

Wearable Technology and Extended Applications

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Abstract— We are living in the turbulent flow of technology, which increases exponentially with every second we live. Technology has made our life ease, effective and enables us to do something we always dreamed of. Wearable Technology is the next step that is taken towards the next generation interaction with new modules and future designed gadgets that works with much efficiency, flexibility, accuracy and can perform various complex operation with ease. Wearable technologies are adding more layers to our life by increasing the ways we communicate and share information with each other. The continuity of these devices creates a continuous link between people that they can relate to each other. Wearable Technology is aimed to provide the real time interaction with new evolving mobile widgets and gadgets. We would see how this technology will overcome the limitations of the existing mobile gadgets and bring it to the new extended level in compare to current scenario. Wearable Technology is new technological revolution that would create a world faster reliable and secure data transmission network. We would analysis the capability, expandability and limitations of it.

Keywords- *Wearable Technology, Wearables, Wearable devices, Wearable Gadgets*

I. INTRODUCTION

We are living in the era where not only Desktop Computers or Laptops are getting smaller and compact but also the actual work that is done on the them. The main reason behind that is the evolving mobile and wearable technology. Humans are creators so why stop even if you are at the peak of the hand-held devices. We need more than the current mobile technology. This is why all the research, production and marketing of the Wearable Products got the push. The word “Wearables”, “Wearable Technology” or “Wearable Devices” represents the range of electronic devices that can be worn by user for having mainly hands free interaction and mobile computing. These devices can be as powerful as your laptops, computers or mobile phones and compact as the wrist watch. Wearable devices can easily take on the hand-held devices in upcoming future. Wearable Technology is much more flexible than the hand-held devices. The interaction that take place between the user and wearable device is of very different kind. Wearables are always ready to use.

Wearable Gadgets are very personal devices. Wearables can not only collect all the personal information of the user such as our current location that can be used for navigation purposes or managing the social network or photos, videos, etc., but they can also be used to keep track on our physical body parameters such blood pressure, ECG, Medical Data. Wearable devices are always power compatible and are accessible to the user in very effectively and user friendly manner. Wearables can easily be controlled by the user.

We use existing infrastructure of the computing technology that also involves the wired and wireless communication techniques to build a Wearable Gadget that is smart enough to perform varies tasks. Wearable Gadgets are basically the mini wearable computer that performs dedicated tasks. Wearable Technology is not a new technology as it origins back in 1970s -1980s where the most famous Calculator Watch was Developed. The most intimating thing to observe is that the evolution happens in Wearables since then is magnificent and we humans have not stopped here as were are still coming up with various wearables gadgets that never imagined before.

II. ARCHITECTURE

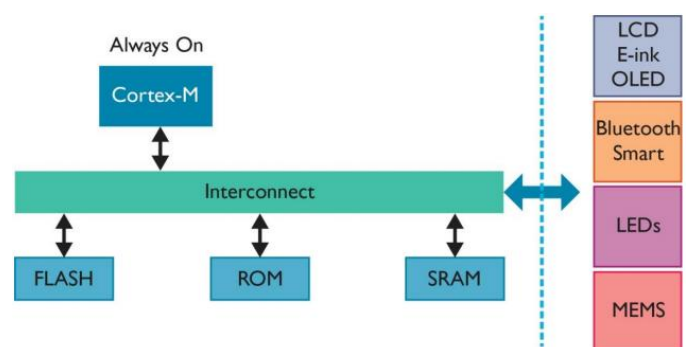


Figure 1: Basic Device Architecture

Wearables are dedicated task devices therefore there is no defined architecture that is all wearable gadget uses. Every time, as per requirement a new architecture is introduced. Figure 1 introduces that basic architecture of a Wearable that

user Cortex M Processor that uses the Smart Bluetooth technology to connect with the host computer.

