INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

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INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

REFERENCES

APPENDIX/ANNEXURE

It should be in a 8 point Calibri Font, single spaced and justified. The manuscript should preferably not exceed ***5000 WORDS***.

10.   **FIGURES &TABLES:** These should be simple, crystal clear, centered, separately numbered &self explained, and **titles must be above the table/figure**. **Sources of data should be mentioned below the table/figure**. It should be ensured that the tables/figures are referred to from the main text.

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12.   **REFERENCES**: The list of all references should be alphabetically arranged. The author (s) should mention only the actually utilised references in the preparation of manuscript and they are supposed to follow **Harvard Style of Referencing**. The author (s) are supposed to follow the references as per the following:

- All works cited in the text (including sources for tables and figures) should be listed alphabetically.
- Use (**ed.**) for one editor, and (**ed.s**) for multiple editors.
- When listing two or more works by one author, use --- (20xx), such as after Kohl (1997), use --- (2001), etc, in chronologically ascending order.
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BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

ONLINE RESOURCES

- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

WEBSITES

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

AN IMPERATIVE STUDY ABOUT HUMAN COMPUTER INTERACTION: TRENDS AND TECHNOLOGIES

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ABSTRACT

Computer is a device that has established its importance in almost every field of today's life. There was a time when some devices were needed to feed the data in computer machine but time has changed. Inventions are going in such a way that data can be directly pass to computers but with the intervention of human being. Such procedure introduced the concept Human computer Interaction (HCI). It is a highly advanced field that describes how the users are able to deal with computers to accomplish their respective tasks in a new way and how he can directly deal with machines. Lots of technologies have been rooted out in HCI – sixth sense technology, gesture recognition, speaker recognition etc. All these technologies are the in-trend and pioneer research topics for researchers nowadays, because research on such advance and interesting topics motivates the researcher to move ahead. The basic contents of this paper focus on the study of human computer Interaction (HCI), conjunction between human and computer. Moreover, this paper comprises of definitions, application related concepts, latest advancements in of the area Human Computer Interaction, Architecture that it possesses, modeling of HCI and broad range of references for referred material.

KEYWORDS

Human Computer Interaction, Speech Recognition, Variations of HCI, Applications

INTRODUCTION

Usage of Computers in every day of human life is indispensible activity. For very small to larger tasks, all are being done by Computers. There are considerable advantages of using Computers for some of the special fields especially in engineering and medicines. For this, abundant of inventions have been done to make more use of computers by such areas. HCI (human-computer interaction), study of way, how the people interact with computers and to what extent computers are successfully interacting with human beings. Hewett [3] defined "Human computer interaction is 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.". HCI studies the relationship between human and computers, it needs supporting knowledge on both the human and the machine side. Before such kind of invention, for interaction between computers and human being key-boards, mouse etc, were in trend. But no ways so many devices have been released which are helpful in developing interaction between user and computer. Thomas [1] in his paper focused on variety of new devices for user computer interaction. The highlighting objectives of this broadly defined paper are to describe the overall architecture of Human Computer Interaction, approaches that come under HCI and some of the newly arrivals in the field of input devices that are useful in HCI these days. Aforementioned variations of HCI are the most covering areas for researchers as it polishes their knowledge for happenings of world. As name implies, HCI consists of three parts: the **user**, the **computer** itself, and the ways they work together that is **interface** itself.

LITERATURE REVIEW

Fakhreddine Karray, Milad Alemzadeh, Jamil Abou Saleh and Mo Nours Arab (2008) attempted to include the definitions regarding HCI, presented the study of existing techniques along with study of recent advancements under HCI and all the new interaction methods like intelligent, multimodal methods have been introduced in their paper.

Jia Wei (2009) in his paper purely explores the concept of HCI with numerous definitions and its applicability or use in hospitality industry. Moreover, some standards that are required for designing HCI and many more applications of HCI have been discussed in his paper.

Thomas Hahn (2010) in his paper stated all the techniques and devices which are favorable for HCI like devices that uses the human hand gesture along with multi touch tabs like iPad and sixth sense technology all have been described in so deep way.

Acm sigchi curricula for human-computer interaction (updated on 2009) It is a curricula that involves all the matter in the form of chapters. Five chapters have been designed, covers introduction, HCI courses, HCI curriculum designs and some kind of observed issues.

Sanjeev Tayal, Pramod Kr. and Monika Garg (2012) focused on every aspect related to Sixth Sense. They have provided enormous details on Sixth Sense technology like how it works actually and what are the important and vital components behind its working and the advantages of Sixth Sense technology also been introduced in this paper.

