvilion. It claims to produce enough energy in direct sunlight to charge most smartphones.

At the Consumer Electronics Show, a startup called Visijax demonstrated a cycling jacket with bright LEDs (light-emitting diodes) that help the rider be seen by motorists. In addition, the configuration of the lights can be changed via an internal switch. The jacket also contains sensors that detect when a cyclist is lifting his or her arm (in order to signal a turn), in which case the LEDs begin to flash, further increasing visibility.

Some wearable-tech jackets are programmed to give a hug. The smartphone app that comes with the T.Jacket, made by Singaporean company T.Ware, allows a parent, teacher or guardian to deliver varying levels of pressure (or “a hug”) to a child from anywhere, and integrated airbags in the vest simulate it. The jacket allows the pressure to be applied to different parts of the body, creating a more personalized form of remote physical interaction. The app also allows the parent to track the location and activities of the child using the T.Jacket, which was specially designed for children with sensory processing issues, including those with autism and ADHD.
Gloves and Scarves

Zepp’s sensor-outfitted smart glove for golf contains a sensor that, in conjunction with a smartphone, enables a 3-D analysis of the user’s swing, club speed, swing plane, tempo, backswing position, and hip rotation. It also can analyze a player’s swing captured on video. New York City-based Scough makes stylish germ- and pollution-filtering scarves that use the same carbon-filter technology that the military uses to protect against chemical warfare.

Belts

Emiota’s “Belty” is a smart wearable belt that tracks wellness and comfort with a built-in pedometer, (in)activity monitoring, waistline trend analysis, Bluetooth capabilities, and sister phone app. The device also features an actuator that can increase the wearer’s comfort throughout the day by automatically loosening the belt as he sits or tightening the belt as he stands. The belt also signals the wearer, if inactive for a certain period of time, to stretch and take a break from work.

Battery-Charging Handbags

Empowered, Everpurse, Momon and Mighty Purse are among the dozens of startup companies that are offering full lines of handbags with built-in, lightweight smartphone battery chargers, fusing tech with style to deliver an attractive alternative to the bulky, heavy chargers most of us carrying with us wherever we go. These handbag chargers are compatible with most leading smartphone and other mobile-device brands.

Ralph Lauren has also unveiled a high-end handbag with a built-in LED light and USB charger. The Ricky bag, named for Lauren’s wife, has a battery life equivalent to about four or five months of continual use and plugs into your laptop when it eventually needs recharging.

Tattoos

ElectroZyme looks like a temporary tattoo; however, it is really a sensor that adheres to the skin for a limited period of time and provides feedback on perspiration rate, muscle fatigue, and even muscle degradation as the wearer exercises.

Other Wearable-Tech Apparel Applications

There are numerous possible applications for wearable technology for military and industrial applications, including industrial safety, military goggles and heads-up displays, toxic gas detectors for mining, and so on. Many applications under development are
comprised of a sensor worn on the wrist or embedded in a garment, for example, from which it sends signals to a smartphone. In another example, a smartphone can represent a portable digital hub, receiving messages and alerts on dangerous safety situations.

The Wearables Pyramid
There are numerous participants in the manufacturing of wearable devices and clothing. Smart components comprise the sensors, microprocessors, data storage units, controls, software and typically, an embedded operating system and enhanced user interface. We have simplified the ecosystem into the pyramid below.

- **Value-added manufacturing.** The lightness and durability of wearables has required new advances in materials and manufacturing, spurring manufacturing companies to develop new materials, components, and manufacturing techniques. Flextronics, the leading end-to-end supply-chain solutions company, is the manufacturer of the Fitbit, Jawbone, and the discontinued Nike Fuel. Foxconn (i.e., Hon Hai Precision Industry Co., Ltd.) is the likely manufacturer of the upcoming Apple Watch.

