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DIGITAL JEWELRY

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ABSTRACT

The latest computer craze has been to be able to wear wireless computers. The Computer Fashion Wave, "Digital Jewelry" looks to be the next sizzling fashion trend of the Technological wave. The combination of shrinking computer devices and increasing computer power has allowed several Companies to begin producing fashion jewelry with embedded intelligence. Today's, manufacturers place millions of transistors on a microchip, which can be used to make small devices that store tons of digital data.. The whole concept behind this is to be able to communicate to others by means of wireless appliances. The other key factor of this concept market is to stay fashionable at the same time.

KEYWORDS: Digital Jewelry, Portable Devices, Miniature, Wearable Computer, Java Ring

INTRODUCTION

The emergence of the digital jewellery is marking the commencement of the breaking down of personal computer and even mobile phone into tiny pieces which is called micro-devices that will soon be used by people to adorn themselves. The digital jewelry will soon eliminate the sitting down of computer on one's desk or inside one's bag or pocket but rather, it will be worn on the body. This paper reveals the concept and the idea behind the digital jewelry by showcasing other miniature devices that could be worn. These miniature or small devices are called wearable computers. The definitions, history, advantages, and limitation of these portable devices were mentioned. The paper also explains the different components of digital jewelry (both the internal and the external components) and how it works. Finally, Java Ring and IBM Magic decoder ring were examined as some other types of digital jewelry. By the end of the decade, we could be wearing our computers instead of sitting in front of them.

WHAT IS DIGITAL JEWELRY

A digital jewelry is a fashionable jewelry that has an implanted intelligence which assists to store personal information like passwords, identification number, account information etc. It has the potential to be all-in-one replacements for driver's license, business cards, credit cards, health insurance card, and corporate security badge etc. They can also solve a common dilemma of today's wired world – the forgotten password. The changes in technology have brought about many miniature devices which allow people to do things with ease.

HISTORY OF WEARABLE COMPUTER

The described the history of wearable computer and dated it to 16th century when pocket watch was invented. The advent of some sophisticated software brought a tremendous various types of wearable computers at this age. Some group called and known as Eudaemonic Enterprises used a CMOS 6502 microprocessor with 5K RAM to create a shoe-computer with inductive radio communications in 1970. Another early wearable system was a camera-to-tactile vest for the blind, published by C.C. Collins in 1977. It converted images into a 1024-point, 10- inch square tactile grid on a vest. In 1981 Steve Mann built a backpack-mounted 6502-based computer to control flashbulbs, cameras and other photographic systems. In 1989 Reflection Technology marketed the Private Eye head mounted display which scanned a vertical array of Light Emitting Diodes (LED) across the visual field using a vibrating mirror. In 1994, Edgar Matias and Mike Ruicci of the University of Toronto invented wrist computer. Their wrist computer presented an alternative approach to the emerging head-up display plus chord keyboard wearable. The system was built from a modified HP 95LX palmtop computer and a Half-QWERTY one-handed keyboard. In 2002, as part of Kevin Warwick's Project Cyborg, Warwick's wife, Irena wore a necklace which was electronically linked to Warwick's nervous system via an implanted electrode array. The color of the necklace changed between red and blue depending on the signals on Warwick's nervous system. International Journal of Life Science and Engineering Vol. 1, No. 2, 2015, pp. 33-38 35

COMPONENTS

The various components that are inside a cell phone: Microphone, Receiver, Touch pad, Display, Circuit board, Antenna, and Battery.

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IBM has developed a prototype of a cell phone that consists of several pieces of digital jewelry that will work together wirelessly, possibly with Blue tooth wireless technology, to perform the functions of the above components.

Fig1. Cell phones may one day be comprised of digital accessories that Work together through wireless connections. Here are the pieces of computerized-jewelry phone and their functions:

Earrings - Speakers embedded into these earrings will be the phone's receiver.

Necklace - Users will talk into the necklace's embedded microphone.

Ring - Perhaps the most interesting piece of the phone, this "magic decoder ring" is equipped with light-emitting diodes (LEDs) that flash to indicate an incoming call. It can also be programmed to flash different colors to identify a particular caller or indicate the importance of a call.

