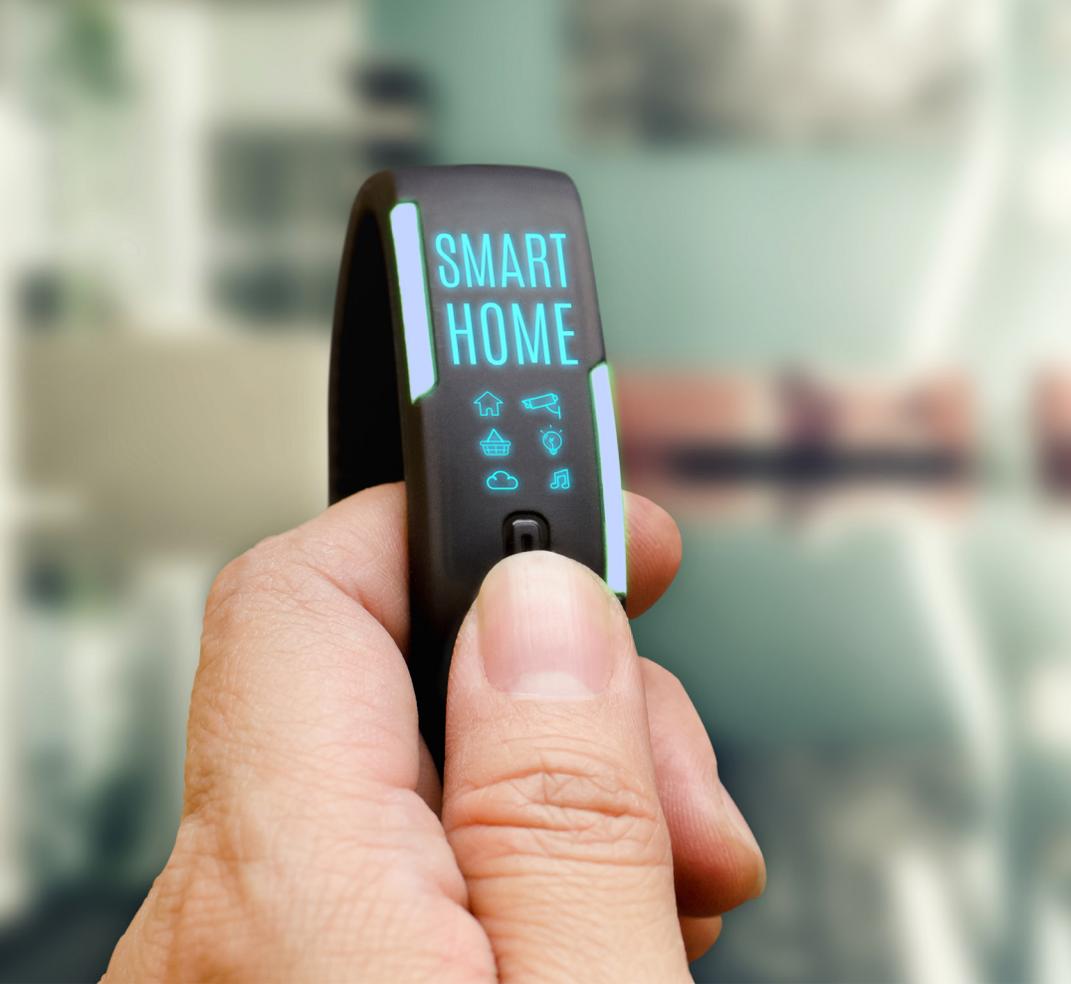# THE PRESENT APPLICATIONS AND THE FUTURE OF WEARABLES
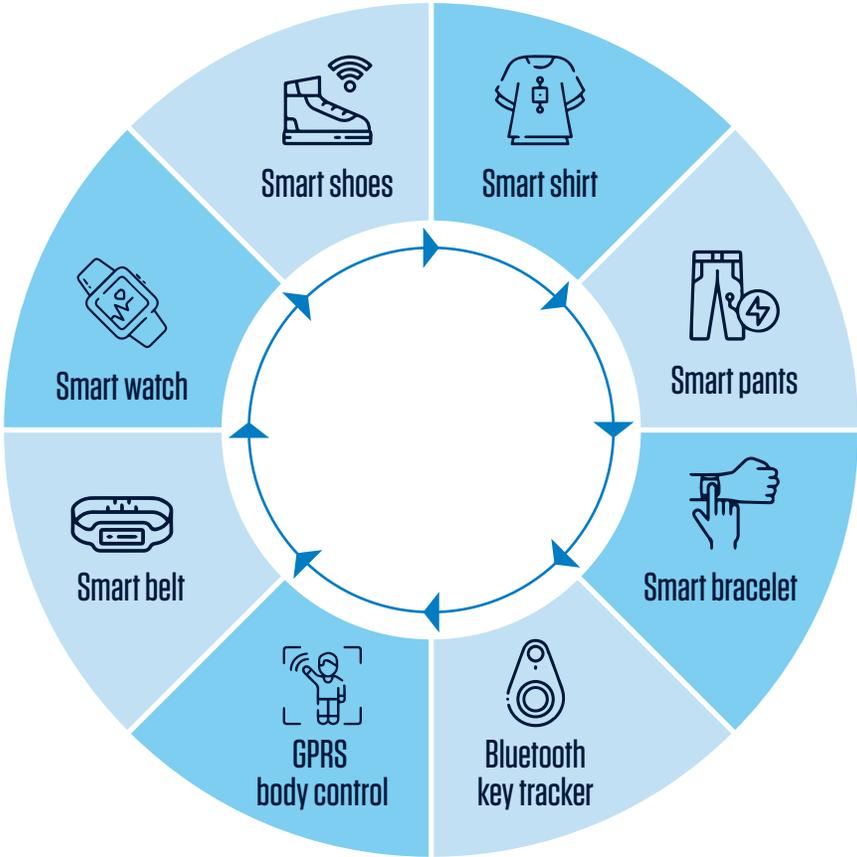
Abstract

