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Human Computer Intraction

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ABSTRACT: The intention of this paper is to provide an overview on the subject of Human-Computer Interaction (HCI). Human-computer interaction basically covers the concepts of humans interacting with computers, but computers do not understand our feelings or emotions, so we need to inform them of how they should react in different situations, and to help the computer understand different situations, we use various techniques. In these different techniques, principles are designed for the interaction of a human and a computer in such a manner that our expectations are met. Additionally, we can define HCI as the area of study where only the approaches, principles, and techniques are applied to build a user-friendly interface between people and computers. Because we are all surrounded by many devices that make our jobs easier, HCI is crucial in our daily lives. Therefore, HCI is the end result of ongoing testing and improvement of interface designs that may have an impact on the context of usage for users.

KEYWORDS: Human-Computer Interaction (HCI), techniques, interface, principles, design, ComputerHuman Interaction (CHI)

I. INTRODUCTION

Human-computer interaction (HCI) is the study of how to use and develop computer technology, with a particular emphasis on how users and computers interact with one another. HCI researchers study how people use computers and develop new technologies that let people use them in inventive ways. "Humancomputer Interface (HCI)" refers to a device that enables interaction between a human and a computer. The interface between humans and computers is essential for supporting the various ways in which humans and computers communicate. HCI may alternatively be referred to as computer-human interaction (CHI), man-machine interaction (MMI), or HMI (human-machine interaction) (CHI). The widely used graphical user interfaces (GUI) of today are found in desktop applications, internet browsers, mobile computers, and computer kiosks.

The evolving multi-modal and Graphical user interfaces (GUI) enable humans to interact with embodied character agents in a way that is not possible with other interface paradigms. Voice user interfaces (VUI) are utilised for voice detection and synthesising systems. Then a description of current technology and more recent developments in the subject is given. A description of the many architectures used in HCI designs follows below. The concluding parts provide an overview of certain HCI applications and discuss possible future developments. Since the interface between humans and computers is essential to facilitating this contact, humans engage with computers in a variety of ways.

HCI, or human-computer interaction, is a specific area of computer science that deals with cognition, human factors and economics, as well as design approaches. It was established in the early 1990s of the 20th century. It involves the research, design, implementation, and evaluation of computing systems that are implicated in behavior of human users with software expert systems on the one hand. Additionally, HCI strives to improve user-computer interactions by improving the responsiveness of computers. Life has changed dramatically in the twenty-first century as a result of the invention of a technical marvel known as the "computer." Computers have permeated society in a variety of ways, including the Internet of Things, autonomous vehicles, and smart cities. It should come as no surprise that over time, the ways in which we communicate with computers have improved to the point where we are now able to command and exert authority with just our voice.

II. HUMAN-COMPUTER INTRACTION PROCESS

Human-Computer Interaction Process HCI is concerned with methods and tools for the development of human-computer interfaces, assessing the usability of computer systems [56] and with broader human-centric issues including how people interact with computers [19]. It is based on theories about how humans process information and interact with technology and other people in social contexts where computers are used, placing HCI designers at the heart of a system interaction between human and machine [31,37]. This interaction also brings design knowledge into the context, such as visual hierarchy, color, and typography [71]

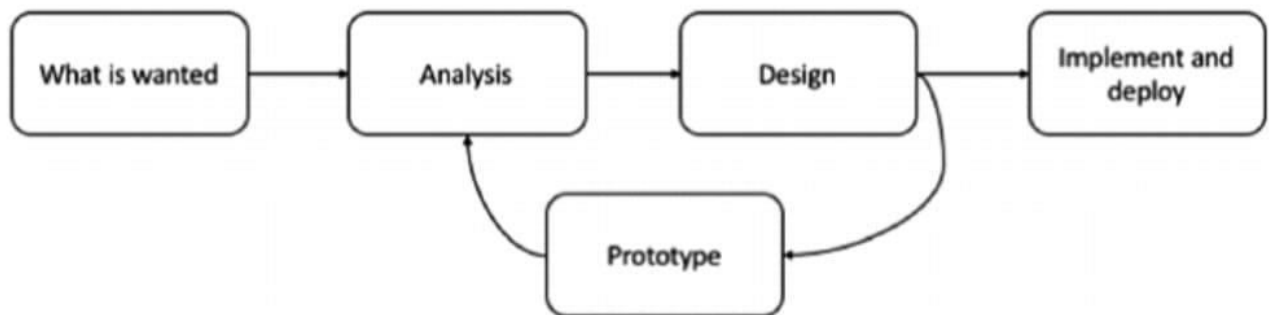


Fig. 1. HCI design process [19].

