

Importance of Human Computer Interaction in Ambient Intelligence

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Abstract: Human-Computer Interaction (HCI) is the study of how people interact with computers and to what extent computers are or are not developed for successful interaction with human beings. HCI researches the design and use of computer technology, focused on the interfaces between people, users and computers. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways.

The concept of Ambient Intelligence (AmI) is a modern technology in Information Technology (IT) that has potential for great impact in the future. The vision of AmI is that the people will be surrounded by intelligent objects that can sense the context or Situation and respond according to the desire of the people. Ambient Intelligence is type of digital environment that proactively but sensibly supports people in their everyday lives. It will bring the feeling that the people are living with technologies. It works with the concept of 'disappearing computer', the environment of AmI make the technology invisible.

This paper is about how the HCI and AmI are inter-related, how they work together and how they are dependent on each other, also to get awareness of the Need and Importance of HCI in the environment of AmI.

Keywords: AmI, HCI, AI, Ubiquitous Computing, User Interface

I. INTRODUCTION

In an Ambient Intelligence world, devices work in concert to support people in carrying out their everyday life activities, tasks and rituals in easy and natural way using information and intelligence that is hidden in the network connecting these devices. As these devices grow smaller, more connected and more integrated into our environment, the technology disappears into our surroundings until only the user interface remains perceivable by users.

One important HCI factor is that different users form different conceptions or mental models about their interactions and have different ways of learning and keeping knowledge and skills (different "cognitive styles" as in, for example, "left-brained" and "right-brained" people). In addition, cultural and national differences play a part. Another consideration in studying or designing HCI is that user interface technology changes rapidly, offering new interaction possibilities to which previous research findings may not apply. Finally, user preferences change as they gradually master new interfaces.

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II. IMPORTANCE OF HCI

Humans interact with computers in many ways is the interface between humans and computers is crucial to facilitate this interaction. 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 human-computer interaction field has been in quality of interaction, and in different branching in its history. Instead of designing regular interfaces, the different research branches have had a different focus on the concepts of multimodality rather than unimodality, intelligent adaptive interfaces rather than command/action-based ones, and finally active rather than passive interfaces.

The Association for Computing Machinery (ACM) defines human-computer interaction as "a discipline 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 simply End User Computing Satisfaction). "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. HCI is also sometimes termed human-machine interaction (HMI), man-machine interaction (MMI) or computer-human interaction (CHI).

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 instrument 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 and thus the conceptually good idea actually had undesirable results.

Human-Computer Interaction studies the ways in which humans make, or do not make, use of computational artifacts, systems and infrastructures. In doing so, much of the research in the field seeks to improve human-computer interaction by improving the *usability* of computer interfaces. How usability is to be precisely understood, how it relates to other social and cultural values and when it is, and when it may not be a desirable property of computer interfaces is increasingly debated.

Much of the field of Human-Computer Interaction emphasis on:

- Different methods for designing new computer interfaces, by optimizing a design for a desired property like learnability, findability, efficiency of use.
- Various methods for implementing interfaces, by means of software libraries.
- Advanced methods for evaluating and comparing various types of interfaces with respect to their usability and other desirable properties.
- Different methods for depth study of human computer use and its sociocultural implications in more broad way.
- Methods to identify whether the user is human or computer.
- Models and theories of human computer use as well as conceptual frameworks for the design of computer interfaces, such as cognitivist user models, Activity Theory or ethnomethodological accounts of human computer use.
- Perspectives that critically reflect upon the values that underlie computational design, computer use and HCI research practice.

When pursuing a cognitivist perspective, researchers of HCI may seek to align computer interfaces with the mental model that humans have of their activities. When pursuing a post-cognitivist perspective, researchers of HCI may seek to align computer interfaces with existing social practices or existing sociocultural values.

In HCI working in developing design methodologies, experimenting with devices, prototyping software and hardware systems, exploring interaction paradigms, and developing models and theories of interaction is going on so rapidly

III. IMPORTANCE OF AMI

In the past ten years, we've witnessed an astonishing mobile computing revolution. Smartphone installation base is expected to reach 6 billion by 2020, according to research firm IHS Markit. Over half of the world's population are carrying personal devices that have powerful processors, sensors, cameras, high speed communications and intelligent applications. In the next ten years, an Ambient Intelligence (AmI) revolution is coming where all the above technologies will be embedded in our homes, grocery stores, offices, hospitals and transportation services. AmI will be one of the key elements of the Fourth Industrial Revolution.

