

# WEARABLE ELECTRONICS MARKET AND TECHNOLOGY ANALYSIS (2013 – 2018)

By Components (Sensors, Battery, Display, Networking); Applications (Consumer, Healthcare, Enterprise); Products (Smart -Textiles, Glasses, Watches); e-Materials & Geography

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## Report Description

### Key Take-Aways

- Market statistics with detailed classifications and splits by revenue and volume.
- The key trends related to the product technology, prices, and the applications that shape and influence market.
- Analysis of the global market with special focus on high growth application in each vertical and fast growing application market segments.
- Impact analysis of the market dynamics with factors currently driving and restraining the growth of the market, along with their impact in the short, medium, and long term landscapes.
- Detailed Porter's analysis, market life cycle analysis of Wearable Electronics products and its respective markets.
- Detailed segmentation of global market by product and component with a focus on cross segment markets like application and industry verticals.
- Illustrative segmentation, analysis, and forecast of the major geographical markets to give an overall view of the global market.
- The future of the global market & industry from both technical and market-oriented perspectives with techno-market oriented roadmaps till 2018.
- Detailed competitive landscape with identification of the key players with respect to each type of market, in-depth market share analysis with individual revenue, market shares, and market share rankings.
- Competitive intelligence from the company profiles, key player strategies, game-changing developments such as product launches and acquisitions.

### Report Overview

The term 'Wearable Electronics' refers to any electronic device or product which can be worn by a person, to integrate computing in his daily activity or work and use technology to avail advanced features & characteristics. Simply put, wearable electronics are set to make routine things easier to perform, and also make life sophisticated by offering several computing features in various day-to-day applications, mainly due to integration of computing & communication devices. Today, several types of wearable electronics exist, with development of various types of wearable technologies and advancements in wearable computing.

Wearable computing/computers are small electronic devices worn by the user which enable mobile computing and wireless networking. Apart from these, the concept of electronic textiles (e-textiles)/smart textiles has recently emerged from the concept of integration of wearable computers in clothing and apparel. 'Smart textiles' are an amalgamation on conventional textiles and computing as well as electronic components imparting additional functionalities such as sensing, monitoring, influencing and recording changes in the surroundings, and

respond appropriately. This report mainly focuses on the complete global market for all types of wearable electronics which are available commercially and which are yet to commercialize in the near future.

Apart from the novel concept of smart textiles, the field of wearable electronics also includes several other products such as smart glasses/goggles, ring/finger worn scanners, footwear such as athletic, fitness & sports shoes, wrist wear such as advanced electronic watches and wrist-bands and others (such as head-bands and neck-wear). Typically, any wearable electronic device may include few or all of the following – sensors & actuators, image & speech recognition technologies, positioning & networking chips, displays & optoelectronics and specialty monitoring devices. The emphasis on using the wearable devices for fitness, health monitoring, entertainment, enterprise and industrial applications has been increasing with advancements such as stretchable electronics, flexible circuits, conducting fabrics, long lasting batteries and smaller specialty wearable sensors.

## Report Description

The report deals with all the driving factors, restraints, and opportunities with respect to the global wearable electronics market, which are helpful in identifying trends and key success factors for the industry. The report also includes qualitative analysis on the market, by incorporating complete pricing and cost analysis of components & products, Porter's analysis and PEST (Political, Economic, Social & Technological Factors) analysis of the market. The report also profiles all major companies active in this field. This report provides the competitive landscape of the key players, which covers all key growth strategies. The report also formulates the entire value chain of the market, along with industry trends of wearable electronic devices with emphasis on market timelines & technology roadmaps, market & product life cycle analysis.

This report covers a sub-market in this field - the wearable electronic components market in detail, segmenting the market by power supply components, networking chipsets, sensors, actuators, controls and displays & optoelectronics. This report's market scope covers the market for wearable electronic products which includes market for all wristbands for example: Nike+ fuel band, all smart goggles (with all display technologies along with HUD & HMD), and all wearable footwear (including special ones with activity tracking sensors), clothing & apparel (including smart textiles) and others (ring scanners & neck-wear) for different applications across all industry verticals.

### Report Scope

The scope of this report is restricted particularly to the market for final products, devices and equipment which can be worn, used in all applications. Thus, the term wearable electronics market, and its statistics wherever mentioned refer only market for end-products or equipment in four major application verticals – Consumer, Healthcare, Enterprise & industrial, and others such as Automotive & Transportation, Military, Defense & Aerospace and Emerging application sectors. In terms of products, the report's scope is limited to wrist-wear, eye-wear, foot-wear, neck and body wear and others such as ring & finger scanners, headsets (voice enabled) and head-bands.

For the components market, only electronic and electrical components in all types of wearable devices were considered in the scope. As semiconductors is a part of electronic

The report also gives an overview of technologies in this field of computing, positioning (GPS, digital compass), networking (Bluetooth, NFC, ANT+), sensors (accelerometers, MEMS), displays (HUDs and HMDs) and image and speech recognition technologies. The report also gives detail on smart textile materials – Auxetic materials, electrically conductive fabrics & yarns, photovoltaic, piezoelectric and thermo-electric devices.

New & upcoming trends in this field such as wearable electronic devices with Multifunction capabilities, mobile & wireless health wearable applications are also considered along with fitness & sports, entertainment & multimedia, and enterprise & industrial applications. Lastly, the wearable electronics market is segmented by geography across North America, Europe, Asia-Pacific (APAC), and ROW (Rest of the World) and further sub-segmented by countries.