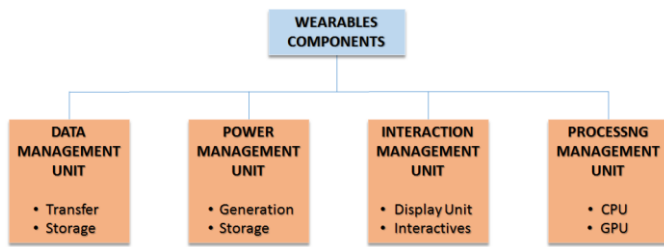


Figure 2: Basic Components of Wearables

In Wearables includes many important components that are Data Management unit, Power Management Unit and Interaction Management Unit and Processing Unit. Figure 2 represents all the important components of a basic Wearable Gadget. Data Management Unit is responsible for managing the flow of data that take place. It controls all the data transaction take place in Wearables. Power Management unit is responsible for managing and controlling the power for the wearables. Interaction Management Unit is responsible for managing controlling all the interactive parts (i.e. Display, Touch and/or Buttons) of a wearable. Processing Unit involves computing units like CPU (and/or GPU - optional).

III. FEATURE OF WEARABLE TECHNOLOGY

Wearables were designed to behave like a mini hand held portable computer that can perform many task as per requirement of the end user. Many features can be added to it and many undesired features were removed in current wearables. Following, we are going to discuss the various characteristics of wearable technology that makes them more efficient, desirable amazing smart human technology:

- A. *Consistency*: The wearable gadgets run continuously until. Therefore, they are flexible and user friendly. The data flow takes place directionally between human and wearable gadgets.
- B. *Convenient*: Wearable technology is of the highest convenience to the user. Great comfort can be offered if right person uses at right place and at right time. Also it increases the utility and comfort.
- C. *Privacy*: a new level of privacy can be achieved using Wearable gadgets. Wearables are very private devices so the privacy is must.
- D. *Multitasking*: wearables are hands free technology so they do not restrict the wearer to only one task. This is a very important feature over the hand-held devices.

IV. ADVANTAGES

Wearables are an innovative innovation and Wearable Techs are attractive concept. We are already using these smart wearable gadgets as our beloved smart watch or our smart

glass. Imagining that our smart watch has the power of our smart phone is actually would not be fictional now. This is not the end these is just the beginning of wearable technology. It is evolving day by day. Following we are going to discuss the advantages of the Wearable technology:

a) *Faster*

You have to plan for the use of some applications before the actual use. But in wearable technology immediate response is provided by the gadget itself. You don't have to waste your time to open an app from your smart phone. You even don't have to unlock it between use.

b) *Stay Connected*

wearable technology is worn on the body so most of the time those devices are on, and functioning at full scale. Fitness bands are recording your data continuously irrespective of your exercise. Also the gadgets like your smart watch are connected to your smart phone ready for your order any instant.

c) *Stay Fashionable*

A buyer of a wearable gadget considers the looks of his device as strongly as the other capabilities such as power or usability. Tech companies also want their device to be smaller, lighter, sleeker, and more beautiful. If these items do not look as good as they should their appeal will become less. Wearable devices look so good that sooner they will be the part of your accessories. Also the wearable jewelry is a wearable device that is made to look good along with its function.

V. DISADVANTAGES

Since every coin has its two side, therefore this expandable, flexible and fabulous technology has disadvantages as well.

Following are the possible disadvantages that may become hurdle to this gigantic tech:

a) *Smaller*

Most of the wearables devices are smaller than your regular hand-held devices. Also no one wants to wear a smart watch as big as your smartphone. Smaller size may make things difficult for you.

b) *Not Yet Globally Accepted*

Acceptance of this technology will take time. As much as people will see it they will get used to it. Currently wearable gadgets are not much accepted by the society. So if you see a nerd wearing a smart glass don't be surprised.

c) *Radiation*

Radiation is electromagnetic energy that can harm users or human beings. Shorter the distance of communication less is the power of electromagnetic energy that is why wearable devices are less harmful than cell phones.

d) *Overheat*

Wearable devices are smaller so keeping them cool is difficult task. Smart watches, wristbands and head-up devices are having the highest possibility to get overheated and harmful to wearer.

