

Exploring the Usability of Wearable Devices and Sensors in Automotive Industry

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Abstract: *Wearable devices like Google glass have been the buzz word for next generation technologies. Sensors are already included in most of the devices in the market. In this paper I tried to explore the possibilities of deploying these technologies in the automobile industry to increase the productivity during manufacturing, shop floor and also improve the experience of the users.*

Keywords: Wearable Devices, Sensors, Automotive industry, Google Glass, Context Aware

1. Introduction

Wearable devices are in market since a long time, one of the first wearable device is the calculator watch that was released back in 1980s. Since then technology has come a long way. The ever decreasing size of hardware has given birth to more wearable devices. Wearable technology has made standalone devices to become a part of our body, like the Bluetooth headset. In olden days measurements were taken using instruments that are bulky, which heavily rely on mechanical components. The advent of technology and innovations in electronics hardware have made modern day sensors a reality. The outcome is same as the old instruments but with more accuracy and are tiny in size. The size factor has made them a perfect candidate to be integrated into wearable devices. Sensors are a major part of the wearable devices these days.

The combination of different sensors and technologies led to various wearable devices. Most of them aim help people in increasing their productivity and better living standards. The most popular types of wearable devices in today's world are

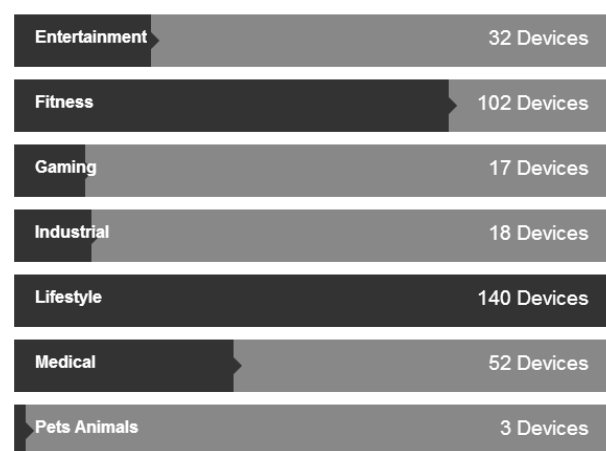
- Smart Watches
- Activity Trackers
- Head Mounted Displays (Near To Eye Displays)

There are also standalone devices that use sensors for recognizing hand gestures and also devices that track eye movements. There are the third kind of devices that are both wearable and which detects gestures.

2. Emerging Market

Since two years there has been a phase shift in wearable devices market. There has been a lot of interest about wearable devices in consumers. Since there is demand, OEM's (Original Equipment Manufacturer) have produced varied devices that cater to different niche markets. There are 233^[4] devices in the market. They have applications ranging from gaming to fitness and from lifestyle to medical. Also, they can be worn anywhere from your feet to head.

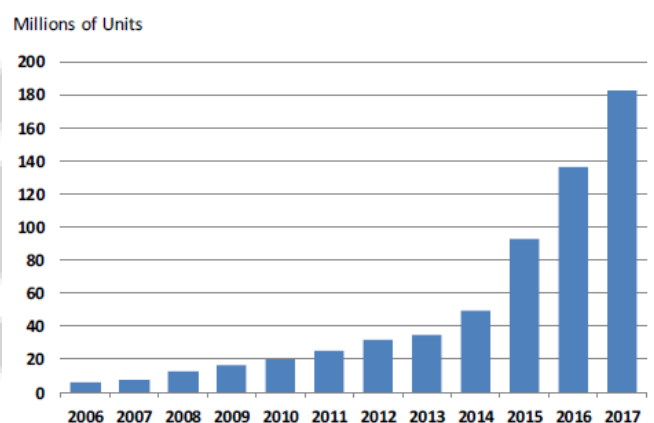
AREAS OF MARKET FOCUS



Note: Some devices fall into more than one category.

Figure 1: Overview of Wearable Devices

Worldwide revenue in 2017 is forecast to reach \$2.3 billion. Cumulatively, over 250 million of wearable fitness devices will ship over the next 5 years.



Source: IHS

Figure 2: Estimated number of devices shipped

3. Automobile Industry

The automobile industry can be broadly classified into 3 categories

Volume 3 Issue 6, June 2014

www.ijsr.net

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- Manufacturing
- Service
- Consumers

The wearable devices can be carefully tailored to meet the requirements of each segment. Some of the important considerations in,

Manufacturing segment:

- Safety
- Accuracy
- Productivity

Service Segment:

- Easier troubleshooting
- Diagnostics
- Less paperwork

Consumer Segment:

- Ease of use
- Comfort
- More features

4. Wearable devices and sensors in automotive industry

During manufacturing, even though most the work is done by robots but there is still manual work left to do. One of them is painting and sanding the car. Workers get exposed to chemicals for extensive periods. Wearable device for monitoring the heart beat and other vitals can be given to the workers and unusual activity of vitals can be recorded, if the behavior has extended the worker can be saved from further damage to their health.

While assembling the car there are a number of times where visual inspection needs to be done for assuring that all the work that the robot/machine has done is according to standards. Devices like Google glass can be deployed along with image recognition and processing capabilities to help the worker in accomplishing the work more accurately. This also increases the productivity of the worker.

Servicing of the car is where there is very less technology deployed. Most of the modern cars have Onboard Diagnostics (OBD) which is Bluetooth enabled. Performance of the car can be monitored in real time. If the OBD is coupled with a data storage, diagnostics and troubleshooting can be performed much easily. Also filling the job sheets manually reduces the productivity. Voice enabled wearable devices can be used to take notes and speech to text engines can decode the data to automatically fill the job sheets which removes the hassle of manual data entry and also increased productivity.

Wearable devices can be made context aware. If the driver is about to fall asleep he can be alerted to stay awake. This can be achieved by having heart rate sensor and other vitals sensors. Navigation can be displayed on a head mounted displays. Real-time traffic data can be included to dynamically route the vehicle. The ambience inside the car can be controlled by taking data from the surrounding

environment of the car. Gesture detecting devices like LEAP can be incorporated into the dashboard to easily control the entertainment and other integrated systems.

5. Conclusion

This paper explored the possibility of using wearable devices in different sectors in automotive industry. Implementing the discussed technologies will be an advantage both for the companies and the customers. Increased productivity levels will make it financially feasible for both customers and companies to invest and develop new technologies. Also the turnaround time will be reduced in both manufacturing and service segments.

6. Future Scope

Only a few devices have been explored and there are many devices that are in the market that can be aligned to automotive industry. Devices are broadly categorized in this paper but each device has its own specialty. Each device has to be individually studied and use case scenarios have to be identified. Usability study needs to be done after implementing and deploying the technologies in real world scenarios.

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