A Study on Emergence of Digital Jewelry

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Abstract- *Wireless networking technology has been a very significant breakthrough in this rapidly advancing world which frees us from the use of wires and has made the process of communication more comfortable and convenient. In the present, era of computer networking, mobile computing has emerged to an unimaginable extent and yet at times it becomes difficult to carry it. This gives way for breaking ground the next era of computing.The combination of microcomputer devices and increasing computer power has made the evolution of fashion jewelry, with embedded intelligence i.e., Digital jewelry.Now a days, all the devices we use are protected by passwords. It is very difficult to remember all the passwords. Digital jewelry is like wearable ID devices that contain personal information like passwords, identification, and account information. It can be your Personal Assistant that remembers everything you till it to*.

The concept behind this is to communicate by wireless means and stay fashionable at the same time. This paper specifies the concepts, features, components, examples of the various advancements in this field till date.

Keywords- Digital Jewelry, Portable Devices, Wireless communication, Miniature, WearableComputer, Java Ring.

I. INTRODUCTION

Many miniature devices have been invented and are rapidly developing in today's era of computer technology, which have simplified many of the day to day tasks and activities and is becoming trendy for people. The latest technology craze is to be able to wear wireless computers such as smart watches, wearable biosensors, etc.

The rapid use of this portable technology and its multiple functionalities in assisting people to engage with other useful activities have made Digital Jewelry a versatile tool for learning and leisure purposes. The Digital Jewelry seems to be the next sizzling fashion trend.

In today's world, manufactures can place lots of transistors on a single microchip and this can be used to make small devices which can store tons of data. Digital Jewelry appears to be one of the upcoming and emerging areas of the wearable computer. Imagine you will be able to email or text your boss just by talking into your necklace. The world will be wireless and hand free.

The dynamism of technology has brought about numerous portable devices ranging from Micro, Super-Micro, Lap, Pad, Tab to the skin and there seem to be no perfect technology for students, workers, and people at large and thus keeps rapidly advancing.

Digital Jewelry is nothing but the re-packaging of some of the components present in the cell phone. The components that form each piece of Digital Jewelry, include Microphone, Receiver, Touch Pad, Display, Circuit Board, Antenna, and Battery and they have the functionalities similar to that of a cell phone.

A. WEARABLE COMPUTER (WEAR COMP)

A wearable computer is a miniature electronic device that is worn by the user under or on top of clothing. 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. It is a device which is small and light enough to be worn on the human body with ease and comfort while parallel providing all its functionalities. It is a device that is incorporated into a person's apparel or personal accessories and is capable of storing and processing data.

B. DIGITAL JEWELRY

Digital Jewelry is small electronic devices that are designed as fashion jewelry and are embedded with intelligence.

These facilitate in storing important personal information such as identification number, passwords, account information, etc. Today, each individual has numerous passwords to remember. This issue can be solved by the use of Digital Jewelry. It has the capability to be an all-in-one replacement for documents and information such as credit cards, business cards, driver's license, corporate security badges, etc.

Fig 1.Digital Pendent

II. HOW THE TECHNOLOGY WORK

Worldwide, various individuals, manufacturers and companies have designed and developed various digital jewelry that range from bracelets to rings and necklaces.

The main idea of digital jewelry is to divide the different components inside a cell phone such as Battery, Circuit Board, Antenna, Display, Microphone, Camera, Reciever, etc. and repackage them in such a way so as to form a fashion jewelry that the user can wear it and it also performs its functionalities effectively and efficiently. Each piece of jewelry will contain a piece of the components found in a mobile phone. In all, the digital-jewelry cell phone should work just like a conventional cell phone.

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

III. 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** – 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.

Fig 2. Digital Jewelry

A. COMPONENTS OF DIGITAL JEWELRY:

The components include:

- **Earrings** - Its design is such that, the speakers will be embedded into the earrings and will serve as the phone's receiver. Various companies worldwide are developing technologies such as pendants and earrings that serve the functionality of Bluetooth devices which the user can wear as jewelry and at the same time help enhance their devices.
- **Necklace** – Microphones are embedded into necklaces which the users will talk into using the assistance of voice recognition software that is embedded into it.

Fig 3. Digital Necklace

- **Ring** – The rings have light-emitting diodes (LEDs) embedded into them that flash to indicate an incoming call. Different flash colours to identify different callers or indicate an important caller can also be programmed.
- **Bracelet** – This device can be used as a wrist display and can also be used as a caller. It has a video graphics array (VGA) equipped into it for display.

B. HOW DIGITAL JEWELRY WORKS AND ITS INTERNAL COMPONENTS:

The keypad and dialing functionalities are integrated into the digital bracelet. To make any calls, the voice-recognition software will be used. If you say aloud the name of the contact you would like to call, the cell phone will auto dial that number. Users can then talk into the microphone that is embedded in the digital necklace. The information transfer is done in the form of signals, the sensors embedded in these devices help in the information transmission through a wireless technology. If the user receives a phone call, he/she can identify it when the digital ring flashes. A user is also notified when he/she receives an email. The ring, bracelet are all inbuilt with a rechargeable battery and they can be also set to vibrate to indicate an incoming call. International Business Machines Corporation, an American company has developed a working prototype of a cell phone. It consists of various components of digital jewelry that will work together in coordination with the help of wireless Bluetooth technology. To power these components, IBM also develops small rechargeable batteries.