Bracelet - Equipped with a video graphics array (VGA) display, this wrist display could also be used as a caller identifier that flashes the name and phone number of the caller.

With a jewelry phone, the keypad and dialing function could be integrated into the bracelet, or else dumped altogether -- it's likely that voice-recognition software will be used to make calls, a capability that is already commonplace in many of today's cell phones. Simply say the name of the person you want to call and the phone will dial that person. IBM is also working on a miniature rechargeable battery to power these components. IBM's magic decoder rings

The same ring that flashes for phone calls could also inform you that e-mail is piling up in your inbox. This flashing alert could also indicate the urgency of the e-mail. The mouse-ring that IBM is developing will use the company's Track Point technology to wirelessly move the cursor on a computer-monitor display. (Track Point is the little button embedded in the keyboard of some laptops). IBM Researchers have transferred Track Point technology to a ring, which looks something like a black-pearl ring. On top of the ring is a little black ball that users will swivel to move the cursor, in the same way that the Track Point button on a laptop is used.

This Track Point ring will be very valuable when monitors shrink to the size of watch face. In the coming age of ubiquitous computing, displays will no longer be tied to desktops or wall screens. Instead, you'll wear the display like a pair of sunglasses or a bracelet. Researchers are overcoming several obstacles facing these new wearable displays, the most important of which is the readability of information displayed on these tiny devices.

ADVANCEMENTS

The advancement in technology has brought about small, portable, miniature and ubiquitous devices that are worn either outside or inside the body. The combination of shrinking computer devices and increasing computer power has allowed several companies to begin producing fashion jewelry with embedded intelligence. This is the beginning of the disintegration of the personal computer into tiny pieces, and new micro devices that would soon be adorning on human body, and how they will make daily communication and computing even more ubiquitous. There are different types of wearable devices that are commonly used. Such devices include: eyeglasses, wristwatch, wearable radio, digital jewelry, etc. These ubiquitous mobile devices are portable devices usually worn on the body or inserted under the skin. They are fabricated- based upon light emitting and organic computer devices can be formed in surface or products like clothes, curtains and other non-conducting materials (Wikipedia, 2014). Digital Jewelry is one of the newly emerging areas of wearable computer. It is a broken up of some of the components in the cell phone which is re- packaged as a piece of digital jewelry. The components in the cell phone which include Microphone, Receiver, Touch Pad, Display, Circuit Board, Antenna, and Battery form each piece of digital jewelry and it works just like cell phone.

WHAT IS WEARABLE COMPUTER

A wearable computer is a miniature electronic device that is worn by the user under or on top of clothing (Wikipedia, 2011). It is a form of human-computer interaction that is capable of been worn, available and collaborative to the user always. It is a ubiquitous device that is always with the user which allows the user to enter commands and to do other activities without hindrance (Mann, 1998). It is a small and light device that is capable enough to be worn on one's body without causing discomfort.

ELECTROMAGNETIC BEADS

The closest comparison to this model is that of 'beads' which are strung together to make a custom necklace or bracelet, with interchangeable electromagnetic component systems or devices. One bead may be a capacitor on the inside, and a solar panel on the outside. Another bead may have an internal resistor which feed power into a programmed microcontroller bead which drives an external screen, with other options available in a variety of bead configurations which compose a circuit, including beads with a piezo element, voltage regulator, crystal, or



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rechargeable battery as part of the modular jewel circuit. The number of data pins on the microcontroller needs to be enough to easily program the display layer plus the switches without overly complex and advanced coding methods.

FEATURES OF DIGITAL JEWELRY

There are many features that distinguish wearable computers from other computers like Laptops, Desktops, PDA etc. Some of the features were enumerated by Mann (1998) are listed below:

1. **Portability:** One of the most distinguishing features of a wearable computer is that it can be used while walking or moving around because of its small size. This particular feature distinguishes wearable computer from desktop computer or other smaller computers like laptop computers.
2. **Sensors:** In addition to user inputs, a wearable computer should have sensors for its physical environment. Such sensors might include wireless communications, cameras, or microphones.
3. **Always on:** By default a wearable is always on and working, sensing, and acting. This is opposed to the normal use of pen-based PDA, which normally sits in one's pocket and needs to be woken when need arises. It is constantly available to the user – always on, ready and accessible
4. **User Attention-Free:** Shall not require the constant user attention or interaction. You can attend to other matters while using the device. It is unobtrusive and unrestrictive to the user. The user shall be able to walk around or ride in a crowded bus. You can do other things while using it.
5. **Communication:** Always communicate with user within reasonable time limits. It can communicate to other systems & external world.