Chris Harrison, Desney Tan, and Dan Morris (2010) In this paper the authors have presented their work/approach towards the fact that human body or skin is appropriate as an input surface. They have used the approach of wrist, finger tips, forearm and armband for input surface and afterwards Results for the same in the terms of percentage have been declared which shows which part is highly effective to serve as input for data even while moving/walking these surfaces work!!

STATEMENT OF PROBLEM

In this paper there is extreme focus on inseparable concepts of HCI and all the major developments that have been done under HCI like various smart devices that enable today's user to interact with computer directly without intervention of input devices or output devices. The main reason behind the creation of this Research paper is to provide abundant data or a crystal clear view on HCI and all the techniques that fall under HCI which play vital important role in efficient working of HCI. So for this purpose an overview of HCI, Vast researches that are done on HCI and some trendy devices which are being used in HCI have been drafted out in this paper.

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COMPONENTS OF HCI

USER / END USER

User is the one end of entire system, but Prior component of Human Computer Interaction. The days have gone when user was responsible to enter the data into the system via some restricted Input devices. Nowadays vast list of devices has been introduced which incorporates very advance devices for forwarding the data into the machines. Jia Wei [7] stated that user may an individual user or may group of users working together are the actual users of HCI. It is the need of user and interesting concepts that are behind their origin and development.

COMPUTER/ MACHINE

Computer is the actual machine where interaction is to be carried out. Computers ranging from mini to mainframes are considerable useful, depending upon the utility of a user. But all these new technologies like gesture & speech recognition, sixth sense technologies require one particular device for their efficient working. Like speech recognition requires high quality Mic where as sixth sense technology requires sort of mini projector by which it can project the view that user is viewing. Nicky Danino[11] stated that computers in HCI refers to technologies that involves systems from desktop to generalized. For invoking user interaction with computers, Imperative input devices with high storage memory are required to be attached with such computer systems. Laptops cum notepads are in trend that can act as laptop one time and notepad at another time if screen is detached from its keypad.

INTERFACE/ADMIX/INTERACTION

HCI is responsible to create the enhancing interaction between the computers and human beings. All the input and output devices are being involved this process. Lew, Sebe, and Huang [5] in their paper stated that human beings not only with speech interact with one another , but use body gestures too for the reflection of their emotions .Graphical user interface is highly efficient interface to create the interaction with machine to complete the task.

GOALS THAT HCI ATTEMPTING TO ATTAIN

Introduction and development of new concepts, logics always possess some goals or some objectives behind them. HCI has been coined out due to several reasons. User involvement is at prior place that makes it efficient at highest. Acc to Te'eni [9], HCI is to be designed to achieve compatibility between its user and machine by providing well-suitable interfaces. The highlighting goals of HCI are to produce usable, friendly, simple to learn systems: A basic goal of HCI is to improve the interactions between users and computers by making computers more usable and receptive to the user's needs. HCI is a design that should produce a fit between the user, the machine and the required services in order to achieve a certain performance both in quality and optimality of the services. Specifically, HCI is concerned with:

- Methodologies and processes for designing interfaces (i.e., given a task and a class of users, design the best possible interface within given constraints, optimizing for a desired property such as learnability or efficiency of use)
- Methods for implementing interfaces (e.g. software toolkits and libraries; efficient algorithms).
- Techniques for evaluating and comparing interfaces.
- Developing new interfaces and interaction techniques.
- Developing descriptive and predictive models and theories of interaction.

HIGHLY IN-TREND STREAM FOR RESEARCHERS

All the recent technologies and advancements in the field of HCI are making this stream so interesting for the researchers. No area has been left untouched where the sort of latest advancements of HCI have not been involved. Smart home concept, Smart classes, Smart phones, sensor Networks, human speech recognition all are the concepts of HCI. So Far, Special models have been introduced for the efficient working of HCI. Classical Input devices that were in so high demand have been completely replaced by the new methods and new techniques for feeding the data into the computer systems for processing. Hand gestures, human voice are the highly adaptable methods to feed the data as input, all is great achievement by using HCI. Speech recognition, this is one of the important application of HCI that has made handicapped user able to interact with Computers without the intervention of their hands by only speaking out the words either isolated or connected and these words are easily captured by computers and these machines can act upon data that they received from Users. Another the most important application that comes under HCI is Sixth sense technology, that lets the users to use hand gestures to interact with the information. This outstanding invention has been proposed by Pranav Mistry. This technology uses some sort of Pocket projectors, a mirror, a camera along with mobile like wearable device and this has reduced the need of all kind of input and output devices, wherever the user is he can use his palm or his arm as an input device, can say its really the super advancement in the area of HCI