The world of smart wearables is expanding at a huge scale with a gamut of devices finding a wide range of useful applications for individuals and businesses. This paper examines this growing trend and its outlook for the future.

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The genesis of modern wearable technology dates back to the first small watch, invented in 1500 by the German inventor Peter Henlein, and worn as a necklace. Since then, watches have grown smaller in size, been carried around in pockets, and since the 1900s worn on wrists.

Today's wearables include a gamut of devices — smart watches, goggles, wireless earbuds, wrist bands, and so on. They can broadly be classified into wrist-wear, eyewear, headwear, footwear, neckwear, and bodywear, with applications across lifestyle, consumer electronics, healthcare, defense, advanced textiles, enterprise, and industrial applications.

Today's wearables

- Smart shoes
- Smart shirt
- Smart pants
- Smart bracelet
- Bluetooth key tracker
- GPRS body control
- Smart belt
- Smart watch

Often worn either close or directly on the skin, the smart electronic devices are built with micro-controllers to detect and analyze body signals. The in-built technology then converts these signals into valuable information or biofeedback to the user.

However, the world of smart wearables has even wider applications and is expanding at a huge scale with devices multiplying their computing powers and processing speeds. Increasingly, they are also connectible with the IoT ecosystem, thus poised to take a quantum leap forward through riding on the impending 5G revolution that promises 100 times current 4G speeds.

A growing market

The 2020 global wearables market size is at $ US 37 billion and at a 16% CAGR is poised to grow through the current decade to a whopping $ US 164 billion by 2030 .

Increasing machine-to-machine communication, high growth in connected devices, increasing awareness about the many benefits of wearable electronics, rising disposable incomes, and smartphone penetration are the factors driving this explosive development of wearable products. With the expanding market potential, companies are allocating a high degree of R&D investments into the areas of computing, displays, networking, positioning, batteries, and sensors that are key to further growth.

[1] https://www.techsciresearch.com/news/398-global-smart-wearable-market-to-surpass-usd37-billion-by-2020.html
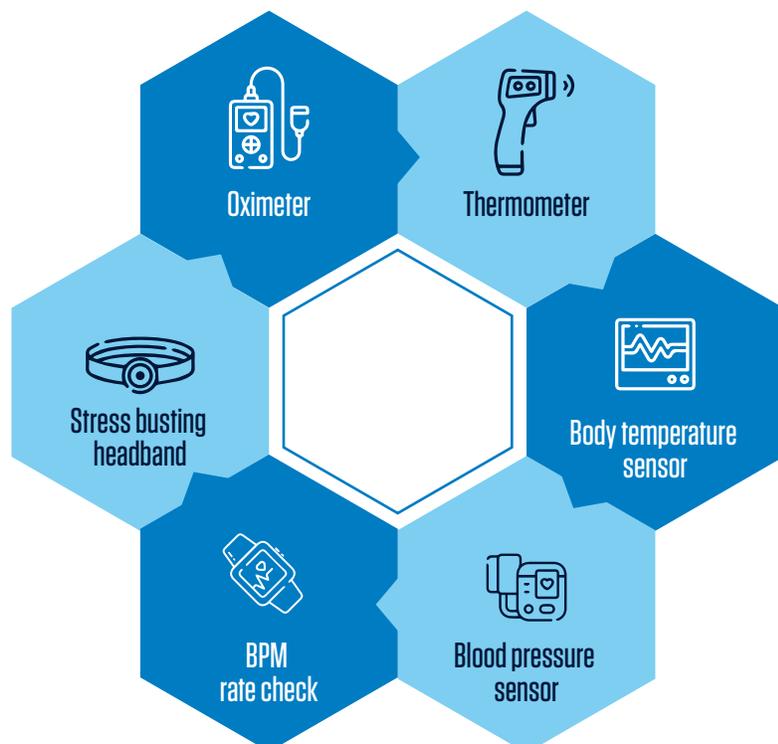
Wearables in healthcare and entertainment

With growing concerns of lifestyle diseases such as obesity and chronic diseases like diabetes, the market has recorded an adoption of wearables such as activity trackers. Also surfacing are wearables that are AI-enabled, can act as a portable dialysis device and offer real-time information such as electrolyte and water loss to athletes.