Advantages of Wearable Computer

1. **Freedom from desk.** A wearable computer is a wireless device. Of course, it may have connection or similar, but it should not depend on external devices.
2. **Always connected to the Internet and/or reference materials.**
3. **Immediately usable.** No need to get it from bag or pocket and/or turn it on.

DISADVANTAGES

Despite the numerous benefits given by the Mobile Devices, there are limitations. The under listed points are few mentioned by Ojo and Ajose (2014) as some of the disadvantages pose by any ubiquitous devices.

1. **Health Hazard:** The health hazard poses by the mobile devices can never be over-emphasized. It ranges from eyes strain, finger strain, to the development of mental disorder if not cautiously used.
2. **Human Interface with Devices:** The small screen or keyboard provided by some portable devices make it more hard to use, while the alternative input methods (Speech or handwriting recognition) by some other portable devices require training.
3. **Cost of Acquiring:** The huge cost needed to purchase some of this wearable computer is beyond reach.

METHODOLOGY

Different companies, manufacturers and even individuals have designed different digital jewelries that ranges from necklace even to the ring. Different designed and concepts have been explored to feature all these jewelries.



Java Ring

The Java ring which is programmed with Java applets will communicate with host applications on networked systems (Bonsor, 2015). The applet which is a small program designed to run within another is built in the Java ring. The Blue Dot Receptor which is used to allow communication between host system and the Ring captures the information stored inside the Ring. The ring is made with a stainless steel of 16 millimeters in diameter with about 1 million transistor processor called iButton. Java Ring has 134KB of RAM, 32 KB of ROM, Java Virtual Machine with a software that recognizes Java language which will display it on the user's system. (Bonsor, 2015). At Celebration School where the Java Ring was first launched, the Ring has been programmed to store different numbers of things like cash to pay for lunches, to take attendance, store a student's medical information etc. all this information is stored when the students press the signet of their Java Ring International Journal of Life Science and Engineering Vol. 1, No. 2, 2015, pp. 33-38 37 against the Blue Dot Receptor while the system connects to the receptor performs the function that the applet instructs it.

JAVA FUNCTIONALITIES

1. Runs Java better because of the enhanced Java Card 2.0 embedded in the Ring.
2. Careful attention to physical security
3. Durability to stand up to everyday use without building problems.
4. High memory capacity: There is high memory which is up to 134K bytes NV SRAM to store information.

IBM RING

The IBM Magic Decoder Ring is a mouse ring which IBM is developing that will use the IBM TrackPoint technology like the one embedded in the laptop keyboard to wirelessly move the cursor on a computer monitor. The TrackPoint has been built into a ring which looks like a black pearl ring. There is a little black ball on top of the ring that the user will rotate or turn around to move the cursor.

KEYNOTES

The rapid use of these portable technologies and their multiple functionalities in assisting people to engage with other useful activities have made the technology a versatile tool for learning and leisure purposes.



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Various studies have investigated the potential of miniature devices for ubiquitous learning systems, leisure and confirming their effectiveness and how they have impact on lives and other areas of human endeavor.

SUMMARY AND CONCLUSION

The concept behind digital jewelry is to have a smart devices that are wireless and always on while remaining attractive to people. It is a broken up pieces of the components inside the mobile phone which are repackaged as a jewelry that can be worn about. This fundamental idea will later resolve into total elimination of computer on one's desk or inside one's pocket but lead to situation where computer will be worn on the body. Although, there are numerous features of a wearable computer which digital jewelry is no exception but the limitations pose by these miniature devices still serve as the set back. Conclusively, we are gradually moving to the fifth generation computers where portable, small and miniature devices will be part of people's dressing. However, this small computing devices offer limited interaction capabilities, compared to a computer or even a phone. This is due to their lack of display, or its limited size as observed by Perrault, et al.

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