HYPE-CYCLE FOR HUMAN COMPUTER INTERACTION

A hype cycle diagram for Human Computer Interaction is a representation of the maturity, adoption and social applications of this technology the term was introduced by Gartner, Inc

FIG. 1: HYPE CYCLE FOR HUMAN-COMPUTER INTERACTION, 2010 (GARTNER, 2010)
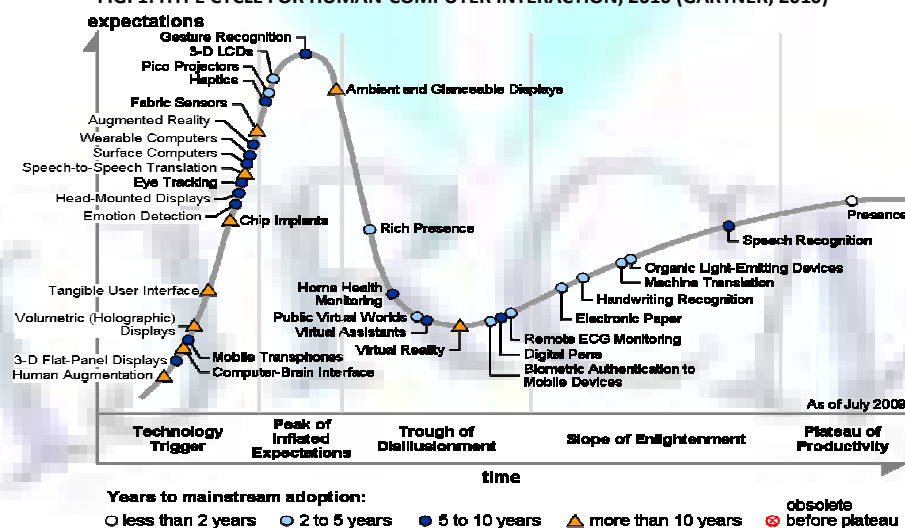
As far as HCI is concerned three main aspects are inseparable part of HCI and they can be represented as: cognitive aspect, physical aspect and finally affective aspect. The cognitive aspects associates with the ways by which the user is understandable to the system and can easily communicate with the system. The physical aspect associated with the mechanisms that are involved in human – computer interaction. The affective aspect deals with way by which the user is continued to use the machine although the machines change its attitude and behavior about the user. hype cycle diagram above shown , is a graphical representation that is mirroring the maturity and adoption of HCI technologies and showing the emerging trends as well as which have gone under slope that is slope of enlighten.

VARIATIONS UNDER THE FIELD OF HCI

HCI wraps variety of techniques in itself. Impressing fact about this, each and every technology under HCI is highly in trend topic under these days research. Slow and steady but researchers are working on every field that is under HCI. It is based on different modalities [4], HCI can be divided into three categories -

1. Visual driven HCI
2. Audio approach based HCI
3. Sensor approach based HCI

Different variations or types come under HCI which enables to enter the data in different ways by streaming data in Audio based approach, Visual Based Approach and/or via sensor technology.

VISUAL DRIVEN HCI

The visual approach based human computer interaction is probably the most widespread area in HCI research. Here researchers emphasizes on human responses which can be recognized as a visual signal. Devices recognize the visual movement or physical movement of user and responds in accordance with that. Body movement is just enough to make the machine understand of concepts. Such kinds of devices are helpful to people who are quite less known to computer machines. Some of the main research areas in this section are as follow [4]:

Detection/ Analysis of face expressions

Facial Expression Analysis

Body Movement Tracking (Large-scale)

Gesture Recognition

Gaze Detection (Eyes Movement Tracking)

Facial expression analysis generally deals with recognition of visually emotions. Facial expressions are the automatic recognition of facial expressions, very important component of natural human-machine interfaces; it may also be used in behavioral science and in clinical practice.

Gaze tracking is tracking the gaze of people looking at images to determine regions of interest and their importance. Eye tracking systems are basically for helping disable candidates in which eye tracking plays a important role.

AUDIO APPROACH DRIVEN HCI

The audio approach based interaction; inverse to visual HCI is another important area of HCI systems. User voice is required to make here computer understand the instructions that are delivered by speaker. This area deals by acquiring information in different audio signals. Research areas in this section can be divided to the following parts:

Speech Recognition

Speaker Recognition

Human made Noise/Sign Detections

Speech recognition and Speaker recognition have been the major areas of researchers.

