A Seminar On

"Wearable Computer"

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Exam No[ ]

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Acknowledgement

Every seminar results from hard work and sincere effort by those involved. Hard work and success go hand in hand, and I am grateful to everyone who contributed to my seminar, as they played a vital role in both.

Studying at **Ambaba Commerce College, MIBM, and Deviba Institute of Computer Application** was an educational journey, and working with dedicated computer teachers was one of the most memorable experiences of my life.

This acknowledgment is my humble way of thanking all those who directly or indirectly supported me in my seminar work. With great pleasure, I present this report on the seminar titled "**Wearable Computer**."

I am deeply thankful to our Principal, **Dr. Falguni Thakkar**, for allowing me to prepare this seminar, and to my seminar guide, **Dhruti Patel**, for her invaluable help.

I also thank our H.O.D., **Dr. Rajesh Savaliya,** for his continuous support and encouragement.

I hope this seminar marks a significant milestone and helps me fulfill my aspirations.

Thank you,
Kumhar Harshad

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1. Introduction of wearable Computer :

1.1 Introduction

- Wearable computers, also known as wearable technology or wearables, are small computing devices designed to be worn on the body.
- These devices have gained popularity in recent years due to advancements in technology and their potential to transform various aspects of our lives.
- Wearable computers are small, body-mounted devices with computational power that can perform a variety of functions, often with wireless communication capabilities. They offer convenience, hands-free operation, and can be worn like clothing or accessories, such as watches, glasses, or even embedded in fabric. These devices are increasingly used in various fields for enhancing productivity, monitoring health, and providing real-time information.
- The vision behind the concept of a wearable computer is that a mobile computer should not just be a machine that we put into our pocket when we plan on doing some office work while on the road.
- Instead it will be an integral part of our everyday outfit (hence wearable), always operational and equipped to assist us in dealing with a wide range of situations.
- For example user programmable device that is always on and always ready and accessible. The “always ready” capability leads to a new form of synergy between human and computer characterized by long-term adaptation through constancy of user--interface.
- The computing unit maybe anything small but powerful enough! Laptop or Tablet PC.

1.2 Definition of Wearable Computer?

- Wearable computing facilitates a new form of human-computer interaction comprising a small body-worn computer that is always on and always ready and accessible.

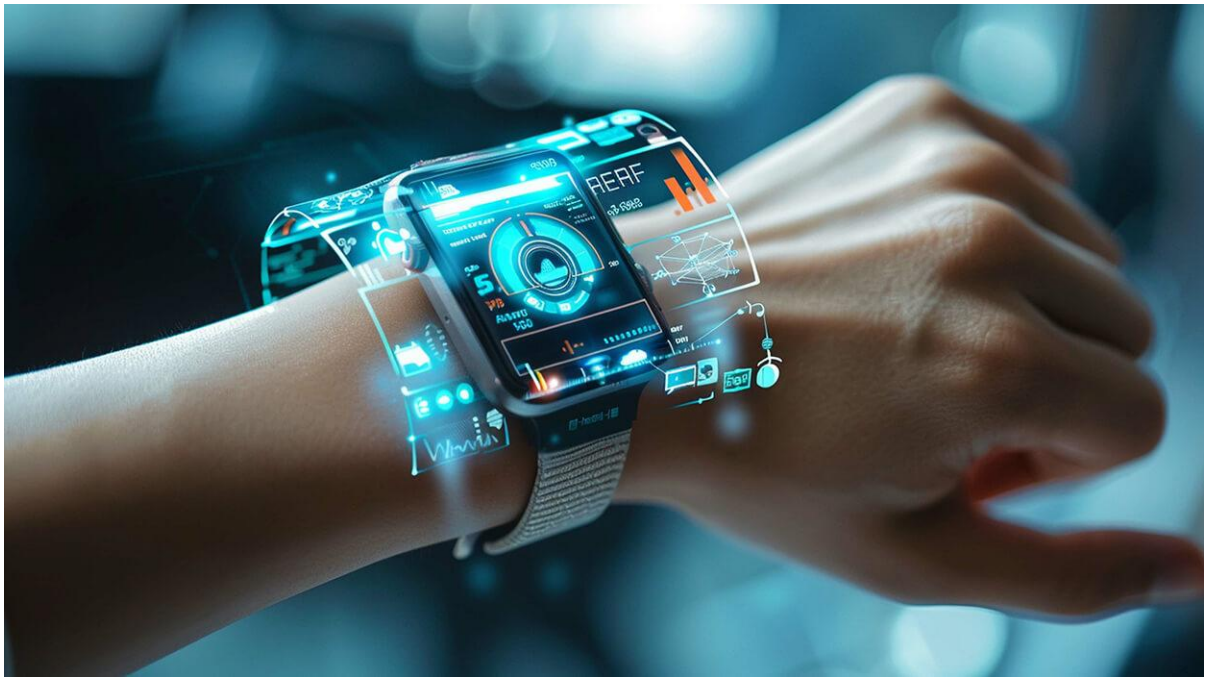
- Laptop computers and personal digital assistants (PDAs). The "always ready" capability leads to a new form of synergy between human and computer, characterized by long-term adaptation through constancy of user-interface.