The advent of technology, especially in healthcare division has further led to an exponential rise in remote health-monitoring as the vitals captured by these wearables are metrics including blood pressure or pulse rate, cholesterol level, sleep intake calorie gained or reduced, and likewise which then can be uploaded onto a server that is accessible by doctors, to avail online or remote consultation through tele-medicine.

Healthcare Industry

Oximeter

Thermometer

Stress busting headband

Body temperature sensor

BPM rate check

Blood pressure sensor

Besides, wearables have gained a strong foothold into the entertainment space as well. Users today have multiple channels to experience digital media. For instance, virtual reality headsets and augmented reality have witnessed an increased adoption, owing to their capability to overlay digital projection onto real-life objects, and simultaneously provide contextual information, allowing users to manipulate their surroundings virtually.
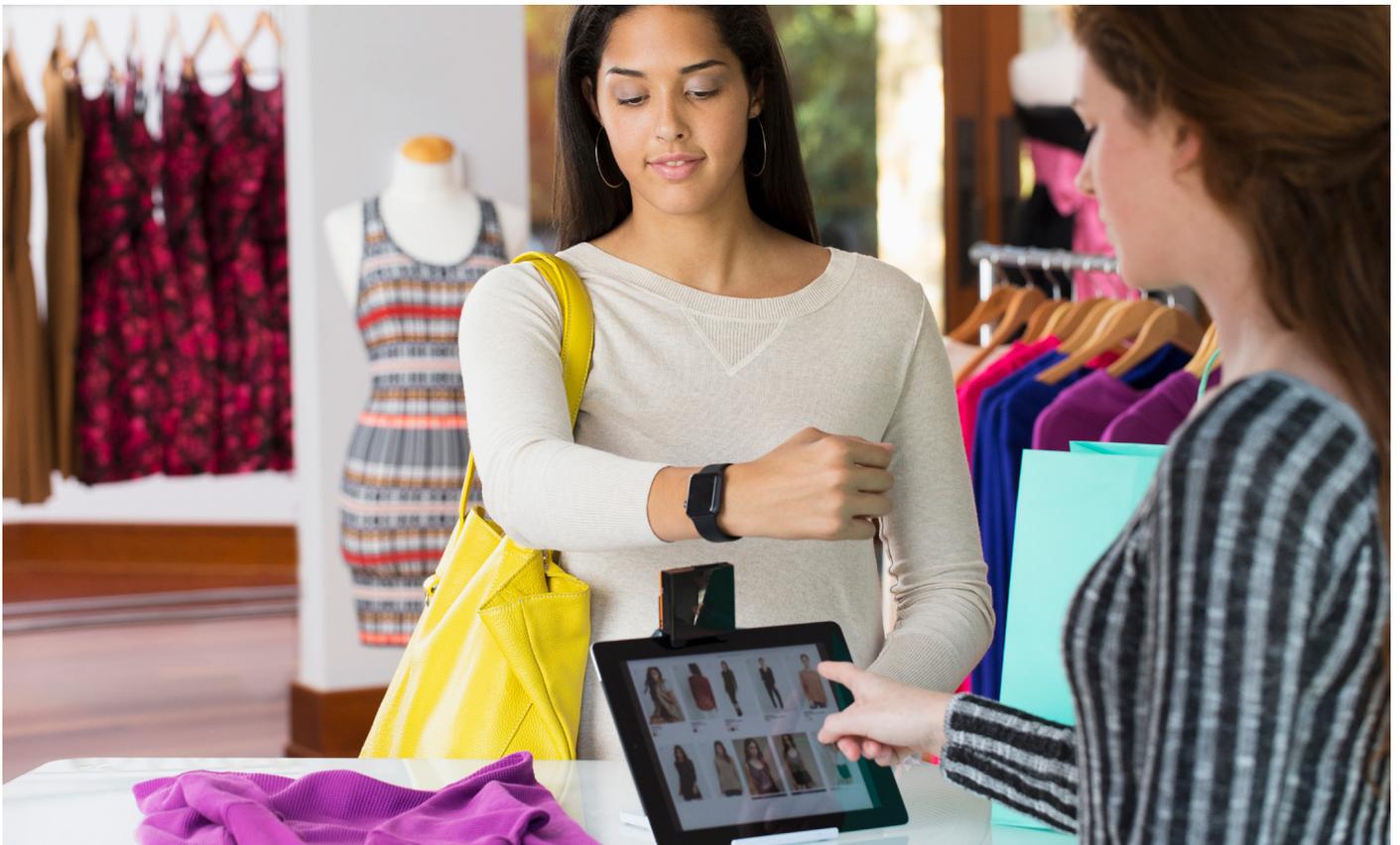
Wearables in the enterprise ecosystem