Major players in this field includes: Abbott Laboratories, Inc. (U.S.), Adidas AG (Germany), BodyMedia, Inc. (U.S.), Fitbit, Inc. (U.S.), Freescale Semiconductor Ltd. (U.S.), Google, Inc. (U.S.), GreenPeak Technologies B.V.(Netherlands), Medtronic, Inc. (U.S.), Nike, Inc. (U.S.), Olympus Corporation (U.S.), Qualcomm, Inc. (U.S.), Recon Instruments, Inc. (Canada), SuuntoOy (Finland), Texas Instruments, Inc. (U.S.), and Zephyr Technology Corporation (U.S.).

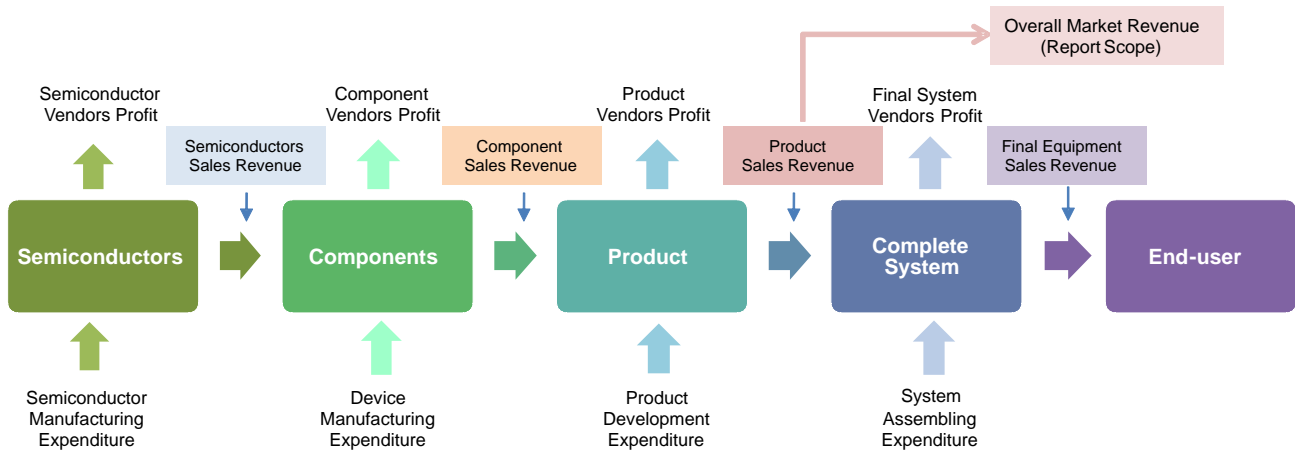
components, the global wearable electronics - semiconductors market, also analyzed in the report is limited to market for any type of semiconductor device integrated into a wearable device and product (as per the scope defined above).

Though the report mentions statistics of other display products in a few instances, they are purely for comparison analysis and product, component or application markets of no other complementary, substitute or competing technology are considered in the market scope.

An illustrative diagram of the complete wearable electronics monetary chain, showing the clear view of the market considered and analyzed in this report for quantitative data and statistics of 'wearable electronics market', wherever mentioned, is given below.

# Report Description

## Wearable Electronics Industry Monetary Chain

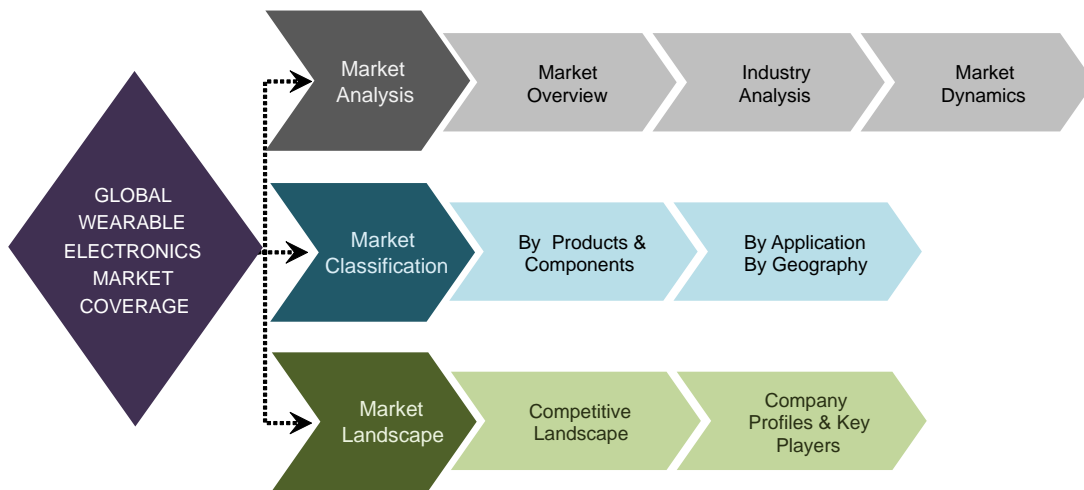


The figure above shows the flow of money in the form of a monetary chain, illustrating the flow of goods & services from one segment to the other in the Wearable electronics industry. It

also shows the relationship and links between the major industry segments, with the analysis below giving an insight into the effect of these industry segments on the overall market scenario.

## Market & Industry Aspects Covered

The figure below shows the complete list of aspects covered in this report in great detail.



The figure above shows the various aspects covered in this research study on the global wearable electronics market. Three major aspects of the complete market are covered in this report. They are the Market Analysis, Market Classification, and Market Landscape.