The first step in the HCI process, what is wanted, focuses on investigating user's needs and their lifestyles to provide insights on how the HCI designers can generate interactive solutions to match the user's needs [19,62]. Some suggested tools for this exploration phase are interviewing the user, recording the user's behavior, observing user's world directly, and analyzing existing documents [19]. Analysis step emphasizes synthesizing the main issues coming from the first step and provides directions to the next step, design [19]. The main goal of this phase is to solve problems while bringing usability factors and practices into the process [19]. As designers' progress towards the goal of the ideal solution, they develop prototypes to analyze the quality of their solutions using guidelines such as Shneiderman's eight golden rules, guidelines like heuristics, and Norman's seven and Nielsen's 10 design principles. These guidelines are used to enhance the solution's usability and interaction with the targeted users [19]. Paper-based designs, storyboards, video presentation, and cardboard mockup are created as early forms of prototypes [19,62]. Next step is integrating physical device and software where HCI researchers rely on guidelines to assess design violations while users interact with the solutions in their own environment [19]. Prototypes are often treated as restricted presentations of a design and used for testing the solutions effectiveness with the users [62]. This design evaluation phase helps the HCI designers to find problems and gives them an opportunity to address it in early steps of development [19]. Once the prototype is proven to be effective and functional, the design is implemented and deployed to market [19].

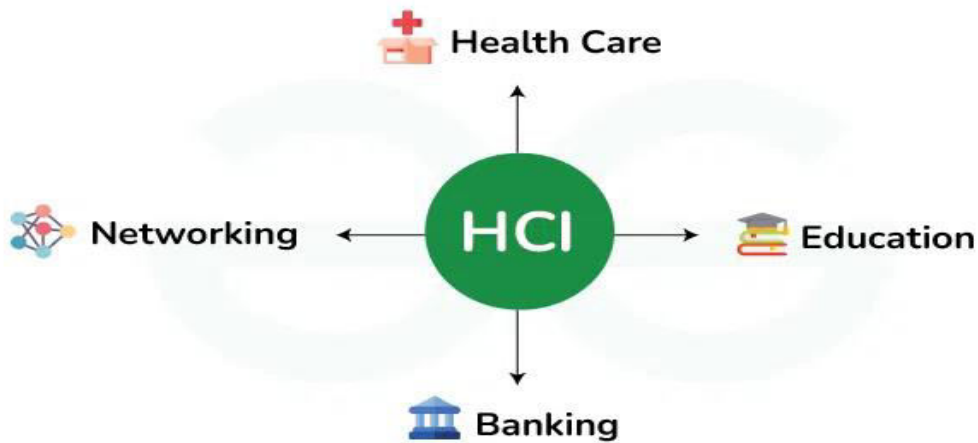
III. LITERATURE

Human-computer interaction can be viewed as two powerful information processors (human and computer) attempting to communicate with each other via a narrow bandwidth, highly constrained interface. Human-Computer Interaction (HCI) is defined by (ACM SIGCHI, 1996) as "a discipline concerned with the design, evaluation, and implementation of computing systems for human use and with the study of major phenomena surrounding them. As by the definition HCI knows as intersection of different disciplines such as computer science, behavioral science and several others. As the result there is real confusion in what HCI is, a science, a design science or an engineering discipline. Newell & Card (1985) defined HCI as a science; HCI is tempered by approximation, providing engineering style theories and tools for designers. Carroll & Campbell (1989) defined HCI as a design science, developing a craft based approach and new research methods to evaluate existing systems in their intended and tasks context, using the results to inform designers for the next generation of systems. The design and strategy of humans and computers intermingling to accomplish work effectively, exposed as an engineering discipline (Long & Dowell, 1989). Preece (1994) defined as, Human-computer interaction (HCI) is "the discipline of designing, evaluating and implementing interactive computer

systems for human use, as well the study of major phenomena surrounding this discipline” (Preece, 1994). As the whole human-computer interaction studies related with both human and machine in combination, it draws from supporting knowledge on both the machine and the human side. Dix(1998) stated that HCI involves the design implementation and evaluation of interactive systems in the context of the users’ task and work. Human Computer Interaction basically concerned with the interfaces between man and machine. HCI differs from human factors (or ergonomics) in some ways. HCI mainly focus more on user’s perspective, working specifically with computers. HCI also focuses on the implementation mechanisms in software and hardware production to support effective human computer interaction.