Speech recognition systems is also known as Automatic Speech Recognition (ASR), or computer speech recognition, is the process of converting a speech signal to a sequence of words, by means of an algorithm implemented as a computer program used by the general public e.g. phone-based automated information retrieval, or ticketing purchasing – the user makes contact with the system, and speaks instead of commands and questions. Models for these recognition systems can be depicted as-

- Zipf's law
- Hidden Markov Models (HMM)
- The noisy channel
- Parametric clustering

A speech recognition system needs a microphone for the person to speak into, Speech recognition software, a computer to take and interpret the speech, a good quality soundcard for input and/or output.

Speaker recognition encompasses verification and identification. Automatic Speaker Verification (ASV) is the use of a machine to verify a person's claimed identity from his voice.

Music generation and interaction is a new area in HCI which has applications in art industry in both audio- and visual-based HCI systems.

SENSOR APPROACH DRIVEN HCI

This comprises of at least Physical sensor that is placed between user and machine to carry out the interaction. These sensors are very sophisticated.

Pen-Based Interaction (Light pen)

Mouse & Keyboard

Joysticks

Motion Tracking Sensors

Digitizers

Pressure Sensors

Taste/Smell Sensors

Pen-Based sensors are specifically for mobile devices and are related to pen gesture and handwriting recognition areas.

Mouse and Keyboard, the main goal of any mouse is to translate the motion of our hand into signals that the computer can use.

A **keyboard** is a typewriter-style device, which uses an arrangement of buttons or keys. Keyboards have become the main input device for computers. It has characters engraved or printed on the keys and each press of a key typically corresponds to a single written symbol.

Motion tracking sensors/digitizers are the latest technology which has revolutionized movies, animations, art, and video game industry.

These types of sensors are also preferred in medical surgery application.

INTERACTIVE & IMPERATIVE TECHNOLOGIES OF HCI

TELEPRESENCE

Telepresence is an interactive and imperative technique that comprises of video technologies to give the perception to employees as they sit together in a same location although they are geographically separated. Very high definition cameras with very high fidelity acoustics are needed in the both of the side of participation .The California Community Colleges (CCC) is the real example using such interactive technology.

PERVASIVE HUMAN SENSING AND REMOTE ASSISTANCE

This technique is basically for military and civilian personnel by whom they can provide abundant information possibly by the use of head –mounted cameras and they could have benefit from virtual assistance. For example, for the bidirectional way, the information from translator, cultural experts, and intelligence medical staff could be provided directly to a soldier in the field. These specialists are intended to feed the information directly into the HMD of a soldier

MULTI TOUCH DEVICES INCORPORATING HCI TECHNIQUE

IPAD

The recent invention of iPad came from Apple is one of the latest implementation of full multi-touch displays which is entirely a new way that lets the people to interact with their computer. Thomas [1] in his paper stated importance of iPad and its contribution in HCI efficient working. With the introduction of iPad, it is now possible to use all the finger movements two finger movement or four finger movement to navigate through the interface. For example two fingers can magnify the things and four fingers to browse through the windows.

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FIG. 2: IPAD PICTURE (TAKEN FROM http://www.google .co.in/)

MICROSOFT ©SURFACE

Microsoft Surface is a collection of software and   hardware technology that allows the people to interact with digital contents. These devices make use of infrared cameras for recognition of objects that are used on screen. An object may the human fingers or even other items which can be placed on the screen. Thomas [1] in his paper described these devices much suitable for stationary purpose like for a normal table with which it is then feasible to interact with. Here no extra devices are required for a usage of this tool and interaction can be made directly with the hands. With the large 30 inch display more people able to interact with the system and with each other at the same time. So it is perhaps possible to browse through different information menus about the placed item and obtain more digital information.

SMART* APPLICATIONS OF HCI

SMART* CARS

HCI has been pointed out under the keen vision of car manufacturers too. They are putting their efforts for introducing the cars with backseats along with imperative gaming, location tracking features etc.

SMART* TVS

When talk about Smart TVs, one cannot avoid the Samsung TVs, who introduced the Smart these very firstly for the users by involving the concept of HCI where it is possible to manipulate the TV with finger gesture. Moreover, TV can act as computer systems in the same time with access of internet. These TVs enables the user to install vast range of applications and plug-ins and they do run their own complete operating system.

NEW APPLE TV

Apple TV, Digital media receiver that has been designed to fetch the contents from Youtube, Flicker, I cloud etc. This TV comprises of hard drive, its third generation was introduced on March 7, 2012 with new user interface.

SMART PHONES

Smartphone Technology brought into light by Sony Ericsson. Later on, Samsung, one of the leading Brand for advancement in electronics which introduced Smart Phones with prominent features of – Multi-touch, Sensors, Accelerometers, Location detection , Wi-Fi feature, largest display screen and flash for camera etc. These phones require their own mobile operating system (OS) –Apple's iOS, Google's Android, RIM's Blackberry and Samsung's Bada etc.

