Chapter 1
Next-Gen Interaction:
Smarter HCI for Intelligent Personalized Experiences

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ABSTRACT

Human-Computer Interaction (HCI) has advanced greatly, yet the demand for more intuitive, adaptive, and emotionally aware systems continues to rise. As digital technologies become more embedded in daily life, smarter HCI—capable of sensing, interpreting, and responding to users' cognitive and emotional states—is essential. This chapter introduces key HCI principles and traces the shift toward intelligent interfaces driven by AI, machine learning, affective computing, brain-computer interfaces (BCI), and physiological computing. It highlights multimodal inputs such as EEG, EMG, heart rate, GSR, facial expressions, and behavioral cues,

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emphasizing the role of personalization in improving engagement, accessibility, and performance. Through case studies and interdisciplinary insights, it showcases how these technologies create real-time, adaptive systems tailored to individual users. Setting the tone for the book, this chapter outlines the future of empathetic, intelligent, and user-centered interaction design.

1. INTRODUCTION TO HUMAN-COMPUTER INTERACTION (HCI)

Human-Computer Interaction (HCI) – the most widely recognized term, formerly known as man-machine interaction (MMI), sometimes also known as Human-Machine Interaction (HMI) or Computer-Human Interaction (CHI), is the study and practice of designing interactive systems that facilitate communication between humans and machines in a convenient way. Here, human, most of the time, refer to amateurs – the layman users, and computer refers to not only the conventional computers like laptop or desktop but also all computational devices, that fall under the 'definition of computer' (an electronic device that accepts data as inputs, stores them, processes that inputs for generating meaningful information in the form of outputs in a user convenient way, and store the same for future reference), that we use in our da-to-day lives, e.g., a smartphone, a smart TV, a smart microwave oven, a smart refrigerator, a smartwatch, a digital pedometer, and likes. Therefore, to make them more usable, over the years, HCI has evolved from basic command-line interfaces to highly sophisticated multimodal and adaptive systems and interfaces that anticipate needs of these layman users as depicted in Figure 1.