



## Digital Jewelry: An Upcoming Technology

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**Abstract:** As we all know, jewelry is fascinating and attractive to everyone. But in today's generation, we all are surrounded by a great hub of digital things. We are affected by these technologies. So, researchers take a small step toward filling the gap between technology and today's fashion. They combined both the things and added a few other technologies, like a microphone. The primary purpose behind creating this type of digital jewelry is to make communication faster. Several different concepts are there the sometimes it is also good to stay trendy and cool and seem so classy. Digital jewelry is jewelry with embedded intelligence. It has an all-in-one replacement technique in it. This paper has some other miniature devices in it. A wearable computer is the beginning of something that prevents us from

sitting in front of a computer desktop. This paper will focus on enhancing its charging concept and securing its data.

**Keywords:** *Fashion Technology, Wearable Computer, Embedded Intelligence, Microchip, Communication, Digital jewelry.*

### Introduction:

Jewelry with artificial intelligence is called digital jewelry. Nowadays, it has become trendy in today's fashion. It can be used for detective views, furnishes security, and is a computing machine. It looks like fashionable jewelry like a bracelet, necklace, ring, or earrings. It works like a computer or phone and is stylish simultaneously [1]. In the coming generation of computing, there will be a sudden release of computer components across our bodies rather than on our desks. Generally, the jewelry decorates the body, and at present, researchers are looking to transform the way people think about the beads and bobbles that the people wear.

The idea behind digital jewelry is to exchange information with others through wireless appliances and be stylish at the same time. With the development of

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digital jewelry at the end of the decade, people will be wearing computers instead of sitting in front of them.

Combining microcomputers and machines and enhancing computer power has permitted several companies to start manufacturing or generating fashion jewelry with integrated intelligence like digital jewelry.

It can help us solve many problems like free from the desk and mainly girls' security. The new invention in a digital world will make computer elements entirely relevant to the human form.

#### Components of the Digital jewelry:

- ❖ Microphone
- ❖ Battery
- ❖ Touchpad
- ❖ Display
- ❖ Cameras
- ❖ GPS
- ❖ Receiver
- ❖ Voice recorder
- ❖ Circuit board
- ❖ Antenna
- ❖ Micro-Chip

#### How does digital jewelry work?

The mobile phone will take a new look, appearing to have no form. Instead of one single device, mobile phones will be divided into essential components. Each part of the jewelry will contain a fraction of the features found in a traditional cell phone [3]. The digital jewelry mobile phone works just like a cell phone side-by-side.

There are many parts of the digital jewelry, and their function is as follows:

- **Earrings:** speakers embedded into these earrings will work as the phone's receiver.
- **Ring:** LEDs (light-emitting diodes) are equipped with LEDs that flash to indicate an incoming call. The different colours of the flash help identify a particular caller or demonstrate the importance of a call.

- **Bracelet:** It provides video graphics array (VGA) display. It will work as a caller identifier that flashes the name and phone number of the caller.
- **Necklace:** people having a conversation through the microphone embedded in the necklace. They transfer the information in the form of signals. It will work on the sensor and Bluetooth technology.

Many functions like keypad and dialing are integrated into the bracelet or kick off altogether. It's likely that voice-recognition software will be used to make calls, a caliber that already had a commonplace in many current cell phones. Simple when we say the name of a person we want to call, the cell phone immediately makes the call.

IBM (International Business Machines) also works on a miniature rechargeable battery to power these components.

And the most discussed topic is charging; it is the way we make calls; digital jewelry will influence how we tackle the ever-increasing bombing of e-mail; suppose that the ring that notifies for phone calls could also inform you about the e-mail dumped up in your inbox. This notification alert could also indicate the urgency of the e-mail. The mouse and monitor are the two most identifiable components familiar to us as a computer set.