Market Overview (Chapter 3) and Industry Analysis (Chapter 4), along with Market Dynamics (Chapter 5) and additional qualitative analysis account for 'Market Analysis'. 'Market Classification' encompasses segmentation & sub-segmentation of the market by Products, Applications and Geography. Lastly,

# Report Description

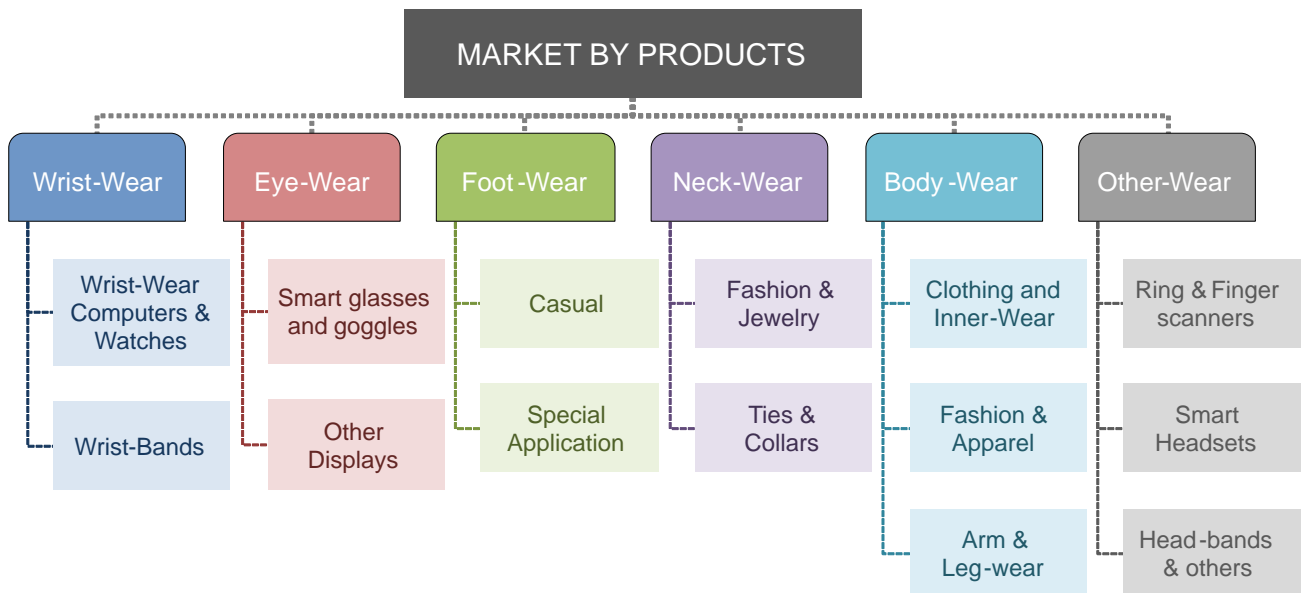
the current market landscape is covered with detailed competitive landscape and company profiles of all key players across the ecosystem.

This report focuses on the complete global market for all types of wearable electronics which are available commercially and which are yet to commercialize in the near future. The report's market scope covers the market for wearable electronic products which includes market for all wristbands (like Nike+fuelband), all smart goggles (with all display technologies

along with HUD & HMD), and all wearable footwear (including special ones with activity tracking sensors), clothing & apparel (including smart textiles) and others (ring scanners & neck-wear) for different applications across all industry verticals.

The report excludes all wearable product or device that does not employ "wearable technologies" or "wearable computing" such as conventional wrist-wear, eye-wear, foot-wear, neck-wear and body-wear, with no advanced electronics embedded in it.

## Wearable Electronics Market by Product



As shown in the figure above, the global wearable electronics market is detailed segmented into six product categories, namely, wrist-wear – covering wrist-wear computers/watches and wrist-bands; eye-wear – covering smart glasses & goggles and other displays (contact lens & so on); foot-wear - covering casual footwear and special application footwear;

neck-wear - covering fashion & jewelry products and ties & collars; body-wear – covering clothing & inner wear, fashion & apparel products, and arm & leg-wear; and others – covering ring & finger scanners, smart headsets, head-bands and all other wearable electronic products.

# Report Description

## Stakeholders

Listed below are major fields which stakeholders of the global Wearable Electronics market belong to:

