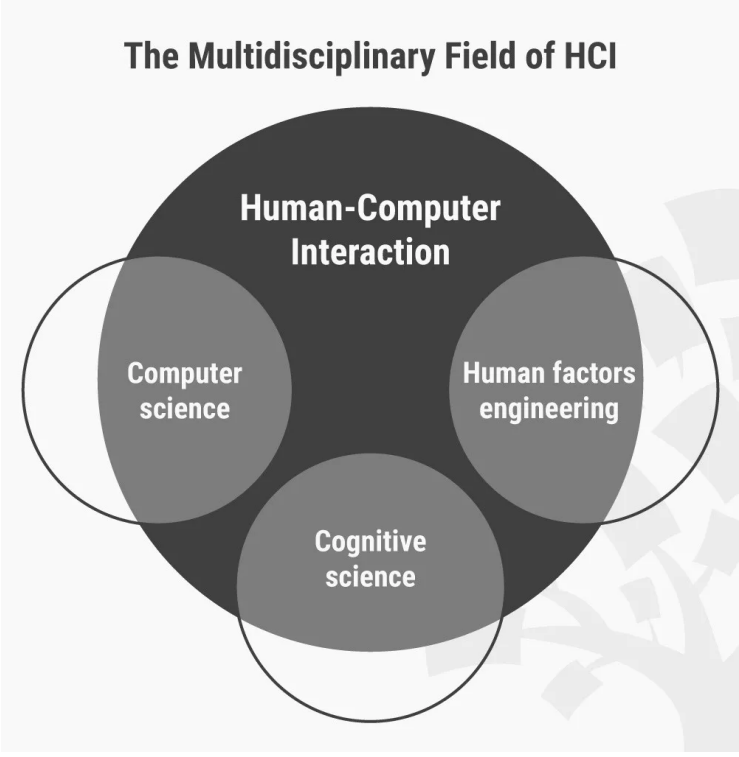
Human-Computer Interaction (HCI)

What is Human-Computer Interaction (HCI)?

Human-computer interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between humans (the users) and computers. While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design.



Human–computer interface

The human-computer interface can be described as the point of communication between the human user and the computer. The flow of information between the human and computer is defined as the *loop of interaction*. The loop of interaction has several aspects to it, including:

- **Visual Based**: The visual-based human-computer interaction is probably the most widespread human-computer interaction (HCI) research area.
- **Audio Based**: The audio-based interaction between a computer and a human is another important area of HCI systems. This area deals with information acquired by different audio signals.
- ***Task environment***: The conditions and goals set upon the user.
- ***Machine environment***: The computer's environment is connected to, e.g., a laptop in a college student's dorm room.
- ***Areas of the interface***: Non-overlapping areas involve processes of the human and computer, not about their interaction. Meanwhile, the overlapping areas only concern themselves with the processes of their interaction.
- ***Input flow***: The flow of information begins in the task environment when the user has some task requiring using their computer.
- ***Output***: The flow of information that originates in the machine environment.
- ***Feedback***: Loops through the interface that evaluate, moderate, and confirm processes as they pass from the human through the interface to the computer and back.
- ***Fit***: This matches the computer design, the user, and the task to optimize the human resources needed to accomplish the task.

Introduction

Humans interact with computers in many ways, and the interface between the two is crucial to facilitating this interaction. HCI is also sometimes termed human–machine interaction (HMI), man-machine interaction (MMI) or computer-human interaction (CHI). Desktop applications, internet browsers, handheld computers, and computer kiosks make use of the prevalent graphical user interfaces (GUI) of today. Voice user interfaces (VUI) are used for speech recognition and synthesizing systems, and the emerging multi-modal and Graphical user interfaces (GUI) allow humans to engage with embodied character agents in a way that cannot be achieved with other interface paradigms. The growth in the human–computer interaction field has led to an increase in the quality of interaction, and resulted in many new areas of research beyond. Instead of designing regular interfaces, the different research branches focus on the concepts of multimodality over unimodality, intelligent adaptive interfaces over command/action based ones, and active interfaces over passive interfaces.

The Association for Computing Machinery (ACM) defines human-computer interaction as "a discipline that is concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them". An important facet of HCI is user satisfaction (or End-User Computing Satisfaction). It goes on to say:

"Because human-computer interaction studies a human and a machine in communication, it draws from supporting knowledge on both the machine and the human side. On the machine side, techniques in computer graphics, operating systems, programming languages, and development environments are relevant. On the human side, communication theory, graphic and industrial design disciplines, linguistics, social sciences, cognitive psychology, social psychology, and human factors such as computer user satisfaction are relevant. And, of course, engineering and design methods are relevant."

Due to the multidisciplinary nature of HCI, people with different backgrounds contribute to its success.

Poorly designed human-machine interfaces can lead to many unexpected problems. A classic example is the Three Mile Island accident, a nuclear meltdown accident, where investigations

concluded that the design of the human-machine interface was at least partly responsible for the disaster. Similarly, accidents in aviation have resulted from manufacturers' decisions to use non-standard flight instruments or throttle quadrant layouts: even though the new designs were proposed to be superior in basic human-machine interaction, pilots had already ingrained the "standard" layout. Thus, the conceptually good idea had unintended results.