#### Business point of view: Rating

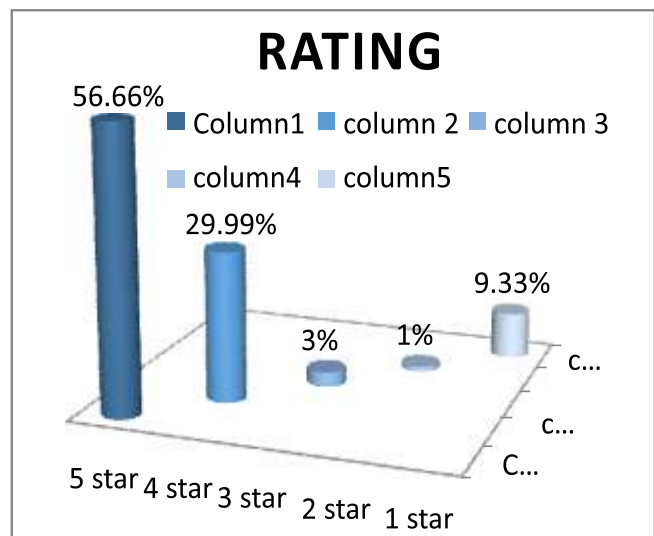


Fig. 1

### Advantages:

- **Portability:** wearing digital jewelry is an innovative idea because it can be used as a wearable computer while walking and moving from one place to another. Because of this feature, it can be different from a desktop computer.
- **Sensor:** A digital jewelry consists of sensors which include cameras, microphones, and wireless Communication for its physical environment.
- **User attention free:** Technology like digital jewelry does not provide any restrictions to the user. The user is free to move even in a crowded area and will not require any attention.
- **Free from the desk:** Digital jewelry is a wireless device, but it depends on external devices for its data access purpose.
- **Provide security:** Embedded with a tracking device, it can be used as a necklace or secured to a keychain. It is programmed to trigger an alarm and send a notification to pre-defined phone numbers in an emergency.
- **Immediately usable Limitations:**
  - Charging capacity is low.
  - Display is very small.
  - Rays may be harmful.
  - Less data security.

### Objectives:

- online reviews of various digital wearables from different shopping sites are taken into account.
- Collection of data and analysis of the charging capacity was done.
- To enhance the charging capacity of the digital jewelry, three different types of batteries with the best battery backups were inserted.

### PRESENT BATTERY USED IN DIGITAL JEWELLERY:

#### Lithium-ion battery:

A lithium-ion battery is a type of battery that consists of a rechargeable battery type in which lithium

ions pass from the cathode to its anode during discharge and return back when recharging, it is mainly used in movable electronic and electric vehicles, toys, wireless headphones, and electrical energy storage systems [8]

The batteries have a high energy density, no memory effect (other than LFR cells), and low self-discharge.



Fig. 2: Lithiumion Battery

#### Performance:

Specific energy	: 100 to 250w-h/kg (360 to 900kj/kg)
Energy density	: 250-693 W- h/L(0.90-2.43 MJ/L)
Specific power	: ~250-340W/kg
Discharge efficiency	: 80-90%
Self-discharge rate	: 0.35% to 2.5% per month, depending on the state of charge
Cycle durability	: 400-1200 cycles

#### Disadvantages of Li-Ion battery:

- Lithium-ion batteries are not that strong, so they require much protection from being overcharged and discharge more quickly. They need to charge under the safe limit and maintain current [8].
- It has a low charging rate. Because of this, it required more charging time.
- Sometimes, it catches fire under high-temperature conditions.
- Lithium-ion batteries have a low cycle time, and the cycle is directly proportional to the temperature and c-rates.

### Hypothesis:

This study is being undertaken with the following hypothesis:

- We have surveyed digital jewelry to make people aware of this type of jewelry and its benefits.
- By doing this survey, we know that its charging capacity can be increased by adding graphene batteries, gold nanowire, and sand batteries.
- This can be done by replacing the pre-existing rechargeable battery. We replaced that battery because its charging capacity was deficient, and it was its big drawback, and because of this, people are less attracted to this digital jewelry.
- For storing data, a microchip embedded in the digital jewelry was programmed to provide authentication for data security.
- To revolutionize the jewelry business with the combination of fashion and technology.

### Methodology:

**Area of study** – Various websites, educational institutes, and electronic stores have various electronic devices and their battery.

We have also done it practically.

**Sample size and sampling method-** Samples will be collected from online surveys and interviews with the seller of the electronic stores and those who belong to any electronic institution or field.

**Tools and technique** – programmed microchips and different types of future coming battery such as-gold nanowire, graphene, and sand.

**Data analysis-** Data will be of two types. The first will be primary data collected from the whole seller of electronic devices and educational institutions. The second will be secondary data collected from books, journals, websites, and seminar reports.

### A program coded microchip to secure data:

As we all know, there is a data storing microchip inserted in this digital jewelry. Still, we will code a program in it that helps provide security of data. We can only access our

data by using a unique ID; by using this technique, no one can access our data without knowing the unique ID.

### Advantages of a program coded microchip

- By using this chip, our digital jewelry becomes more efficient.
- It provides data security.

### Future battery types can be used in digital jewelry to enhance its charging capacity:

- Gold nanowire battery
- Sand battery
- Graphene battery

**Gold Nanowire:** These batteries are very conductive and a thousand times thinner than human hair with a large surface area [9].

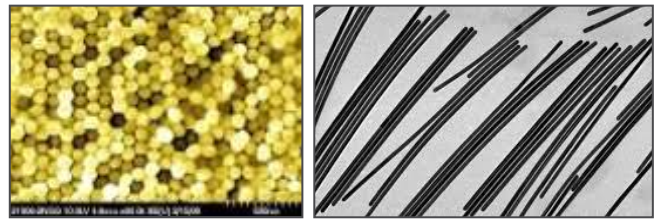


Fig. 3 Gold Nanowire

### • The solution?

Researchers cover the gold nanowire on a manganese dioxide shell. Then it was placed on electrolytes which are made up of plexiglass thickener. Within three months, the electrodes were tested up to 200,000 times. These tests reveal that there is no loss of nanoshell capacity and also, there is no breakage.

