



Exploring the Role of Human Factors in Interactive Systems: A Review

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Abstract

With the vast development of technology, Human-Computer Interaction (HCI) is the field concerned with enhancing usability and understanding the relationship between humans and computers. It involves creating software that simplifies tasks for users and fosters enjoyment and effectiveness in their interaction with technology. To make this review paper, our main goal is to provide better results on how our Systems approach humans. For instance, an interface may be designed to communicate with users in a human-to-human manner, as if the computer empathizes with the user. HCI is the design and implementation of interactive computing systems that users can interact with. It includes desktop systems as well as embedded systems in different devices. The success of technology simply results from the ease with which the user can interact with it.

Keywords: Human Computer Interaction, Methodology, Humans, Fidelity, Design

INTRODUCTION

Human-Computer Interaction (HCI) has emerged as the primary strand within computing- related research that seems to have at its heart the design of novel information interaction and communication technology. HCI is the field concerned with enhancing usability and understanding the relationship between humans and computers. It is Interdisciplinary that works and focuses on designing and evaluating computer systems that humans can easily interact with. It involves creating software that simplifies tasks for users and fosters enjoyment and effectiveness in their interaction with technology. HCI encompasses three key components: the user, the computer, and their interaction. Designing HCI involves creating both low and high-fidelity representations of systems. It involves the high fidelity that the interaction is being enjoyed and is effective. Its three components are concerned with improving human interaction with computers to make technology more efficient and effective.

Ebert (1994) outlined Four Approaches to human-computer interaction (HCI)

1) Anthropomorphic Approach: This approach involves designing interfaces to mimic human characteristics, aiming to create a more relatable and natural interaction between users and technology.

2) Cognitive Approach: The cognitive approach focuses on developing interfaces that support users based on the capabilities of the human brain and sensory perception. It considers how users think, learn, and process information to enhance usability.

3) Empirical Approach: This approach involves empirically evaluating and comparing the usability of different interface designs. It relies on real-world testing.

4) Predictive Modelling Approach: Utilizing methods such as GOMS (Goals, Operators, Methods, and Selection rules), this approach predicts user experience by analyzing the time it takes for users to accomplish specific tasks efficiently and effectively. It involves breaking down tasks into subcomponents to estimate performance metrics accurately. These approaches can be utilized individually or in combination to design interfaces that optimize user experience and achieve desired usability goals.

A framework of broad HCI issues and Review of Literature

This framework should be relatively parsimonious, thus easy to use. It should demonstrate the major components and their relationships, the dynamic and rich nature of HCI, and the contextual factors that play an important role in HCI. Only a few comprehensive frameworks of HCI issues and topics have been developed so far. This coincides with the observation that no agreed-upon definitions of the range of topics for HCI exist (Hewett et al., 1992). Among these few frameworks, Eason (1991) proposed a three-level model of HCI, as depicted.

THE MENTAL MODEL: Central to human-computer interaction are mental models, which represent users' beliefs about systems. These models are internal to each user's brain and guide their predictions and actions. Mental models are dynamic and fluid, constantly evolving as users interact with systems. Challenges arise when users possess mixed-up mental models, leading to confusion about different system functions. Aligning the design team's understanding with users' mental models is essential for effective design.

The Mixed-up Mental model –These models confuse different parts of the system, because many users have not formed a model of their screen functions. The design team and the user have different mental models, and while creating something for the user, the design team has to think according to the user, which is a very big problem.

Challenges for HCI

The challenge is addressing privacy and security concerns, as the increasing integration of technology in daily life raises the risk of data breaches and misuse of personal information. HCI must also contend with the rapid pace of technological advancement, which demands constant innovation and adaptation to new devices, interfaces, and interaction paradigms, such as virtual and augmented reality. Additionally, there is a need to balance functionality with user experience, ensuring that new technologies are not only powerful but also intuitive and enjoyable to use. Finally, ethical considerations in AI and automation, such as the impact on employment and decision-making, pose complex questions that HCI professionals must navigate to design responsibly. Addressing these challenges is crucial for creating technologies that are effective, equitable, and ethical.

The main challenges of human-computer interaction involve the study of Human Environment Interactions, MAIN Addressing potential shortcomings and risks of emotions research.