The man behind the machine continues to play a pivotal role in delivering results in the industry. Today, enterprises have many options to equip their workforce for data based, bias-free decision making in a far quicker and safer manner than ever before. Enterprise oriented wearables can greatly improve the agility of a business and its response time.

Wearables also have the potential to improve the productivity and efficiency of individuals, and consequently of their larger teams. Further, the increased proliferation of wearables has democratized access to information. At the mere touch of a button, a worker deployed in the field in any corner of the world today can access the global ERP database of an enterprise and take critical business decisions in a safe and secured manner.

Wearables in the supply chain

In today's globalized environment, the supplier, manufacturing and customer base of a business can be widely dispersed geographically. Driven by geopolitical compulsions, modern supply chains are under constant pressure to develop and hone capabilities that will enable them to accurately predict, analyze, and respond to ever changing business needs. In this context, access to information and the ability to turn it into actionable intelligence is a key driving force.

Today, a warehouse worker using a barcode or RFID scanner can automatically trigger the flow of information to several databases. This data not only enables easy location and transfer of stock items but also helps system intelligence to listen and analyze the business needs accordingly so that decisions and corresponding actions can be taken instantly. Moreover, advancement in voice recognition technology now allows warehouse workers to interact with the WMS (Warehouse Management System) hands-free and wirelessly, thereby optimizing picking, receiving, putting-away, replenishment, and cycle counting processes.

Further, smart glasses give workers in extremely large warehouses the access to real-time information, providing visual and voice cues on order information and target location. These glasses have navigation features that sense the worker's location in the warehouse to guide them properly and ensure error-free picking.

New Frontiers on Applications

With every advancement in wearables technology, their applications seem limited only by imagination, as innovators continue to discover a variety of new use cases. A recent intervention of wearables in assisting living and senior citizen care is an example of widening horizon of wearables technology. Given the valuable potential of these wearables to produce big data for applications in biomedicine, researchers are directing their efforts to convert the captured data into intelligent algorithms using data mining techniques such as statistical classification and neural networks.

So far, analyzing the wearables-collected biometric data such as heart rate (ECG), brainwave (EEG), and muscle bio-signals (EMG) has helped the researchers derives valuable information in the field of healthcare and wellness. Taking a cue, efforts are channelized to upgrade the wearables with haptic technology to ease navigation for visually impaired.

Also, another emerging field in wearable technology is using epidermal electronics that monitors rates and levels by sensing the outermost layer of skin. These wearables are mounted directly onto the skin to continuously monitor physiological and metabolic processes, both dermal and subdermal. These wireless devices use advanced battery, Bluetooth, and near field communications (NFC) technologies making them convenient, portable, and mechanically invisible.

Also, virtual reality technology is now paving the way for mixed reality headsets. These would be primarily used in the work environment to help provide hands-on experience of complex tasks that are otherwise difficult to replicate in the real world. For example, they can virtually place an aeronautical apprentice inside the fins of a moving aircraft engine to explain the flow of air and its effect on the aircraft performance. Such augmented reality head-mounted displays (AR HMDs) can be used as hands-free tools for business process improvement and training by professionals including engineers, scientists, military personnel, and surgeons.

Gazing into the future

The rapid rate of advancement in wearable technology will be further amplified by rising disposable incomes and the Gen Z desire to stay 'always connected.' The ongoing pandemic is another factor creating widespread needs for better health monitoring, contactless appointments, meetings governed by social distancing norms, and WFH productivity tracking.

The wearables of the future will possess greater accuracy in collating data, faster processing algorithmic speeds, better connectivity by leveraging the power of a 5G enabled IoT environment, as well as higher durability and reliability through ultra-low power management technology to extend battery endurance. These wearables will revolutionize the world as we know it today, by delivering a seamless and enriching consumer experience.

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About the Author

Saurabh Singh

Sr. Domain Principal, Infosys BPM

Saurabh Singh is currently a Sr. Domain Principal in the Sourcing & Procurement Practice at Infosys BPM. In a career spanning over two decades, he has worked in the Electronics, Oil & Gas, 3PL & Express Distribution industries across various geographies besides having served in the Indian Army.

For more information, contact infosysbpm@infosys.com

Infosysbpm.com

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