1.3 What is wearable computer?

- A wearable computer is a computer that is subsumed into the personal space of the user, controlled by the user, and has both operational and interactional constancy i.e., is always on and always accessible.

- It is a device that is always with the user, and into which the user can always enter command and execute a set of such entered commands, and in which the user can do so while walking around or doing other activities.

- A wearable computer is a computing device small and light enough to be worn on one's body without causing discomfort.



- Unlike a laptop or a palmtop, wearable computer is constantly turned on and interacts with the real-world task.

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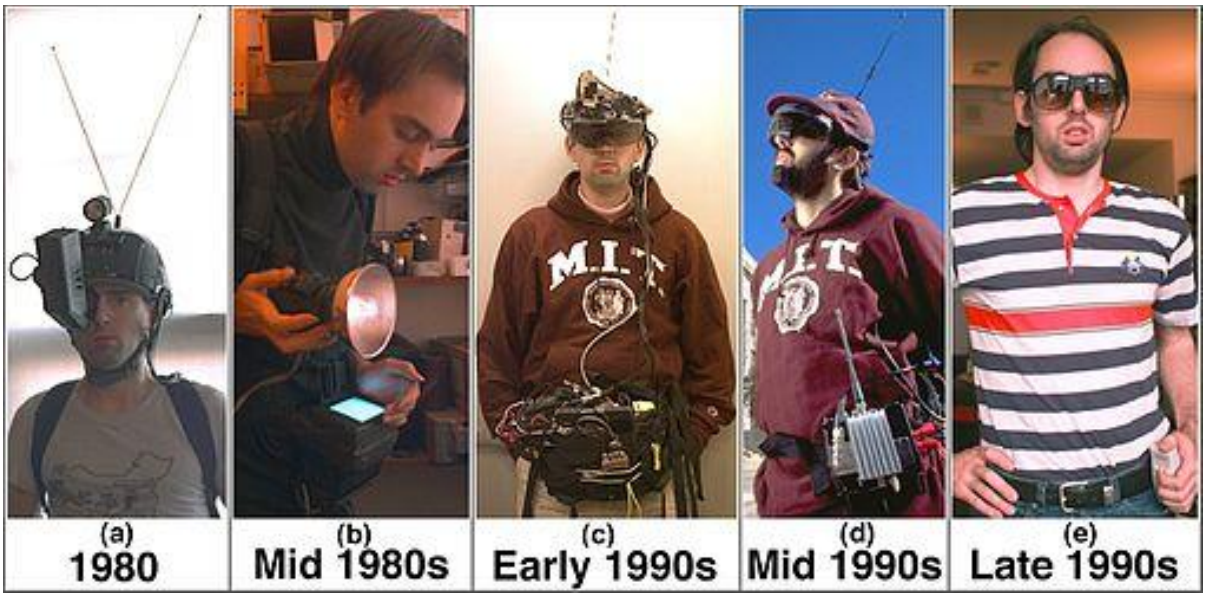
2. History of Wearable Computer :

- The concept of wearable computers dates back to the 1960s, when the first wearable computer was developed by Edward Thorp, a mathematician and computer scientist.

- However, it wasn't until the 2010s that wearable computers began to gain mainstream popularity with the introduction of smartwatches and fitness trackers.

