

Reserch Paper on Human Computer Interaction (Hci)

**Guarav Rajendra Shegekar¹, Gajashri Satyawan Bhosale²,
Shilwan Vilas Fulzele³, Kalyani Suresh Khope⁴**

^{1,2,3,4}Student, Nagpur Institute of Technology

Abstract

Human-computer interaction (HCI) is the study of how people interact with computers and design systems that are usable, efficient, and enjoyable to use. HCI researchers study how people use computers, develop new technologies that let people use them in inventive ways, and evaluate the usability of existing systems.

HCI is a multidisciplinary field that draws on research from a variety of disciplines, including computer science, psychology, design, and linguistics. HCI researchers use a variety of methods to study human-computer interaction, including user studies, usability testing, and ethnographic research.

HCI research has played a major role in the development of many of the computer technologies that we use today, including graphical user interfaces, touch screens, and voice recognition. HCI research is also important for the development of new technologies, such as augmented reality and virtual reality.

Keywords: Human-computer interaction, user experience, user interface, usability, accessibility, interaction design, information architecture, visual design, multimodal interaction, emerging technologies

Introduction

HCI is a relatively new field, but it has grown rapidly in recent years due to the increasing ubiquity of computers in our lives. Today, computers are used in virtually every aspect of our work, education, and personal lives. As a result, it is essential that computers be designed in a way that is easy and enjoyable to use. HCI researchers and practitioners work on a wide range of topics, including:

Usability: How to design systems that are easy to learn and use, even for users with limited computer experience.

Accessibility: How to design systems that can be used by people with disabilities.

Interaction design: How to design interactions between users and computers that are efficient, effective, and enjoyable.

Information architecture: How to organize and present information in a way that is easy to understand and find.

Visual design: How to design user interfaces that are visually appealing and easy to navigate.

Multimodal interaction: How to design systems that allow users to interact with computers using a variety of modalities, such as speech, gestures, and eye gaze.

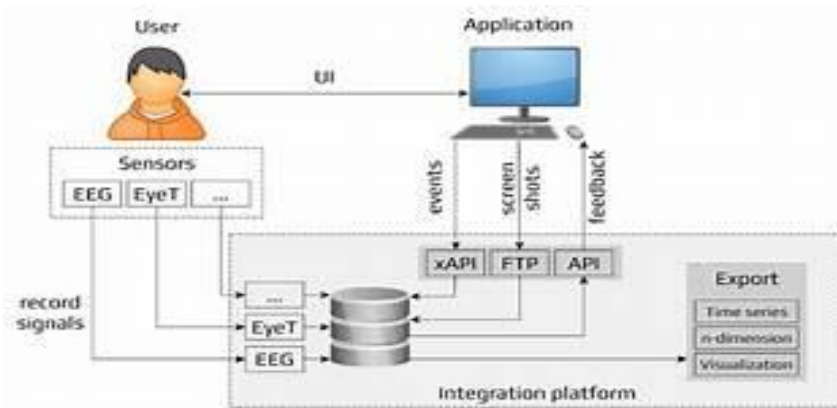
Emerging technologies: How to design systems that incorporate new and emerging technologies, such as virtual reality and augmented reality.

Definition

Human-computer interaction (HCI) is the study of how people interact with computers and design systems that are usable, efficient, and enjoyable to use. HCI researchers study how people use computers, develop new technologies that let people use them in inventive ways, and evaluate the usability of existing systems.

Description with Diagram

The following diagram shows a simplified HCI system architecture:



[Diagram of HCI system architecture]

The user interface (UI) is the part of the system that the user interacts with directly. It can include input devices, such as a keyboard and mouse, and output devices, such as a monitor and speakers.

The application layer is the part of the system that performs the user's tasks. It may include components such as a database, a web server, or a game engine.

The middleware layer provides services to both the UI and the application layer. It may include components such as a user authentication system, a communication system, or a security system.

The operating system provides the basic services that the HCI system needs to run, such as memory management, file system management, and process management.

The hardware layer is the physical hardware that the HCI system runs on, such as the computer, the monitor, and the input devices.

