


Chapter 9

Enhancing Human– Computer Interaction Through Artificial Intelligence and Machine Learning: A Comprehensive Review

Neha Singh

 <https://orcid.org/0009-0000-5097-8945>

Invertis University, India


Jitendra Nath Shrivastava

Invertis University, India

Gaurav Agarwal

Invertis University, India

Akash Sanghi


 <https://orcid.org/0000-0002-3532-7981>

Invertis University, India

Swati Jha


Invertis University, India

Kamal Upreti

 <https://orcid.org/0000-0003-0665-530X>

Christ University, India

Ramesh Chandra Poonia

 <https://orcid.org/0000-0001-8054-2405>

Christ University, India

Amit Kumar Gupta

KIET Group of Institutions, India

ABSTRACT

The interaction between Human-Cyber-Physical Systems (CPS) has become increasingly critical as CPS technologies permeate various facets of modern life, from smart homes to industrial automation. This highlights the evolving landscape of

DOI: 10.4018/979-8-3693-5728-6.ch009

research aimed at fostering smooth interaction between humans and CPS, stressing the necessity of bridging the gap between users and these intricate systems. Effective interaction with CPS requires a profound understanding of human behaviors, preferences, and cognitive processes. Furthermore, this emphasizes notable research trends aimed at improving Human-CPS interaction, including the exploration of innovative interaction modalities such as natural language processing, gesture recognition, and brain-computer interfaces. Thanks to Artificial Intelligence (AI) and Machine Learning (ML), computer interactions are changing a lot.

1.INTRODUCTION

This chapter leverages the power of machine learning and artificial intelligence to enable and enhance the productivity of human-computer interaction. Human-computer interaction is a field of emerging basket of technologies which interact with each other and human (Baheti, R. and Gill.H,2011).

Cyber Physical System: A cyber-physical system (CPS) is a network of interconnected computational and physical components that interact to monitor, control, and optimize physical processes. These systems integrate advanced computing, communication, and control technologies to monitor, analyze, and manage physical processes in real-time (Baheti, R. and Gill.H,2011). Let's delve into the details of a cyber system:

It includes:

1. **Cyber Layer:** The cyber layer of a cyber system encompasses the computational and communication infrastructure that processes data, runs algorithms, and facilitates interaction between different system components. Key elements of the cyber layer include:
 - **Computational Units:** These units consist of computing devices such as microprocessors, microcontrollers, and embedded systems that execute software programs and algorithms.
 - **Software Platforms:** Cyber systems rely on software platforms and operating systems to manage computational tasks, handle communication protocols, and provide interfaces for interaction with users or other systems.
 - **Communication Networks:** Networks enable data exchange between different components of the cyber system, allowing seamless coordination and collaboration. Communication technologies include wired and wireless protocols such as Ethernet, Wi-Fi, Bluetooth, and Zigbee.

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/enhancing-human-computer-interaction-through-artificial-intelligence-and-machine-learning/363633

Related Content

Predicting Software Abnormal State by using Classification Algorithm

Yongquan Yan and Ping Guo (2021). *Research Anthology on Recent Trends, Tools, and Implications of Computer Programming* (pp. 1095-1113).

www.irma-international.org/chapter/predicting-software-abnormal-state-by-using-classification-algorithm/261070

Methodology for ISO/IEC 29110 Profile Implementation in EPF Composer

Alena Buchalceva (2021). *Research Anthology on Recent Trends, Tools, and Implications of Computer Programming* (pp. 422-438).

www.irma-international.org/chapter/methodology-for-isoiec-29110-profile-implementation-in-epf-composer/261037

Assessing the Potential Improvement an Open Systems Development Perspective Could Offer to the Software Evolution Paradigm

James Austin Cowling and Wendy K. Ivins (2021). *Research Anthology on Recent Trends, Tools, and Implications of Computer Programming* (pp. 1553-1573).

www.irma-international.org/chapter/assessing-the-potential-improvement-an-open-systems-development-perspective-could-offer-to-the-software-evolution-paradigm/261090

Unleashing Metaverse for Sustainable Development: Challenges and Opportunities

Anjali Gautam, Priyanka Dadhich, Himanshu Gupta, Lakshay Rekhi, Shitiz Upreti, Ramesh Chandra Poonia and Kamal Upreti (2025). *Navigating Cyber-Physical Systems With Cutting-Edge Technologies* (pp. 309-326).

www.irma-international.org/chapter/unleashing-metaverse-for-sustainable-development/363636

Enhancing Cybersecurity With SuperHyperSoft Computing Approaches

Pankaj Bhambri (2025). *Modern SuperHyperSoft Computing Trends in Science and Technology* (pp. 127-148).

www.irma-international.org/chapter/enhancing-cybersecurity-with-superhypersoft-computing-approaches/365470