VI. APPLICATIONS

The use of wearable devices can be done in lot of fields such as fitness, sports, medical, fashion, apparel, gaming, recreation, defense, security, industry. The application of wearables is very useful where remote and hands-free data collection is required. For almost every part of the body wearables can be used or van be created.

TABLE I. APPLICATION AND DEVICE

Application	Device
Military and Industrial	Head-Up Display, Ultra-Rugged Wearable PC Smart Clothing/Fabrication Hand-Worn Terminals
Infotainment	Smart glasses Smart Watches Bluetooth Headsets Wearable Virtual Projectors
Medical and Health	Blood pressure Monitors ECG monitors ECG monitors blood pressure monitors Insulin pumps Patches Hearing aids Glucose Monitoring
Fitness and Wellness	Activity trackers Sleep sensors Fitness and heart rate monitors Emotional Measurements Smart Clothing

A. *Military and industrial:* Key of success in military campaigns is technology. The applications of wearables technology for military are also as useful as medical industries. Wearables can provide the real time tactical information to the soldiers or then base camps. Safety, productivity and efficiency are the goal for the wearables in industries. Many workers need their one or both hands for their task, also eye contact is very important for safety. Wearable gadgets because of their hands free interaction are very useful in the industries.

- 1) *Military and industrial applications:*
 - a) *Safety issues*
 - b) *Quality of product*
 - c) *Improving aiming capabilities*
 - d) *Monitoring the physical state*
 - e) *Communication*

B. *Infotainment:* Virtual reality can be easily achieved using wearable technology. head-up devices and smart watches will be playing major role in the infotainment. Multimedia such as songs, videos, photos can be accessed easily using wearable gadgets. Quality if service (Qos) is important factor in infotainment.

- 1) *Infotainment applications:*
 - a) *Game recreation*
 - b) *Sensor based gestures*
 - c) *Smart headphones*
 - d) *Virtual reality*

C. *fitness and wellness:* Wearables will play a very transformative roll in the fitness, wellness and other medical applications in these areas hands free data collection can be a key to these areas.

- 1) *Fitness and wellness applications:*
 - a) *Electroencephalography (ECG)*
 - b) *Performance enhancements*
 - c) *Smart training*

D. *Medical and health:* wearable technology is more successful in medical and health application than any their field. data gathering is very important in terms of health and medical areas. Remote data gathering can perform a key role in these sector. Data generated by the wearable can be viewed in real time or downloaded using internet for analysis.

- 1) *Medical and health applications:*
 - a) *Skin temperature*
 - b) *Pain relief*
 - c) *Smart lens*
 - d) *Insulin pump therapy*
 - e) *Hands free sterile environment*
 - f) *Electroencephalography (EEG)*

VII. CONCLUSION AND FUTURE SCOPE

In this paper we understand all the aspects of Wearable Technology and including their extended applications for betterment of human effort. Wearables are not much widely recognized technology but soon it will overtake the current hand-held devices dominated world. Currently, all the applications of wearable devices are limited to the humans and to domestic animal to some extent only but in future we can create the wearables that can be used for whole animal kingdom including aquatic and non-aquatic living organism. Also we can keep an eye on our environment by creating wearables for trees. In last five years, use of tablets or phablets have increased. Even the children (aged below 16)

are using them. This results that many schools, organizations are giving the tablets to students for education and exploration purpose. This is how wearables can gain publicity in market or society.

This is the era of multidisciplinary studies and innovations. Therefore, there would be no wonder if in the nearby future, we humans, come up with wearables that involves power of various disciplines like biotechnology and nanotechnology together. Then we would see that Wearables and their applications have extended towards the new horizon of Devices and Technology in Medicals, Military and Industrial Applications.

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