C. JAVA RING:

Fig 4. JAVA Ring

The Java ring which is programmed with Java applets will communicate with host applications on networked systems (Bonsor, 2015). The applet is a small program that is written in Java or any other programming language and is built in the Java ring.

The Blue Dot Receptor is a device that facilitates the host system to communicate with the ring and store into it the captured information. The material which is used to manufacture the ring is stainless steel and its dimensions include: diameter of 16 millimeter and it also has anButton which is a transistor processor. The memory and system specifications of a Java Ring are: Java Virtual Machine software, 134KB of RAM and 32KB of ROM.

Fig 5. Blue Dot Receptor

The Java Ring was first launched at the Celebration School. The Ring has been designed and programmed so as to store different information such as a student's medical records, attendance, and money for various expenditures such as lunches. When a student presses the signet of his/her ring, all this information is stored.

D. IBM RING:

Fig 6. IBM Ring

The American company International Business Machines Corporation (IBM) is developing a device named IBM Magic Decoder Ring, which is a mouse ring that will use the company's IBM Track Point technology. The Track Point Technology is the one used to track the position of a cursor on the laptop keyboard.

This technology is built into the ring and appears as a black pearl ring. To rotate and turn around the cursor, the ring has a black ball on its top.

Fig 7. Digital Ring

The same ring that flashes for phone calls can also inform you that e-mail is piling up in your inbox. This flashing alert could also indicate the urgency of the e-mail.

D. GARNET RING:

Fig 8. Garnet Ring

This ring contains a microprocessor. It vibrates to let you know that you have received a message

E. TECHNICAL SPECIFICATIONS OF DIGITAL JEWELRY:

Digital jewelry devices consist of a screen or display for information display, most likely consisting of 7-16-segment, or dot matrix LEDs, LCDs, or other technologies such as electroluminescent material (EL) or others, which could become an optional display. So too, an audiovisual or other 'display' could consist of a speaker, a single flashing light, a sensor of some kind (such as a temperature driven EL display), or other informational aesthetic. The display layer sits on a face of the device, which is enclosed in some material such as plastic, metal, crystal, or other material. It has external switches and buttons on its side and a data-port for accessing the programmable electronic circuit inside. A micro controller that is a surface mounted device (SMD) on a printed circuit board (PCB) with resistors (R) and capacitors (C) are the internal 'guts' of the jewelry.

F. DISPLAY TECHNOLOGIES:

The digital jewelry display, for instance, every alphabet and number system has found representation within the electronics realm and 'dot-matrix' (a matrix of single LEDs) is used to display Chinese and Japanese and other character sets, as can the alternative display for LCDs (liquid-crystal-displays) also be used, as often found in watches.

Digital Jewelry can be made in many different sizes and shapes with a variety of materials ranging from plastic to metal to rubber and glass. They utilize electromagnetic properties and electronics to display information through a screen or display of some kind. This could range from LED 7-segment, 16-segment, dot matrix, and other programmable LEDs devices to LCDs, OLEDs, and other displays, which are all driven by the self-contained jewelry devices themselves.

G. 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 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

Fig 9. Bracelet with Electromagnetic Beads

IV. FEATURES AND ADVANTAGES

A. FEATURES OF DIGITAL JEWELRY:

There are many significant and unique features of Digital Jewelry, some of which are listed below:

- Portability: The ability to use wearable computer while walking or moving around because of its small size is one of its most paramount
- Sensors: Wearable computers must have sensors for its physical environment in addition to the user inputs.Such sensors may include cameras, microphones or wireless communication.
- User Attention-Free: Other matters can be attended to while using this device and it does not require attention or interaction from the user constantly. It is unrestrictive and unobtrusive to the user. The user will be able to perform daily chores, walk around or ride a crowded bus.
- Communication: These devices can communicate to other systems and the external world. They can communicate with the user within reasonable limits of time.

B. ADVANATAGES OF WEARABLE COMPUTER:

- A wearable computer is a wireless device and hence gives freedom from desk.
- Always connected to the Internet and/or reference materials.
- It is available immediately and there it is not required to remove it from the bag and to turn it on.

V. CONCLUSION

This paper focuses on the upcoming technology of Digital Jewelry. The main concept of the digital jewelry is to have wireless miniature devices that can be used as daily fashion apparel and provide its functionality while remaining attractive.

Whilst wearable computers provide various paramount features of which digital jewelry is no exception, a major setback of these devices are its various limitations. Today, as we are constantly approaching towards the fifth generation of computers which are small and portable devices and can be used as a part of everyone's daily apparel. But along with the advantages also come the limitations of limited capabilities of interactions due to their lack of display, or its small size as compared to a laptop or a mobile phone.

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