- **1500s**: The concept of wearable technology began with the invention of the watch, a portable timekeeping device.
- **1960s**: Mathematician Edward Thorp developed the first wearable computer, used to predict outcomes in roulette games.
- **1980s**: Wearable computing advanced with the creation of a computer featuring a head-mounted display.
- **2010s**: The modern era of wearables emerged with the rise of smartwatches and fitness trackers, bringing computing devices into everyday accessories.



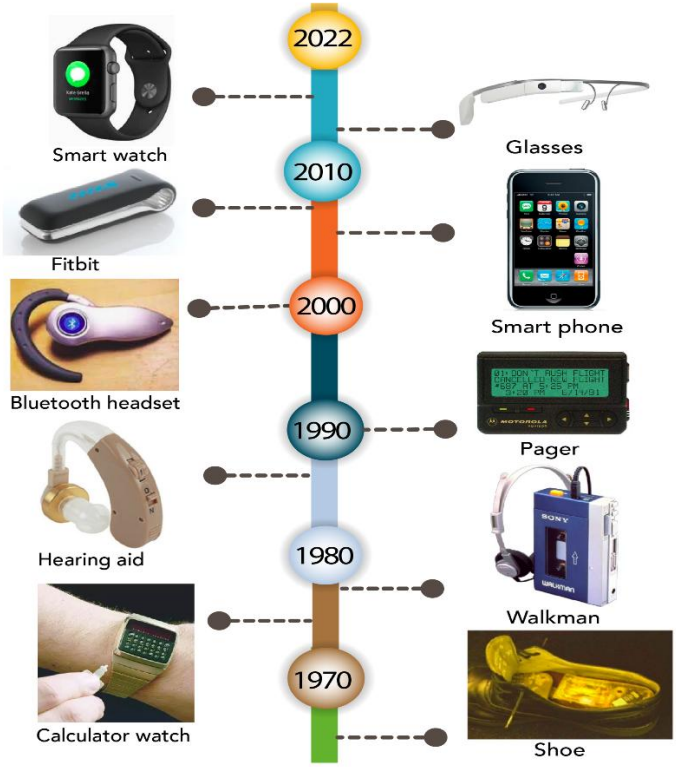
- The concept of wearable computing was first brought forward by Steve Mann, who, with his invention of the 'Wear Comp' in 1979 created a pioneering effort in wearable computing.

- Although the effort was great, one of the major disadvantages was the

  fact that it was nothing more than a miniature PC. Absence of lightweight, rugged and fast processors and display devices was another drawback.

- The 1980s brought forward the development of the consumer camcorder, miniature CRTs etc. brought forward the development of the eyeglass mounted multimedia computer. With the advent of the internet and wireless networking technologies, wearable devices have developed a great deal.

- After its invention wearables have gone through 18 generations of development, with research going on at prestigious institutions like MIT, Georgia Tech and Carnegie Mellon University.



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3. Types of Wearable Computers/Wearable Computer look? :

- A wearable computer can take many forms, depending on its purpose and design. Here's an overview of how it generally looks:

1. **Smartwatches**:
   - Resemble traditional wristwatches but have a screen (typically touchscreen) to display data and interact with apps.

   - They are usually sleek and compact, with straps made of rubber, leather, or metal.
   - Examples: Apple Watch, Samsung Galaxy Watch.

2. **Smart Glasses**:

- Look like regular glasses but may have slightly bulkier frames to house sensors, cameras, and display components.
- Some have a small display visible only to the wearer, while others may have a camera embedded in the frame.
- Examples: Google Glass, Microsoft HoloLens.

3. **Fitness Trackers**:
   - Typically slim wristbands or clips with small screens, mainly used to monitor health metrics (e.g., steps, heart rate).

   - Often made of lightweight materials like silicone or rubber.
   - Examples: Fitbit, Garmin fitness trackers.
4. **Smart Clothing**:
   - Wearable technology integrated directly into fabrics, such as shirts with heart rate sensors or jackets with heating elements.
   - It looks like regular clothing but may have discreet areas for electronics or sensors.

- Examples: Sensoria smart socks, Levi's Commuter Jacket (with Google's Jacquard technology).