HCI IN VIDEO DEVICES

High efforts have been made in the area of video input and output devices like Sixth Sense .The main purpose of such devices is to provide more and more interaction with the computer then with normal touch screens or ipads. Therefore, these techniques tend to recognize human gestures like the hands without any kind of need of additional handheld pointing devices. This comprise of two categories-

SIXTH SENSE

Sixth Sense is a wearable gestural interface device that was introduced by Pranav Mistry, It is the new technique that is helpful in the area of HCI, in which all the interaction is done via hands without involving any kind of handheld devices. Acc to [6] Sixth Sense is a wearable gestural interface that lets the user to use hand gesture in a natural way to deal with information. The Sixth Sense prototype is comprised of a pocket projector, a mirror, colored marker and a camera as shown in fig [3]. Each of the components play vital role in its efficient working where Pocket projector projects the information like data or pictures on to wall or any of the surfaces, Mirror reflects the image or picture to any suitable surface that may be a wall or any of flat surfaces, Camera is to capture required picture that user makes with his hand and sends to the smart phone for further processing of image, Mobile or Smart Phone that processes the picture that it has been captured from camera interprets the hand gesture of user with color tapes or markers wrapped around Finger tips of user [6]. Colored Markers are wrapped around finger tips of user, they are of red, green , yellow and blue tapes that aid the webcam to recognize the hand or finger gesture of user ,The camera, mirror and projector are connected wirelessly to a blue tooth smart phone device that can be easily fit into the user's pocket. Both the projector- the camera and sensors are connected to mobile computing device that lies in the user's pocket. The projector projects visual information enabling surfaces, walls and physical objects; while the camera recognizes and tracks users' hand gestures and physical objects using computer-vision based techniques.

FIG. 3: IMAGE REPRESENTATION FOR SIXTH SENSE WORKING ALONG WITH COMPONENTS [6]
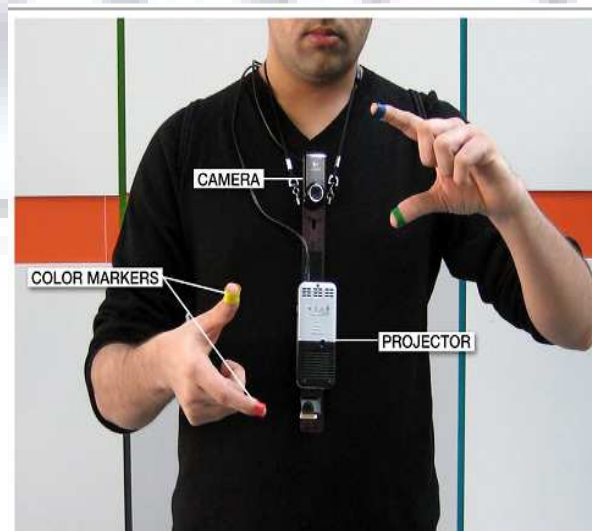
SKINPUT

Skinput is a technology that appropriates the human body for acoustic transmission, allowing the skin to be used as an input surface [2]. It uses bio-acoustic sensing to localize finger tips on the skin. The technology was studied and developed by Chris Harrison, Desney Tan, and Dan Morris at Microsoft Research's Computational User Experiences Group. Likewise sixth sense technology, Skinput also makes use of human body and it is always available mobile input system.

GSPEAK

Gspeak an Oblong's core technology, a full gesture input or output device employing 3D interface. It comes up with very sophisticated user interface and is designed to be used with big screens that use a lot more space. Therefore the user needs to wear hand gloves to control the interface activities, such systems come with very high definition graphical outputs that can be projected to any screen that user facing. User here able to drag the objects from big screens to a smaller screen and can use the interface with touch screen and can again drag the objects back to the big output screens. The most adventurous thing about this, the system can be used with any of the Device you want.

CONCLUSION & FUTURE SCOPE

This paper reflects brief description of Human Computer Interaction, Detail architecture of HCI and scope of Human Computer Interaction in the field of upcoming technologies. Applications of HCI have been flashed so that latest areas can be put into front of readers and they can have very bright knowledge about Human Computer Interaction, about recent applications like in Speech Recognition, Pattern Recognition, Sensor technology, Facial Expression Analysis, Body Movement Tracking, Gaze Detection, Gesture Recognition, and Eyes Movement Tracking etc. It is very important to say that well-designed HCI applications can minimize the gap between the user and the machine reduces time wasting and improve work efficiency to make happy and satisfied users.

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