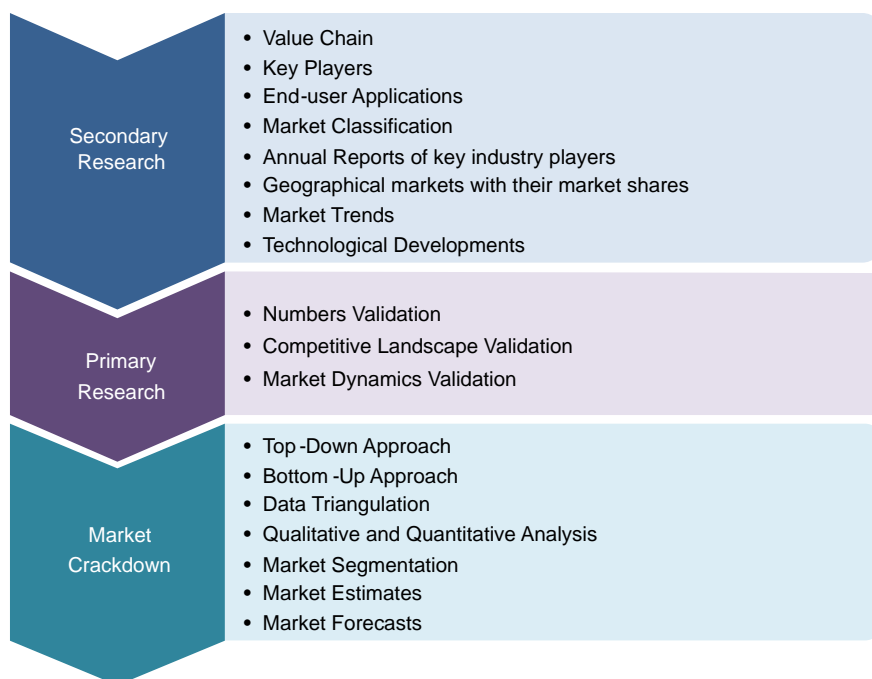
- Raw material & Manufacturing Equipment suppliers.
- Electronic Design Automation (EDA) & Design Tool vendors
- Healthcare, Enterprise and Industrial Wearable Device manufacturers
- Consumer wearable manufacturers
- Textile, Cloth and Yarn manufacturer and suppliers
- Luxury Clothing and accessories manufacturers
- Electronic component manufacturers
- Integrated Device Manufacturers (IDMs)
- Sensor, Actuators, and Transducers players
- Non pure-play (IDM) foundry players
- Fabless and Fabrication players
- Wearable electronics intellectual property players
- Wearable electronics technology platform developers
- Original Device Manufacturers (ODMs)
- Original Equipment Manufacturers (OEMs) (final equipment manufacturers, end-user application or electronic product manufacturers)
- ODM and OEM technology solution providers
- Assembly, testing, and packaging vendors
- Distributors and traders
- Research organizations.

## Research Methodology

This research study involves the usage of extensive secondary sources, directories, and databases such as IEEE, WSTS, Hoovers, Bloomberg, Business-week, Factiva, and One-Source, and so on to identify and collect information useful for this detailed technical, market-oriented, and commercial study of this global market.

The primary sources are mainly industry experts from core and related industries as well as preferred suppliers, manufacturers, distributors, administrators, solution providers, technology developers, alliances, standards & certification organizations from companies, organizations related to all the segments of this industry's value chain. All primary sources were interviewed to obtain and verify critical qualitative & quantitative information as well as assess the future prospects.

The following illustrative figure shows the market research methodology applied in making this report on the Wearable Electronics market.



## Report Description

In the extensive secondary research process for this research study, several hundreds of secondary sources such as certified publications, articles from recognized authors; white papers, annual reports of companies, gold standard & silver standard websites, directories, and databases were used to identify and collect information useful for this extensive technical and commercial study of this global market.

In the extensive primary research process done for this research study, the primary sources – industry experts such as CEOs, Vice Presidents, Marketing Director, Technology & Innovation Directors, Founders and related key executives from various key companies, organizations in the wearable electronics market such as smart eye-wear, smart textiles, smart wrist-wear and soon, have been interviewed to obtain and verify both qualitative and quantitative aspects of this research study.

Secondary research was mainly used to obtain key information about the industry's value chain, market's monetary chain, total pool of key players, the end-user applications, market classification & segmentation according to industry trends to the bottom-most level, geographical markets and key developments from both market and technology oriented perspectives

### Market Size Estimation

Both - "Top-Down" and "Bottom-Up" approaches were used to estimate and validate the market size of the global market and the approaches were also used extensively for market size estimation of various other dependent sub-markets in the overall wearable electronics market. The research methodology used to estimate the market size also includes the following details:

The key players in the industry and markets were identified through secondary research while formulating the industry value chain and their market revenue were determined through primary and secondary research. They include study of the annual and financial reports of top market players and also extensive interviews for key opinions from leaders such as CEOs, directors, and marketing executives.

After the complete market engineering with calculations to calculate market statistics, with market size estimations, market forecast, market crackdown & data triangulation (the methodology for these quantitative data processes is explained in the sections below), extensive primary research was mainly used to gather extensive information, verify and validate critical numbers arrived at, segmentation types, industry trends, key players, competitive landscape of each type of product markets, key market dynamics such as drivers, restraints, opportunities, burning issues, winning imperatives, key player strategies, technology roadmaps, evolutions and timelines.

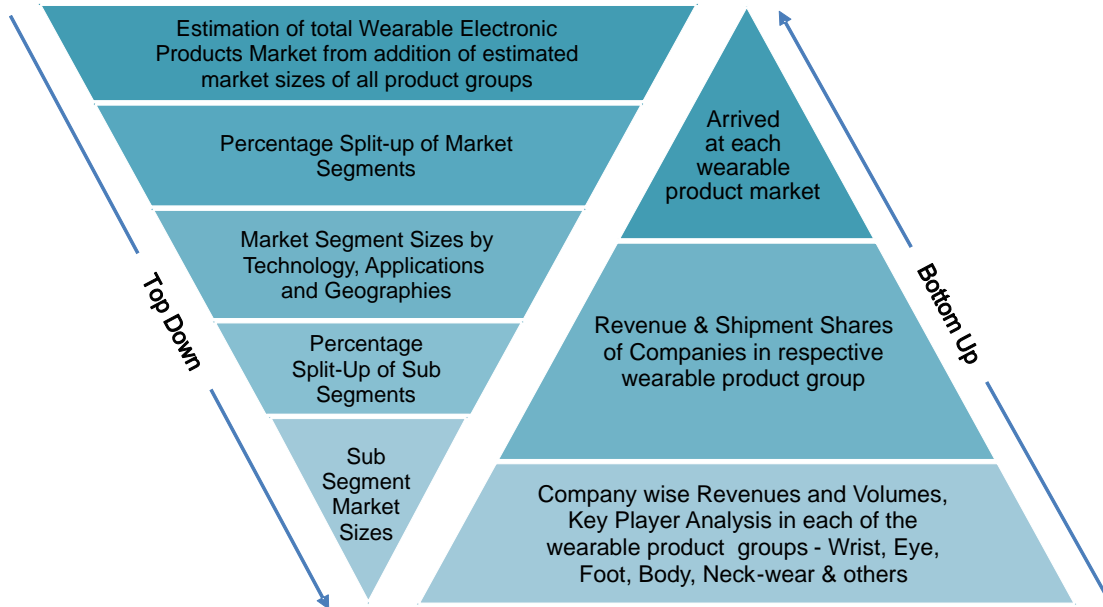
For the complete market engineering done for the total market crackdown, top-down, bottom-up approaches were used extensively along with several data triangulation methods to perform market estimation and market forecast for all the overall, segment and sub-segment markets listed in this report. Extensive qualitative and further quantitative analysis was also done from all the numbers arrived at in the complete market engineering process, to list key information throughout the report.