- **Sensors.** There are many types of sensors that can be used in wearables, including microelectromechanical systems (MEMS), image sensors, magnetic sensors, inertial measurement units (that is gyroscopes), optical sensors, and biosensors. For example, the Apple Watch employs an accelerometer, a gyroscope, a microphone and a pulse sensor. In 2013, fitness and heart-rate monitors and foot pods and pedometers led the wearable market in terms of sensor shipments, but smartwatches are expected take the top position starting next year and should maintain dominance through 2019. Leading sensor manufacturers include STMicroelectronics and InvenSense.

Work on standardizing sensors for smart clothing is under way. Siloed solutions are likely to be replaced by wearable clothing that integrates multiple sensors, ultimately solving application-centric customer needs. In its October 2014 research report, NanoMarket projected that the market for sensors in smart clothing could more than double over the next several years, from roughly $187 million in 2014 to $476 million by 2018, with the strongest growth coming from biosensors.
• **Displays.** The display is a key element in a smartphone, and the major display makers include Korean vendors **Samsung** and **LG**, Japan’s **Japan Display Corp.** and **Sharp**, and Taiwan’s **AU Optronics** and **Chi Mei**.

• **Software.** There has been an explosion in the number of devices available, and it is software that makes the devices useful. In many cases, consumers will make their purchasing decisions based on features like the user interface, rather than on the performance of the hardware. In addition, there is a community of application developers writing software for smartphones and smartwatches that are compatible with popular devices already on the market.

• **Components.** Components include processors, displays, batteries, and power-management integrated circuits (PMICs.) The **NXP Semiconductor** was Apple’s near-field-communication (NFC) chip supplier for its iPhone 6, and it is therefore the likely supplier for the Apple Watch. Though generally known as the supplier of CDMA chips for smartphones, **Qualcomm** has made a push into wearables. Its Snapdragon processors are used in the Samsung Gear S and Gear Live, ASUS ZenWatch, LG G Watch R and G Watch smartwatches.

**Intel**, as part of its keynote address at the 2015 Consumer Electronics Show (CES), unveiled Curie, an integrated module the size of a coat button that is intended to serve as the heart of a wearable electronic module. At its core is Intel’s Quark system on a chip (SoC). Quark’s specs include:

Small as a button, jam packed with power.

- A 32-bit Intel processor
- 384 kB of flash memory and 80 kB of static RAM
- A low-power integrated DSP sensor hub
- Bluetooth low energy for wireless communications
- A six-axis combo sensor with accelerometer and gyroscope
- Battery-charging circuitry (a power-management integrated circuit [PMIC])
Activity Trackers Look Headed for a Shakeup

Currently, wearables for sports, fitness and the outdoors are generally comprised of fitness trackers and fitness bands. They represent the second-largest market for wearables (approximately $1.8 billion this year, or 20 million units) in a $7.1 billion market, according to the Consumer Electronics Association (CEA). ABI Research projects that 32 million sports and fitness wristbands alone were shipped over the past 12 months.

These bands can track a combination of the following parameters:

- Heart rate
- Steps taken
- Perspiration
- Skin temperature
- Hours slept (including hours spent in rapid eye movement (REM) and other sleep phases)
- Global-positioning service (GPS) information
- Calories consumed and burned
- The time and date, with stopwatch functionality

Leading vendors include Basis (acquired by Intel in the range of $100 to $150 million), Fitbit, Garmin, Jawbone, Jaybird, Microsoft, Moov, Nike, Mio Fuse, Misfit Shine, Razer, Runtastic, Samsung, TomTom, and Withings.

According to the most recent available data, Fitbit dominated the wearables market in 2013, with a 69% unit share of the full-body activity tracker market, according to the NPD Group. The number-two vendor, Jawbone, had a 14% share. All the other vendors had to share 17% of the market among themselves.