HCI Technology Currently Used

HCI technology is used in a wide range of products and services, including:

1. Operating systems: Windows, macOS, Linux, Android, and iOS
2. Web browsers: Chrome, Firefox, Edge, and Safari
3. Productivity software: Microsoft Office, Google Docs, and Apple iWork
4. Mobile apps: Games, social media apps, and shopping apps
5. Embedded systems: ATMs, car infotainment systems, and medical devices
6. Graphical user interfaces (GUIs): GUIs use icons, menus, and windows to make computers easier to use.
7. Touch screens: Touch screens allow users to interact with computers directly with their fingers.
8. Voice recognition: Voice recognition allows users to control computers and input data using their voice.

9. Augmented reality (AR): AR overlays computer-generated images on the real world to create a mixed reality experience.
10. Virtual reality (VR): VR creates a completely simulated environment that the user can interact with.

Modern HCI advancements include:

1. Dexta Haptic Gloves

When utilising virtual reality, Dexta haptic gloves were created to simulate touch feelings of hardness, softness, springiness, and more. As the user interacts with things in their VR experience, the gloves replicate these feelings by locking and unlocking the user's finger joints to various degrees. As indicating VR applications here, learn the [applications of VR in the military](#).

2. Pre-touch sensing

It enables your smartphone to read your thoughts (almost). When they first come out, pre-touch phones should be able to detect how the user holds the phone or which fingers approach the screen in order to forecast what the user intends to do. This gives the impression that your phone can read your mind since it executes things before you give it a clear instruction.

3. Paper ID

It is the next effort to digitise paper by converting it to a touchscreen. Paper will be able to "detect its surroundings and respond to gesture instructions, as well as link to the Internet of Things," according to this new technology. The goal is to connect the physical and digital worlds.

These were just a few applications of HCI that we can see in the near future. Considering it just a window to the future, we can be heavily assured that the door has much more to welcome.

4. Multimodal interaction: Users can now interact with computers using a variety of modalities, such as speech, gestures, and eye gaze.
5. AI-powered interfaces: AI is being used to develop more intelligent and user-friendly interfaces. For example, AI can be used to personalize the user experience, recommend content, and detect and correct errors.
6. Virtual reality and augmented reality: VR and AR are being used to create immersive and interactive experiences. For example, VR can be used for training, gaming, and shopping. AR can be used for navigation, education, and product design.
7. User needs and goals: The design of the computer system should be based on the needs and goals of the users.
8. User context: The design of the computer system should consider the context in which it will be used.
9. User feedback: The computer system should provide feedback to the user so that they can learn and improve their performance.

User control: The user should have control over the computer system.

System Architecture of HCI

The system architecture of HCI is typically composed of the following layers:

Presentation layer: This layer is responsible for rendering the user interface and handling user input.

Application layer: This layer contains the business logic of the application and is responsible for performing the user's tasks.

Data layer: This layer stores and retrieves data from the database.

Logic layer: This layer contains the code that controls the overall flow of the application.

Physical layer: This layer contains the hardware components of the system, such as the computer, the monitor, and the input devices.

Application of HCI

HCI is applied in a wide range of industries, including:

Software development: HCI is used to design and develop user-friendly software applications.

Web design: HCI is used to design and develop

Conclusion

HCI is a rapidly evolving field that is playing an increasingly important role in the development of new technologies. HCI research is helping to make computers more usable, efficient, and enjoyable to use for everyone.

References

1. Carroll, J.M. and Olson, J.R., 1988. Mental models in human-computer interaction. In Handbook of human-computer interaction (pp. 45-65). North-Holland.
2. Nardi, B.A. ed., 1996. Context and consciousness: activity theory and human-computer interaction. mit Press.
3. Baecker, R.M. ed., 2014. Readings in Human-Computer Interaction: toward the year 2000. Elsevier.
4. Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S. and Carey, T., 1994. Human-computer interaction. Addison-Wesley Longman Ltd..
5. Chao, G., 2009, March. Human-computer interaction: process and principles of human-computer interface design. In 2009 International Conference on Computer and Automation Engineering (pp. 230-233). IEEE.
6. Rudd, J., Stern, K. and Isensee, S., 1996. Low vs. high-fidelity prototyping debate. interactions, 3(1), pp.76-85.