Human-Computer Interaction (HCI) is a field fraught with complex and multifaceted challenges as it strives to create seamless, intuitive, and equitable interactions between people and technology. One significant issue is ensuring accessibility and inclusivity, as users vary widely in their physical, cognitive, and cultural

backgrounds. Designers must craft interfaces that accommodate these differences, ensuring that technology is usable for individuals with disabilities and those from diverse linguistic and cultural backgrounds. Privacy and security represent another critical area of concern, with the proliferation of digital devices leading to increased risks of data breaches and unauthorized surveillance. As technology evolves at a breakneck pace, HCI must continuously innovate, adapting to new platforms and interaction paradigms such as augmented reality, virtual reality, and the Internet of Things, which present unique usability and integration challenges.

Balancing advanced functionality with user experience is also a core issue, requiring that systems be not only powerful but also intuitive and satisfying to use. Furthermore, the ethical implications of AI and automation, including potential biases in decision-making algorithms and the displacement of jobs, demand careful consideration and responsible design. These intertwined challenges highlight the need for a multidisciplinary approach in HCI, drawing on fields such as psychology, sociology, and design to develop technologies that are effective, ethical, and inclusive.

ANALYSIS

An analysis of Human-Computer Interaction (HCI) necessitates a profound comprehension of the intricate interplay between humans and computational systems, encompassing cognitive, ergonomic, and socio-technical dimensions. The field's complexity arises from the necessity to harmonize multifarious user requirements with sophisticated technological paradigms. This entails a meticulous examination of user interface design principles, usability heuristics, and interaction modalities. Researchers delve into the cognitive load implications, evaluating how information processing capacities affect user performance and satisfaction. Additionally, the ergonomic aspects consider the anthropometric and biomechanical factors that influence the physical interaction with devices. Socio-technical analysis in HCI examines the broader context, including cultural, ethical, and organizational factors that impact technology adoption and use.

RESULTS AND DISCUSSION

HCI, recent results, and ongoing discussions highlight significant advancements and persistent challenges. Research has demonstrated substantial progress in creating more accessible and inclusive interfaces, such as voice-controlled assistants and adaptive technologies that cater to users with disabilities. These innovations have significantly enhanced user experience for a broader audience, affirming the importance of inclusive design principles. However, discussions continue around the ethical implications of HCI, particularly concerning data privacy and security. Studies reveal that while users appreciate personalized experiences, they are increasingly concerned about how their data is collected, stored, and used, prompting a call for more transparent and secure systems. Additionally, the integration of emerging technologies like augmented reality (AR) and virtual reality (VR) has opened new avenues for immersive experiences but also raised questions about usability and user adaptation. The ongoing debate in HCI also focuses on the balance between automation and human control, especially as artificial intelligence (AI) becomes more prevalent in decision-making processes. Researchers emphasize the need for designing AI systems that augment human abilities without eroding autonomy. Overall, the results underscore a dynamic field that is making strides in usability and inclusivity, while the discussions highlight the necessity for addressing ethical, privacy, and usability concerns to ensure that technological advancements benefit all users equitably.

CONCLUSION AND FUTURE SCOPE

Basically, it's for understanding the Particular field, which enhances the credibility of your views. This process not only enhances your knowledge but also hones your critical thinking and analytical skills as you evaluate the quality, relevance, and impact of various studies. In conclusion, review papers play a vital role in the academic landscape by synthesizing existing research, highlighting key findings, and identifying gaps in knowledge. They provide valuable insights that guide future research directions and help scholars stay informed about developments in their field. The process of writing a review paper encourages critical analysis, fosters a deeper understanding of the topic, and contributes to the academic community by offering a comprehensive overview of current knowledge. In order to make the human an integral element of the machine learning system and the machine into a tool to aid in the development of the human, the development of machine learning in human- computer interaction should be anthropocentric. Future scope in the realm of review papers could focus on several areas to enhance their impact and relevance. First, integrating advanced data analytics and machine learning techniques could improve the synthesis and analysis of large volumes of literature, making review papers even more comprehensive and up to date. Additionally, fostering collaborative review efforts among scholars from diverse backgrounds could provide more balanced and multifaceted perspectives. Therefore, future studies should employ a quantitative or qualitative research approach in order to further investigate HCI design approaches in relation to other organizational information systems, with much emphasis on cloud-based systems.

Declaration of Conflicting Interests

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