All the percentage shares, splits, and breakdowns were determined using secondary sources and verified through primary sources. All the possible parameters that affect the markets covered in this research study have been accounted for: viewed in extensive detail, verified through primary research, and analysed to get the final quantitative and qualitative data. This data is consolidated and added with detailed inputs and analysis by MarketsandMarkets, and presented in this report.

The following figure shows an illustrative representation of the complete market size estimation process implemented in this research study, for overall market size estimation, in a consolidated format.

# Report Description

## Market Size Estimation



Firstly, the Bottom-Up procedure was implemented in arriving at the overall market size of the market from the revenue of the key players (companies), shipments deployed and their market shares in each application segment.

Calculations based on the revenue and shipments of key companies identified in each application market led to overall market sizes of the markets. Sum of the three application market sizes was carried out to establish the total market size. This overall market size was used in the Top-Down procedure to estimate the market sizes of all the other individual markets in the market segmentation by geography via percentage splits from secondary and primary research.

For calculation of each type of specific market segment, the most appropriate immediate parent market size was used for implementing top-down procedure. Bottom-Up procedure was also implemented on individual market segment sizes obtained through primary & secondary research to arrive at the overall market size and individual geographical market sizes.

Market shares were then estimated for each of the companies to verify the revenue & shipment shares used earlier in the Bottom-Up procedure. With data triangulation procedure and validation of data through primaries, the exact values of the overall parent market size and each individual product market size were determined in this market research study.

## Market Crackdown & Data Triangulation

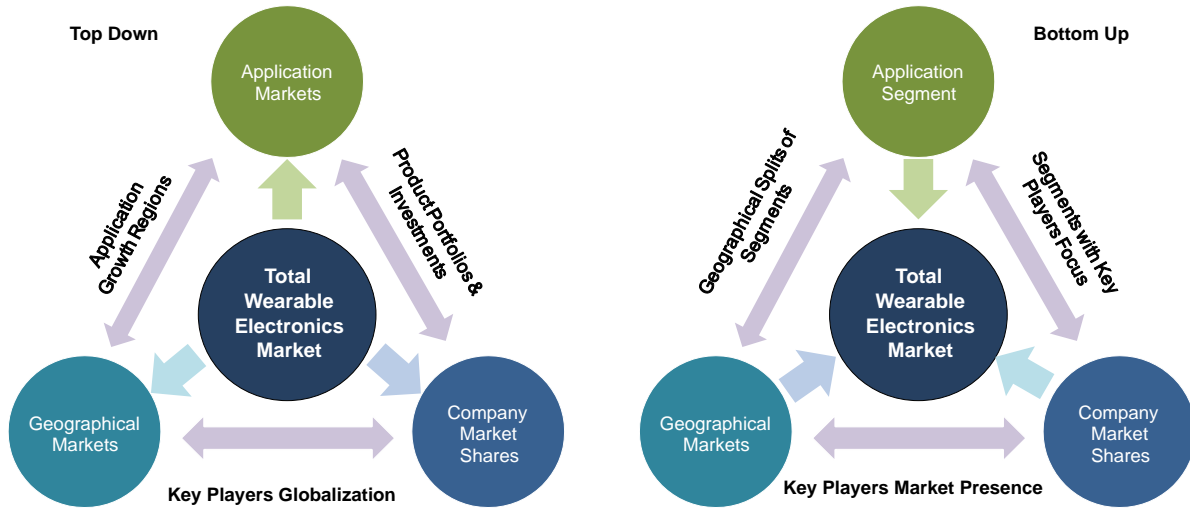
After arriving at the overall market size from the market size estimation process explained above, the total market has to be split into several segments and sub-segments, by various types of classifications. In order to complete the overall market engineering process and arrive at exact statistics for all the market segments & sub-segments, data triangulation & market

crackdown procedures explained below were implemented wherever applicable. The following figure shows the market crackdown structure and the data triangulation procedure implemented in the market engineering process of making this report.



# Report Description

## Data Triangulation Methodology



The figure above shows the core data triangulation procedure used in this report for every market, sub market, and sub-segment. The percentage split-ups of various major market segments (by application and geography) were used to arrive at the market sizes of the major segments of each market by product and geography.

The percentage split-ups of the sub-segments categorized under the application market sub-segmentation were used to arrive at the market sizes of each of the individual sub-segments of the end-user verticals in the market classification of the overall wearable electronics market by application and similarly for market by geography.