In the Rise of Ubiquitous Computer Vision in IoT (Internet of things) and Intelligent IoT and Fog Computing Trends, Ambient Intelligence is and explore how Internet of Things (IoT) solutions should incorporate AmI properties to address the pain points of users, business and society.

Ambient intelligence (AmI) deals with a new world of ubiquitous computing devices, where physical environments interact intelligently and unobtrusively with people. These environments should be aware of people's needs, customizing requirements and forecasting behaviors. AmI environments can be diverse, such as homes, offices, meeting rooms, schools, hospitals, control centers, vehicles, tourist attractions, stores, sports facilities, and music devices. Artificial intelligence research aims to include

more intelligence in AmI environments, allowing better support for humans and access to the essential knowledge for making better decisions when interacting with these environments.

Ambient intelligence (AmI) is a new multidisciplinary paradigm rooted in the ideas of Invisible Computer, and Ubiquitous Computing. AmI fosters novel anthropomorphic human-machine models of interaction. In AmI, technologies are deployed to make computers disappear in the background, while the human user moves into the foreground in complete control of the augmented environment. AmI is a user-centric paradigm, it supports a variety of artificial intelligence methods and works pervasively, nonintrusive, and transparently to aid the user. AmI supports and promotes interdisciplinary research encompassing the technological, scientific and artistic fields creating a virtual support for embedded and distributed intelligence.

IV. IMPORTANCE OF HCI IN AMI

If we try to relate both concepts HCI and AmI we can call them as siblings, we can see that to implement the concept of Ambient Intelligence the only thing that is actually required is human computer interaction. As we have seen AmI works in presence of people only and HCI means machine will work according to humans so communication between human and machines is HCI which is first step of towards the development of Ambient intelligence environment. Like if we talk about three major AmI key characteristics they are Ubiquitous Computing, Ubiquitous Communication, Social User Interface all are based on the concept of Human Computer Interactions only. So here we can see the importance of HCI in AmI.

Ex. (1) In AmI If in the concept of smart house, we want to play music at home when someone arrives then we have to provide the database of humans which is part of HCI. Music can be played with presence of people or on behalf of their mood like happy, sad, angry or neutral. For all this we have to use the concept of HCI.

(2) In AmI virtual room, virtual player all needs Human Computer Interaction.

Almost all concept of Ambient Intelligence follows the various rules of Human computer Interactions.

Developed technique of AmI is Closet System, Automatize Intelligence, Smart room they all have the interaction of humans with machines.

V. CONCLUSION

AmI offers enormous benefits and is expected to have a bright future in two key potential markets:

- Home users interested in saving time and money, higher convenience, security, and safety as well as entertainment.
- Organizations pursuing profit maximization through higher efficiency, effectiveness, security, and safety.

The stumbling blocks that might hinder the widespread adoption of AmI in the home environment are costs and risk of intrusion. In the business field, potential employee resistance, legal and ethical restrictions, and risks associated with high system complexity are additional major hurdles that have to be overcome before AmI can be successfully implemented. In addition, computer scientists are creating standards that will enable computers and people to interact, regardless of their location. Pervasive computing utilizes multi-modal interfaces, and that means developing systems that can recognize voice and gestures systems that perceive their end users.

Research must, therefore, focus on developing user-friendly low-cost solutions with a high level of network security. Managers of the various companies intending to produce and sell AmI technology must agree on common networking standards, which are a major factor determining future success or failure. Managers intending to employ AmI in their companies must ensure that the expected benefits exceed the cost of implementation and that the organization fits the technology, which will in many cases require structural changes. Individuals and organizations will be affected by AmI in various ways and it is the end-user's responsibility to gain the greatest benefits from AmI while preventing or minimizing its potential negative effects as far as possible. HCI also differs from human factors in that there is less of a focus on repetitive work-oriented tasks and procedures, and much less emphasis on physical stress and the physical form or industrial design of the user interface, such as keyboards and mouse devices. So here we can conclude that AmI is based on HCI and they both works together.

VI. REFERENCES

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