Application of HCI in different domains

It includes the design and development of application. These application includes desktop application, websites and mobile apps. These application are used in different domains it includes healthcare, banking, education, networking and many more.



Applications of HCI



Health care

Patients have so many options now a days. They can buy medicines online and book appointments with doctor just with the help of mobile application. Augmented Reality(AR) and Virtual Reality(VR) are now transforming surgical process, previously it was very risky. Now doctor can use 3D animations to visualize the process. It can be used to train new surgeons.

Education

Now students can understand any concept more easily. There are so many resources available on internet now a days. Class room teaching are now very interesting with the help of smart classes. AR/VR can really help students to visualize any concept very easily. Students have option to study online. During COVID-19 students couldn’t able to go outside their home. In this situation they have option to study online.

Banking

Now common people don’t need to wait in long queues of bank. They can get banking solution right at their home using Net banking or Mobile banking. These application also provides user a secure environment to avoid cyber crimes.

Networking

Networking is very easy now a days. It includes social media networking and business networking. Now it is very easy for us to connect and share thoughts with anyone. It streamlines the process of finding jobs.

IV. METHODOLOGY

Sure, here are some key points regarding human-computer interaction (HCI) in metrology:

1. **User Interface Design:** HCI focuses on designing interfaces that are intuitive and user-friendly for operating measurement devices. Clear layouts, well-designed controls, and informative feedback help users interact efficiently with metrology equipment.
2. **Task Efficiency:** HCI aims to streamline measurement tasks by minimizing the steps required to perform measurements. Intuitive workflows and quick access to frequently used functions enhance efficiency in metrology processes.
3. **Data Visualization:** HCI principles guide the presentation of measurement data in a clear and understandable format. Graphs, charts, and other visualizations help users interpret complex data and make informed decisions based on measurement results.
4. **Feedback and Guidance:** Providing timely feedback and guidance during measurement tasks is essential for HCI in metrology. Real-time feedback on measurement quality, error detection, and guidance on corrective actions help users achieve accurate results.
5. **Customization and Personalization:** HCI allows for customization of user interfaces to meet the specific needs and preferences of individual users or applications. Customizable settings, user profiles, and personalized workflows enhance user experience and productivity.
6. **Accessibility:** HCI ensures that measurement devices are accessible to users with diverse abilities and requirements. Designing interfaces with considerations for accessibility features such as screen readers, magnification options, and alternative input methods promotes inclusivity in metrology.
7. **Training and Support:** HCI principles extend to the design of training materials and support resources for metrology users. Clear, concise instructions, interactive tutorials, and accessible help documentation assist users in learning how to operate measurement equipment effectively.
8. **Usability Testing:** Incorporating usability testing into the development process allows for the evaluation of HCI design choices. Gathering feedback from metrology users through testing helps identify areas for improvement and refinement of the user interface.
9. By considering these points, HCI contributes to the development of metrology systems that are efficient, accurate, and user-friendly, ultimately improving the quality and reliability of measurement processes.

V. CONCLUSION

In the above research, human computer interaction literature is reviewed as well as technological matters like interaction styles are studied and pros and cons are dogged. And we searched for better interaction styles among the existing ones. At the same time we found dome best "fit" in between a human and a computer in terms of interaction. While designing moral, effective and user-friendly interfaces, several disputes have to be considered. This research suggests a theoretical support in the area of human computer interfacing. In this paper we have deliberated the promising use of Human Computer Interaction to attain top levels of interaction between user and devices.

We conclude that to design a worthy human computer interaction, we have to appropriately elect the suitable style of interaction, kind of interface to adequate with the group of users it is intended whereas the human issues must be taken into account. Therefore we recommend some important modes of interaction such as parallel input, voice recognition, interoperability among devices and handwriting recognition. We recommend related humancomputer interaction design.

Clearly, we now analyzed all existing techniques in humancomputer interaction, in order to increase the efficiency of devices. However, the implementation of suggested interaction styles and models offer a sound basis for the future research.

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