Demand for health and fitness monitors is likely to remain strong. However, given the plethora of basic also-ran products entering the space and the competition from smartphones and smartwatches offering similar or greater functionality, consumer electronics experts and analysts expect a major shakeout in the activity tracker market over the next couple of years. An abundance of basic fitness bracelets (the kind that only count steps and track sleep) were introduced at CES this year. Most still don’t offer heartbeat monitoring or on-wrist notifications from a smartphone.

As the competition intensifies, big players such as Apple, Google, Intel and Samsung, which are bringing general-purpose platforms to market, are likely to start cranking up spending to establish their brands, build consumer awareness, help consumers understand the benefits, and begin building app ecosystems. It may take a device that is heavy on fashion and tech functionality to truly move this category of wearables to the next level. That may end up being the Apple Watch, an arguably fashionable device with a lot of technology baked inside, which could inspire others to follow its lead. Many of the big fitness-gadget companies are now beginning to show some fashion sense with their products.

The game may have already been decided. After all, buyers for major retailers such as Walmart, Walgreens and Bloomingdale’s have already committed themselves to the big names in the space—Fitbit, Jawbone and Misfit—and may not want to take a chance on new players, preferring to stick with the companies and products that they (and their customers) already know.
Xiaomi, the Chinese smartphone vendor, recently announced a fitness tracker called the Mi Band, which sells for $13 at retail, well below the $90 average selling price for the category, according to the CEA. This product uses the same technology that many of the higher-end devices offer, and the low price point underscores the economics involved in making these devices, which are essentially pieces of plastic wrapped around an accelerometer. Many of the basic fitness wearables we saw at CES this year were in the same league.
• Nike was an early entrant into this market, initially offering running shoes (branded as “Nike+”) with embedded sensors that connected to a smartphone software application as early as 2006. In early 2012, Nike launched the FuelBand, which superseded the shoes. Despite being an early market entrant, Nike got out of the hardware business and laid off its hardware development team in April 2014.

![Figure 4. Nike+ Shoes and FuelBand](image)

• The Smash is a wearable band for tennis that connects with a smartphone app to provide information on one’s tennis game, including the use of gamification to set goals, rate one’s game, and tips on how to compete against others.
APPENDIX

Wearables Market Potential

Market researcher Statista forecasts that the overall wearables market could reach $7.1 billion this year, growing at a 25% CAGR to $12.6 billion in 2018, as depicted below.

Figure 5. Wearable Device Market Value ($ Million)

![Figure 5. Wearable Device Market Value ($ Million)](source: Statista 2014)

With a forecast of approximately 50 million units this year, BI Intelligence outlines in the figure below that the majority of the wearable device market is comprised of smartphones, followed by fitness bands and other activity trackers, followed by other small wearables.

Figure 6. Global Wearable Device Unit Shipment Forecast (Millions of Units Shipped Annually)

![Figure 6. Global Wearable Device Unit Shipment Forecast (Millions of Units Shipped Annually)](source: BI Intelligence)
Figure 7. Overview of Wearable Devices

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<tr>
<th>Wearable Device Type</th>
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<th>Types of Products/Vendors</th>
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<tr>
<td>Smartwatches</td>
<td>![Image]</td>
<td></td>
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<td>Goggles, Headsets and Glasses</td>
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<td>Oculus Rift Sony Morpheus, Microsoft HoloLens, Samsung Gear VR</td>
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<td>Headphones, Headsets and Earbuds</td>
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<td>Bluetooth headsets, Emotion monitors, Heads-up displays for gaming, Smart clothing, Wearable drone cameras</td>
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<td>Smart Rings/Jewelry</td>
<td>![Image]</td>
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<td>Fitness Bands/Activity Trackers</td>
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<td>Connected Apparel</td>
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<td>Jackets, Shirts, socks and underwear, Gloves, Belts, Posture monitors</td>
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<td>Other/Industrial and Military</td>
<td>![Image]</td>
<td>Handheld terminals, Heads-up displays, Smart clothing, Smart glasses, Smartwatches, Gas monitors</td>
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Sources: Companies, IHS, Inc.