5. **Wearable Headsets (AR/VR)**:
   - Bulky headsets worn over the eyes, usually with padding for comfort and straps for a secure fit.
   - They have built-in screens or lenses that display augmented or virtual environments.
   - Examples: Oculus Rift, HTC Vive.

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6. **Wearable Cameras**:
    - Compact devices worn on the body (e.g., clipped to clothing or mounted on helmets).
    - Usually small, rectangular or square, and designed to be lightweight for ease of use.

    - Examples: GoPro, Snapchat Spectacles.

In general, wearable computers are designed to be compact, portable, and comfortable to wear for long periods, blending seamlessly into everyday accessories or clothing.

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4. Applications of Wearable Computers :

- Wearable computers have a wide range of applications across various industries, including:

- Here are some applications of wearable computers:

1. Health and Fitness

1. **Fitness tracking:** Wearable computers can track physical activity, sleep, and other health metrics.
2. **Health monitoring:** Wearable computers can monitor vital signs, such as heart rate, blood pressure, and blood glucose levels.
3. **Disease prevention:** Wearable computers can detect early warning signs of diseases, such as diabetes, cardiovascular disease, and cancer.

2. Communication

1. **Smart notifications:** Wearable computers can receive notifications, such as texts, emails, and social media updates.
2. **Voice assistants:** Wearable computers can integrate with voice assistants, such as Siri, Google Assistant, and Alexa.
3. **Video conferencing:** Wearable computers can enable video conferencing, allowing users to communicate remotely.

3. Navigation and Transportation

1. **GPS tracking:** Wearable computers can provide GPS tracking, enabling users to navigate unfamiliar areas.
2. **Public transportation:** Wearable computers can provide real-time information on public transportation, such as bus and train schedules.
3. **Smart traffic management:** Wearable computers can integrate with smart traffic management systems, providing real-time traffic updates.

4. Gaming and Entertainment

1. **Immersive gaming**: Wearable computers can provide immersive gaming experiences, using augmented reality (AR) and virtual reality (VR) technologies.
2. **Music and video streaming:** Wearable computers can stream music and video content, providing users with entertainment on-the-go.
3. **Social media integration:** Wearable computers can integrate with social media platforms, enabling users to share their experiences and connect with others.

5. Education and Training

1. **Interactive learning:** Wearable computers can provide interactive learning experiences, using AR and VR technologies.
2. **Virtual labs:** Wearable computers can enable virtual labs, allowing students to conduct experiments remotely.
3. **Language learning:** Wearable computers can provide language learning tools, such as translation apps and language learning games.

6. Industrial and Enterprise Applications

1. **Industrial automation:** Wearable computers can integrate with industrial automation systems, providing real-time data and insights.
2. **Supply chain management:** Wearable computers can provide real-time tracking and monitoring of supply chain operations.
3. **Remote work:** Wearable computers can enable remote work, providing employees with the tools and resources they need to work remotely.

7. Military and Defense Applications

1. **Soldier tracking:** Wearable computers can provide real-time tracking of soldiers, enabling commanders to monitor their location and status.
2. **Tactical operations:** Wearable computers can provide real-time data and insights to support tactical operations.
3. **Training and simulation:** Wearable computers can provide immersive training and simulation experiences, preparing soldiers for combat scenarios.

Other Applications

1. **Fashion and textiles:** Wearable computers can be integrated into clothing and textiles, providing users with interactive and dynamic fashion experiences.
2. **Art and design:** Wearable computers can be used to create interactive and dynamic art installations, enabling artists to push the boundaries of creativity and innovation.
3. **Assistive technology:** Wearable computers can be used to assist people with disabilities, providing them with tools and resources to enhance their quality of life.

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5. How it Works Wearable Computer :

- A wearable computer is a compact, portable computing device that can be worn on the body, typically as part of clothing or accessories like watches, glasses, or fitness trackers. Here's how a typical wearable computer works:

1. Components:

- **Processor**: A small chip, similar to those found in smartphones, handles computation and processing tasks.
- **Sensors**: Many wearables include sensors like accelerometers, gyroscopes, GPS, heart rate monitors, temperature sensors, and more. These sensors collect data about the user and their environment.
- **Battery**: Wearable computers are powered by small, rechargeable batteries designed to last for extended periods.
- **Connectivity**: They often have wireless connectivity (Bluetooth, Wi-Fi, or cellular) to communicate with other devices, such as smartphones or cloud servers.
- **Display & Input**: Some wearables, like smartwatches or smart glasses, have small screens or projectors to display information. Others rely on haptic feedback (vibration) or auditory outputs. Inputs can include touch, voice commands, gestures, or physical buttons.