The exact reverse of the above procedure, that is, using "Bottom-Up" from application and geography segments to arrive at the overall market size and "Top-Down" from overall wearable electronics market size to arrive at the individual company (key players) revenue was also done to validate all the market sizes arrived at, in the procedure mentioned above and shown in the figure.

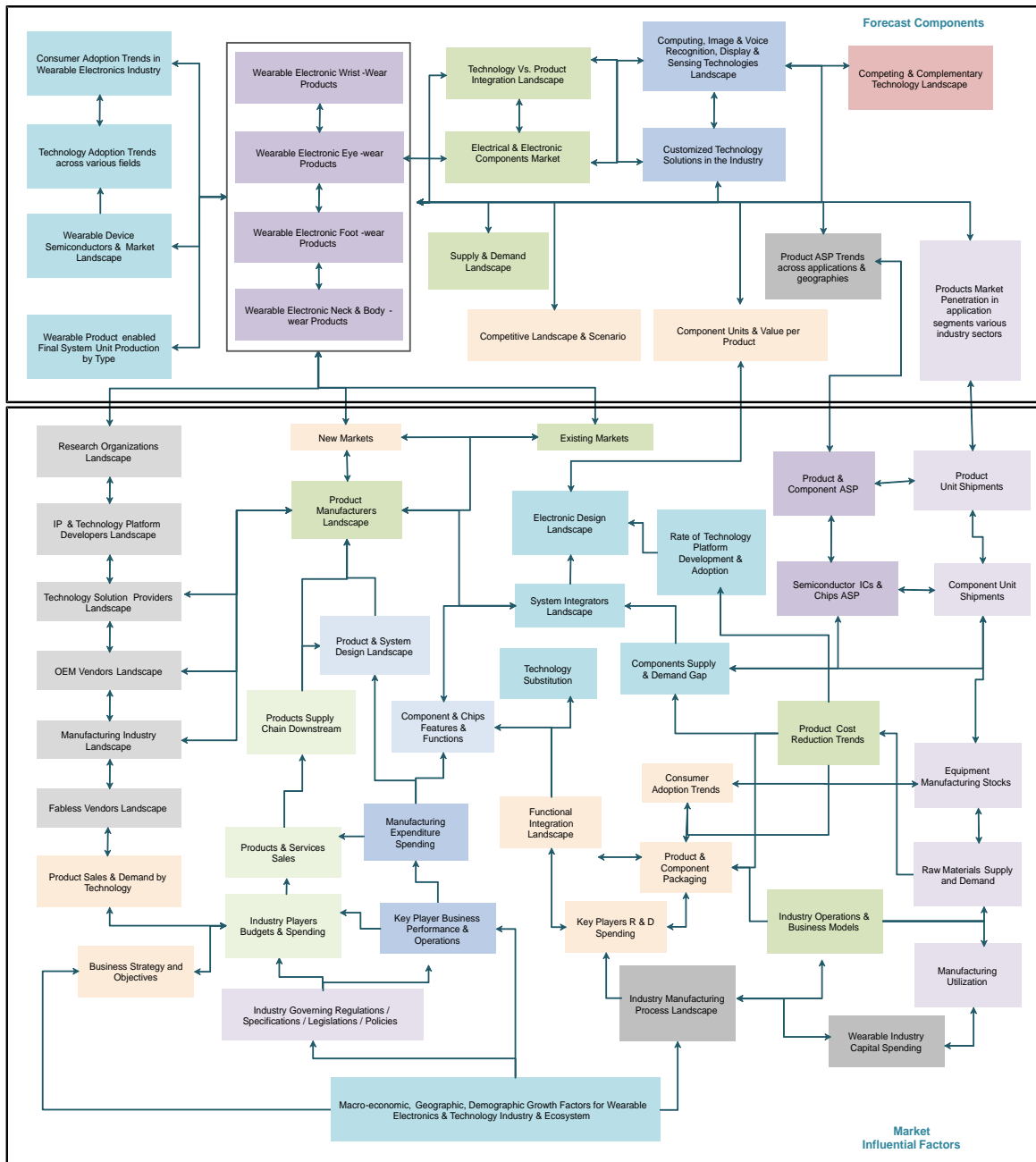
Similarly, the market size volume and average selling prices (ASPs) of the wearable electronics devices in each of the market segments were arrived at by similar methods and procedures. Data was also triangulated among the revenue, volume, and ASPs. Thus validation of every data was done by data derivation from the various aspects of the respective market segments and market aspects.

# Report Description

## Market Forecast Model

The following figure shows the detailed forecast model used with respect to the wearable electronics market implemented in this research study.

### Market Forecasting Model



## Report Description

The figure above shows the extensively detailed forecast model used for forecast the global wearable electronics market till 2018 considering the year 2012 as the base year. There are various influential factors, such as macro-economic, geographic, demographic factors being the bottom most levels that affect the overall market. Several other influential factors were analysed and researched to forecast the global market (and its market segments).

The wearable electronics market forecast factors chain shows all the influential factors for the global market and their inter-connections in the complete web of the wearable electronics industry. The influential factors web consists of key player oriented factors are wearable electronics industry player budget & spending, key player business performance & operations, wearable electronics industry governing regulations, specifications, legislations and policies along with key player business strategy, fabless, foundry, IDM, ATP, IP & technology platform player landscape & activities.

The web also consists of industry manufacturing, design & production-oriented influential factors such as overall industry manufacturing capital & spending, key players operations & business models, manufacturing utilization, product & component packaging landscape, technology & functional integration landscape, wearable electronics devices stocks & so on. On a component & semiconductor level, factors such as

wearable electronics semiconductor chips & ICs consumption & ASPs, product & component unit shipment demands and ASP trends, chip & component features & functions and so on.