### • What led to this experiment? Researchers wanted to construct a battery consisting of electrolyte gel used to hold the battery's charge?

They believed that this method was more trustworthy than liquid.

But after the effect of this experiment was unexpected, its promise that electronics last longer up to 400 times. But it takes a very long period to release a battery in the market.



### Advantages:

- Nanowires are very thin, so it is easy to insert.
- Discharge cycle – 200,000cycles
- Charge efficiency – 94-96%

### Graphene Battery:

Graphene is a thin sheet of many carbon atoms bonded together and forming a honeycomb-like pattern. It is commonly known as a 'wonder material' because of the massive amount of great attributes it holds. It is a conductor that has excellent power of electrical and thermal energy; it contains significantly less weight, is chemically inert and flexible, and occupies a large surface area. It is called eco-friendly and sustainable, which consists of enormous possibilities for various applications.

### Advantages of Graphene Battery:

- Higher capacity hence it will reduce the charging time [7].
- Faster charging
- Lightweight
- High-temperature range
- High durability & efficiency

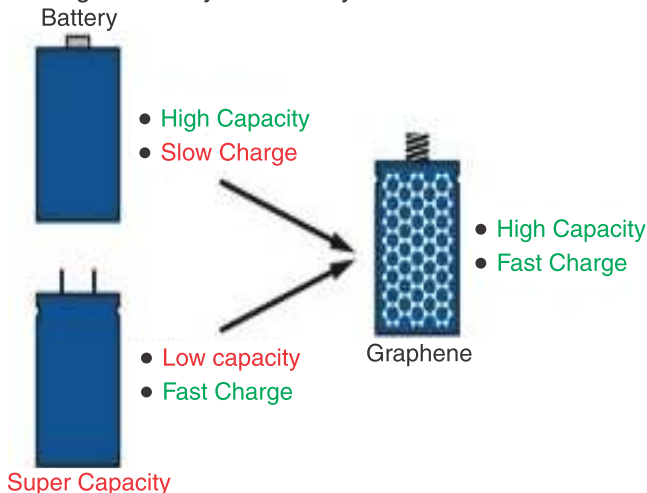


Fig. 4 Graphene Battery

### Sand Battery:

It is small size battery that consists of silicon at its anode instead of graphite. It is three times more efficient and works longer than a conventional lithium-ion battery. The main factor of the research on this battery is the silicon

extraction method, which uses quartz-rich sand as a simple and intensive chemical reaction.

In the sand battery, the sand work like a heat absorber, and magnesium is used to remove the oxygen from the quartz, which ultimately leads to pure silicon [11]. As a result, pure silicon is in its porous state and makes it ideal for use at the battery's anode.



Fig. 5 Sand Battery

### Advantages of sand battery:

- High performance
- Cost-effective
- Non-toxic
- Environment friendly

### Future scope:

**Digital jewelry:** It takes us one step ahead towards the concept of digital India. It is also an excellent source to set up our India as a digital India.

In the future, we want to connect our microchip to our drive so that we can also access our data stored in the digital jewelry from the drive. This will make our data more secure. How can we access the data stored if we

lose our digital jewelry? That's why we need more security of data.

**Gold Nanowire, Graphene, and sand battery:** In the future, ordinary batteries will be replaced by gold nanowire, graphene, and sand batteries entirely for all the digital wearables. By introducing some new mechanisms and technology, we can get Nanowire batteries ten times more efficient than the ordinary battery.

With the combination of fashion and technology, we take another step towards digital India because, in this generation, people are giving more priority to style and technology.

### Conclusion:

The use of digital jewelry has become more popular with advanced technology in today's world. By comparing the technology of the present time with ten years back, we find today's technology has become more developed. There is a microchip embedded in digital jewelry which stores data. Still, our data is not safe because unauthorized users can access the data, so we can code a program in the microchip that provides data security. We can only access our data through a unique ID. Digital jewelry is created by using a lithium-ion battery or ordinary battery. Still, it is not so effective because its charging rate is low, and because of this, it requires more time for charging. Sometimes, it can also catch fire when placed at a high temperature, and its charging capacity is not as good as our requirement in digital jewelry.

So, we have to replace it with the following batteries:

- Gold nanowire battery
- Graphene battery
- Sand battery

After adding these batteries to the digital jewelry, we can conclude that now digital jewelry can work for a longer time than lithium-ion batteries because all these batteries we will use in digital jewelry have high charging capacity.

This combination of fashion and technology takes another step toward digital India because, in this generation, people are giving more priority to style and technology. So, our product is highly trendy and can do a lot of business.

Working women, college-going girls, and detectives are the most potential users of digital jewelry.

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