2. Data Collection:

- Wearable devices continuously gather data through their sensors. For example, a fitness tracker might measure steps, heart rate, and sleep patterns, while a smart watch might track your location or provide notifications.

3. Processing:

- The collected data is processed either locally on the device or sent to another system (like a smartphone or cloud server) for analysis. For example, fitness data might be sent to a mobile app to display progress or provide health insights.

4. User Interaction:

- Users interact with wearable computers using touch, gestures, or voice. For instance, you can swipe on a smartwatch to navigate menus or give voice commands to smart glasses for hands-free operation.

5. Output & Feedback:

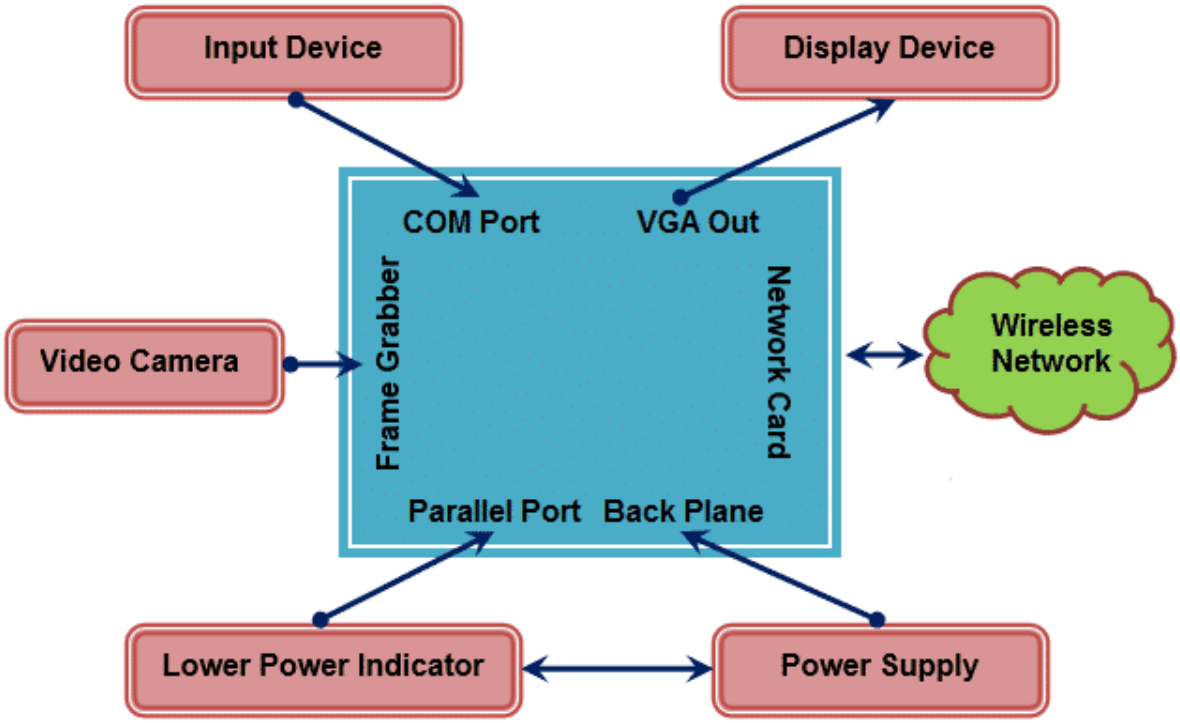
- The device provides feedback through visual displays, sounds, or vibrations. For example, a wearable might vibrate when you receive a message or alert you to achieve a fitness goal.

6. Power Management:

- Since wearables are designed to operate with limited battery life, they often include

energy-saving features like low-power processors, optimized sensors, and sleep modes.

- Wearable computers are commonly used for health monitoring, fitness tracking, navigation, augmented reality, and communication. They enhance convenience by allowing hands-free and on-the-go computing.