All these factors are directly linked to the most crucial factor - wearable electronics product manufacturer landscape in two major fields – existing markets and new markets. The interconnections between all these factors in the web are shown in the figure, which are self-explanatory. Post consideration of the influential factors, the components of the forecast model to forecast the overall market, termed as “forecast components” were decided upon, and linked with the entire mesh network of influential factors.

Some of the most crucial forecast components of the wearable electronics market include Frequency Bands & Spectrum Adoption Trends in Wearable Electronics industry, Technology adoption trends across various fields, Wearable Electronics product enabled final system deployment by type, and wearable electronics customized technology solutions in the industry, competing & complementary technology landscape.

All these “forecast components” directly affect each of core market statistics mentioned in this report. Thus analysis of each forecast component’s inter-related influential factors and their effect on the forecasts, lead to the complete forecast of the overall wearable electronics market.

### Key Data Points Taken from Primary Sources

- Data for extensive and exhaustive segmentation and classification of the global wearable electronics market.
- Validation and triangulation of all the numbers and graphs.
- Segmentation breakups, split-ups, and percentage shares.
- Data for market revenue and volume.
- Key industry trends of the top players of the wearable electronics market.
- Qualitative insights into various aspects of the market, key trends, emerging areas.
- Quantitative data for mathematical and statistical calculations.
- Company statistics (quantitative) and developments (qualitative) for company profiles

## Report Description

### Key Data Points taken from Secondary Sources

- Current and proposed production volumes of a particular products and devices by market players.
- Validation of numbers of the various product and end-user application markets.
- Pricing estimation and validation of the pricing and forecast model.
- Market shares of key industry players in the market.
- Percentage split of individual markets for geographical analysis of the wearable electronics market.
- Forecast for various market segments of overall markets and validation of the forecast data.
- Technological landscape, competition between technologies, industry preferences, market dynamics.
- Competitive landscape of the key players, market shares, market share rankings, the competition dynamics and recent industry activities.

### Key Companies of Primary Research

Few among the major companies of the semiconductor industry whose executives were involved in extensive primary research conversations for making this report are listed below.

- AT&T, Inc. (U.S.)
- EnOcean GmbH (Germany)
- Eurotech S.p.A. (Italy)
- GlassUp Ltd. (Italy)
- Imprint Energy, Inc. (U.S.)
- Plastic Logic Ltd (Germany)
- Shimmer Research (Ireland)
- Solar Fiber (Netherlands)
- TNO Science and Industry (Netherlands)
- Weartechs.I (Spain)
- Zoog Technologies, Inc.(Philippines)

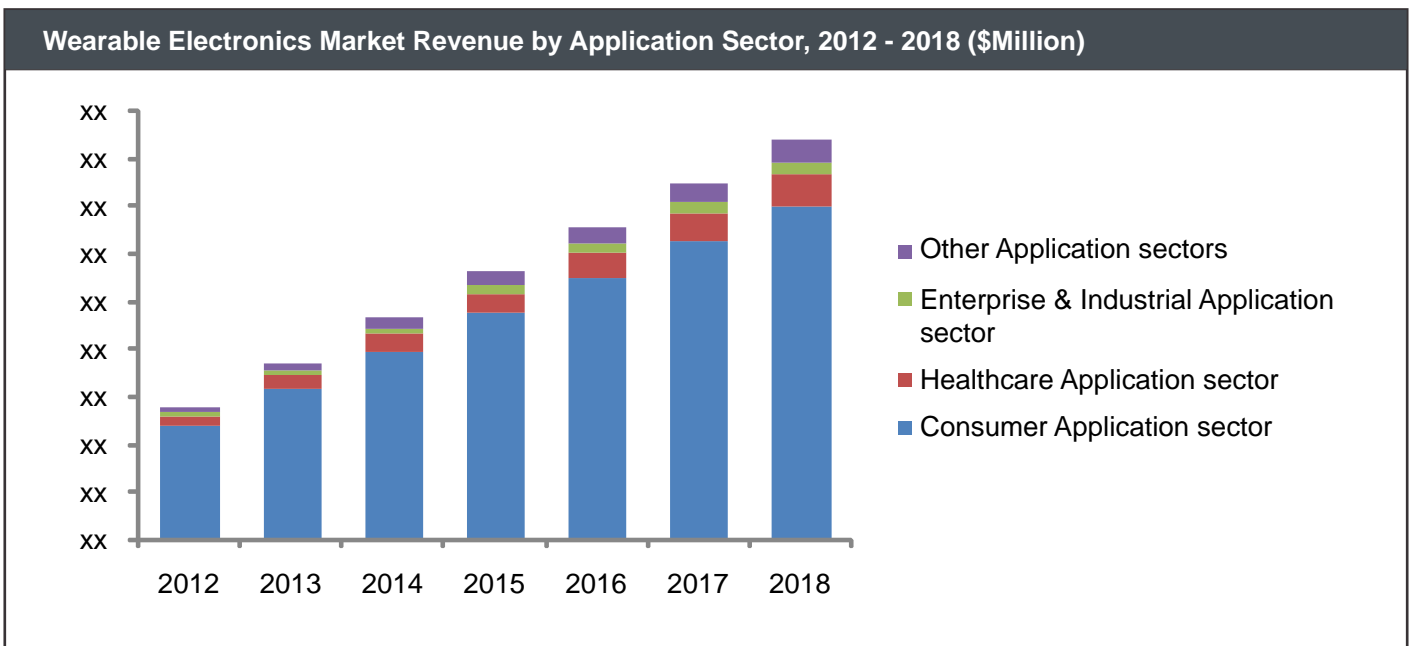
## Executive Summary

Wearable computing/computers are small electronic devices worn by the user which enable mobile computing and wireless networking. The term 'Wearable Electronics' refers to any electronic device or product which can be worn by a person, to integrate computing in his daily activity or work and use technology to avail advanced features & characteristics. In terms of product the wearable electronics would include products such as smart glasses/goggles, ring/finger worn scanners, footwear such as athletic, fitness & sports shoes, wrist wear such as advanced electronic watches and wrist-bands and others (such as head-bands and neck-wear)