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6. Aims of wearable Computer :

- The aims of wearable computers, in simple terms, are:

1. Convenience:

Expanded: Wearable computers are designed to make life more convenient by embedding technology into items you can wear, like watches, glasses, or clothing. Instead of relying on larger devices like smartphones, laptops, or desktops, wearable technology ensures that essential functions are easily accessible without interrupting your daily routine. Whether it's checking notifications, tracking your health, or receiving calls, wearable computers simplify technology interactions by making them instant and readily available.

2. Hands-Free Use:

Expanded: One of the core features of wearable technology is the ability to operate without using your hands. Devices like smartwatches, fitness trackers, and AR glasses can be controlled via voice commands, gestures, or automatic sensors. This hands-free operation is especially useful when carrying or operating a phone or other device that would be cumbersome, such as while driving, exercising, or performing tasks requiring full attention and both hands.

3. Health and Fitness Tracking:

Expanded: Many wearable devices focus on monitoring health and fitness. They use sensors to track various metrics such as heart rate, blood oxygen levels, steps taken, calories burned, sleep patterns, and even stress levels. By offering real-time feedback, these devices help users stay proactive about their health, motivating them to meet fitness goals or reminding them to engage in healthy behaviors. This has proven particularly useful in promoting preventive healthcare, where constant monitoring can detect early signs of issues.

4. Real-Time Information:

Expanded: Wearable computers provide immediate access to important information without the need to pull out a smartphone or sit in front of a computer. Whether it's receiving notifications, checking the weather, getting calendar reminders, or viewing directions, wearable technology ensures that you can stay informed on the go. With wearables, information is always at your fingertips, and you can stay connected without distraction.

5. Augmented Reality (AR):

Expanded: One of the most innovative aspects of wearable computing is augmented reality. AR devices, such as smart glasses, overlay digital information onto your view of the physical world. This can range from simple applications like displaying notifications or directions, to more

complex ones like translating languages in real time, offering immersive gaming experiences, or providing technical instructions for complex tasks. AR aims to blend the digital and physical worlds, enhancing your environment with useful and actionable data.

6. Personalized Experience:

Expanded: Wearable computers can learn your habits, preferences, and routines over time, making them highly personalized. They can analyze your behavior, such as your daily activities, work patterns, sleep habits, and even fitness goals, to provide tailored suggestions or reminders. For example, your fitness tracker might recommend specific exercises, or your smartwatch may learn your typical commute, suggest quicker routes, or remind you of upcoming meetings. The more you use the device, the better it understands your needs and adapts to your lifestyle.

7. Improved Productivity:

Expanded: Wearable computers help boost productivity by keeping you organized and allowing you to perform tasks more efficiently. Features like reminders, task management apps, and instant communication tools help users stay on top of their daily tasks. Wearables make multitasking easier—whether you need to take a quick call, dictate notes, or set a reminder, you can do so while walking, exercising, or even working. The ease of use and accessibility make wearable technology a powerful tool for staying productive, especially in mobile or fast-paced environments.

- In short, wearable computers aim to make everyday tasks easier, keep you connected, and offer real-time insights, all while being easy to carry or wear.

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7. Advantages & Disadvantages of Wearable Computer :

Advantages of Wearable Computers:

1. **Convenience**:
    - Wearable computers, like smartwatches or fitness trackers, are easy to carry and use since they are worn on the body. They provide quick access to information and functions without the need for a phone or laptop.
2. **Hands-Free Operation**:
    - Wearables often allow for hands-free interaction through voice commands, gestures, or touch, which is especially useful when you're busy or can't use your hands.
3. **Health Monitoring**:
    - Devices like fitness trackers and smartwatches can monitor your health in real-time, tracking steps, heart rate, sleep patterns, and even detecting health issues like abnormal heart rhythms.
4. **Real-Time Notifications**:
    - Wearables keep you informed by providing real-time notifications for calls, messages, and alerts without needing to check your phone.
5. **Enhanced Mobility**:
    - Since wearable devices are small and portable, they are ideal for people on the move, providing navigation, notifications, and fitness tracking while you are active.
6. **Personalization**:
    - Wearable devices can be personalized to fit your needs, tracking your habits, learning preferences, and offering suggestions like workout plans or reminders.
7. **Augmented Reality (AR)**:
    - AR wearables, like smart glasses, enhance your surroundings by overlaying digital information onto the real world, improving tasks such as navigation, training, or even shopping.

Disadvantages of Wearable Computers:

1. **Limited Battery Life**:
    - Many wearable devices need frequent charging due to their small batteries, which can be inconvenient if you're relying on the device throughout the day.

2. **Small Screen Size**:
    - Wearables like smartwatches have limited display space, making it harder to view detailed content or perform complex tasks.

3. **Privacy Concerns**:
    - Since wearables constantly collect data about your location, activity, and health, they can raise concerns about privacy and data security if the information is not properly protected.

4. **Cost**:
    - High-quality wearable devices can be expensive, and the cost may not be justified for some users, especially if they already own smartphones that perform similar functions.

5. **Limited Functionality**:
    - Compared to smartphones or computers, wearables have limited processing power and capabilities, so they may not be suitable for tasks that require heavy computing or multitasking.

6. **Dependence on Other Devices**:
    - Many wearables rely on pairing with smartphones or other devices to function fully, which can limit their usefulness if the phone is not nearby or available.

7. **Durability Issues**:
    - Wearable devices, especially those used in active environments like fitness tracking, may be prone to wear and tear, damage from water, or other environmental factors.

In summary, wearable computers offer great convenience and health benefits but can be limited by small screens, battery life, and privacy concerns.

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8. Features of wearable computers

- The feature of wearable computers is expected to be exciting and transformative, with advancements in technology making them more powerful, versatile, and integrated into everyday life. Here are key trends and possibilities for the future of wearable computing:

- A wearable computer is a compact, often body-mounted device designed for hands-free or limited-interaction use. Here are some key features:

1. Portability and Compact Design

- Designed to be worn on the body, like on the wrist, head, or clothing, wearable computers are small, lightweight, and easy to carry.

2. Hands-Free Operation

- Wearable computers often offer hands-free control through voice commands, gesture recognition, or eye-tracking, enabling interaction without manual input.

3. Real-Time Data Processing

- These devices can collect and process data in real time, allowing users to receive and respond to information instantly, such as in augmented reality (AR) glasses or fitness trackers.

4. Sensors and Monitoring

- Many wearable devices have built-in sensors, such as accelerometers, heart rate monitors, GPS, and temperature sensors, allowing them to track physical activity, health metrics, and environmental conditions.

5. Connectivity

- Wearable computers often support wireless connectivity, such as Bluetooth, Wi-Fi, or cellular networks, allowing them to connect to other devices like smartphones or the internet for syncing data and updates.

6. Augmented and Virtual Reality Integration

- Some wearables, like AR glasses or VR headsets, provide immersive experiences by overlaying digital information onto the real world or creating entirely virtual environments.

7. Low Power Consumption

- Efficient power usage is essential due to the small size of wearables, ensuring longer battery life for continuous monitoring and operation.

8. User Interface Adaptation

- Wearable computers may use simplified or context-aware interfaces suited to limited screens, using vibrations, sounds, or light indicators for notifications.

9. Health and Fitness Tracking

- Many wearable devices, such as smartwatches or fitness bands, focus on health monitoring, tracking metrics like steps, calories burned, sleep quality, and vital signs.

10. Customizability and Personalization

- Wearable computers often allow users to personalize settings, apps, and interfaces to suit their specific needs and preferences.

11. Durability and Water Resistance

- Since they are often worn in various environments, wearable computers are typically built to withstand physical wear, water, dust, and shock.

12. Seamless User Experience

- Wearables are designed to provide quick and easy access to information with minimal interruption to the user's daily activities.

- These features make wearable computers highly versatile for applications in fitness, healthcare, entertainment, industrial use, and everyday convenience.

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9. Conclusion:

- Wearable computers bring computing power into devices that can be worn, allowing hands-free access to information. Starting with Edward Thorp's 1960s invention, they have evolved into modern smartwatches and fitness trackers that enhance everyday life. These devices combine portability, connectivity, and ease of use, making technology a seamless part of daily activities. As the field advances, wearable computers are making interactions with technology more intuitive and accessible.

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10. Reference Sites

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