Apart from these, the concept of electronic textiles (e-textiles)/smart textiles has recently emerged from the

concept of integration of wearable computers in clothing and apparel. 'Smart textiles' are amalgamation on conventional textiles; and computing and electronic components imparting additional functionalities such as sensing, monitoring, influencing and recording changes in the surroundings, and respond appropriately.

The emergence of wearable electronics is seen as the next big thing after smartphone revolution. The application area for wearable electronics ranges from consumer application, healthcare, enterprise and industrial and various other fields. As the technology matures over the time, it is expected to find new application verticals and increased application in the existing one.



As shown in the above figure, consumer application sector accounted for the largest market share in 2012 and is expected to continue its dominance during the forecast period. However,

Enterprise and Industrial application sector is expected to grow at the highest CAGR from 2013 to 2018.

## Executive Summary

| Global Wearable Electronics Market Revenue by Geography, 2012 - 2018 (\$Million) |      |      |      |      |      |      |      |                   |
|--|------|------|------|------|------|------|------|-------------------|
| Particulars  | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | CAGR% (2013-2018) |
| North America  | xx   | xx   | xx   | xx   | xx   | xx   | xx   | xx                |
| Europe   | xx   | xx   | xx   | xx   | xx   | xx   | xx   | xx                |
| Asia Pacific   | xx   | xx   | xx   | xx   | xx   | xx   | xx   | xx                |
| ROW  | xx   | xx   | xx   | xx   | xx   | xx   | xx   | xx                |
| <b>Total</b>   | xx   | xx   | xx   | xx   | xx   | xx   | xx   | xx                |

North America accounted for the largest market share of the global wearable electronics market accounting for xx% of the market. Europe, Asia Pacific and RoW accounted for xx%, xx% and xx% respectively in 2012. Asia Pacific is expected to grow at the highest CAGR during the forecast period from 2013 to 2018.

Major players in this field include Adidas AG (Germany), Fitbit, Inc. (U.S.), Vuzix Corporation (U.S.), Google, Inc. (U.S.), Apple Inc (U.S.), Epson America, Inc. (U.S.), Nike, Inc. (U.S.), Olympus Corporation (U.S.), Qualcomm, Inc. (U.S.), Recon Instruments, Inc. (Canada), Texas Instruments, Inc. (U.S.), Infineon Technologies AG (Germany) and Weartech S.L (Spain) among others.

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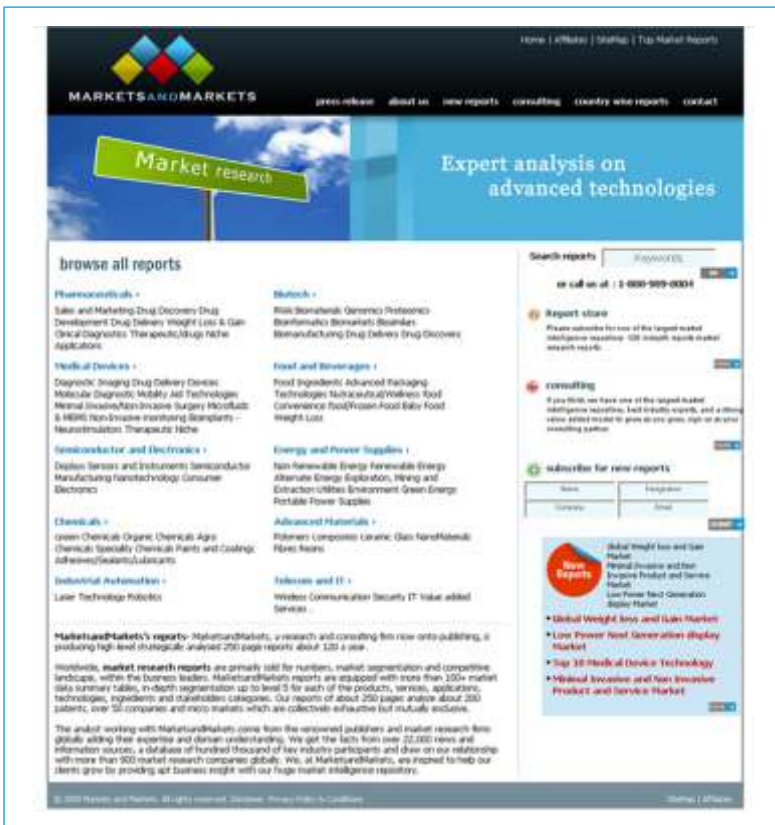
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Smart fabric is fabric that enable computing, digital components, and electronics to be embedded in them. Part of the development of wearable technology, they are known as intelligent clothing or smart clothing because they allow for the incorporation of built-in technological elements in everyday textiles and clothes. Electronic textiles do not strictly encompass wearable computing because emphasis is placed on the seamless integration between the fabric and the electronic elements, such as cables, microcontrollers, sensors and actuators.

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