

# Current Research and Applications on human-computer interaction

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## Abstract:

*This paper presents current development in human computer interaction development. Human computer interaction is a area of computer science concerned with the design, evaluations and implementation of interactive computer systems for human friendly application.*

*Basically, human computer interaction technology change area of computing totally. Human computer interaction gives research new view for computing area drawing program, text editing video games. It saves computing time and complexity of computing. HCI touches almost every area of computer application. The role the human factors plays important factor in many real life based application.*

**Keywords:** human computer interaction, computer science, interactive computer system

## I. INTRODUCTION

Basically, human computer interaction focus is on interaction and specifically on interaction between one or more humans and one or more computational machines. The classical situation is a person using an interactive graphics user interface program.

Human-computer interaction involves the study, and design of the interaction between users and computers. It is referred as the intersection of computer science, behavioral sciences, design and other fields of study.

human-computer interaction work on a human and a machine in conjunction, it need knowledge on both the machine and the human . 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, and human factors such as computer user satisfaction are relevant. Human computer interaction is multidisciplinary nature, people with various field contribute to its success.

## II. OVERVIEW OF HUMAN COMPUTER INTERACTION RESEARCH

### User customization

For particular application, end user requirements are primary. End-user development studies includes ordinary users interaction for routinely tailor applications to their own needs and use this power to invent new applications based on their understanding of their own domains. With their deeper knowledge of their own knowledge domains, users could increasingly be important sources of new applications at the expense of generic systems programmers.

### Embedded computation

Computation is passing beyond computers into every object for which uses can be found. Embedded systems make the environment alive with little computations and automated processes, from computerized home appliances to home automation system. Human interfaces to these embedded devices may be very different from those appropriate to workstations.

### Augmented reality

Augmented reality refers to the notion of layering relevant information into user vision of the world. Existing projects show real-time statistics to users performing difficult tasks, such as manufacturing. Augmented reality might include

augmenting social interactions by providing additional information about those individual converse with.

### III. RELATED WORK

Automatic gender classification has many applications in human computer interaction. However, to determine the gender of an unseen face is challenging because of the diversity and variations in the human face. Biologically significant facial landmarks for gender classification are important and hence, develop a fully automatic gender classification algorithm. 3D Euclidean and Geodesic distances between these landmarks are extracted and use feature selection to determine the relative importance of the biological landmarks for classifying gender [1].

Swarm control algorithms are developed to give the operator haptic feedback as well as visual feedback [2]. A robotic swarm is a decentralized group of robots which overcome failure of individual robots with robust emergent behaviors based on local interactions. These behaviors are not well built for accomplishing complex tasks, however, because of the changing assumptions required in various applications and environments. A new movement in the research field is to add human input to influence the swarm in order to help make the robots goal directed and overcome these problems. This Human Swarm Interaction focuses on different control laws and ways to integrate the human intent with local control laws of the robots.

Hand gesture recognition system can be used for human-computer interaction [3]. The use of hand gestures provides an attractive alternative to cumbersome interface devices for HCI. Proper hand segmentation from the background and other body parts of the video is the primary requirement for the design of a hand-gesture based application. These video frames can be captured from a low cost webcam for use in a vision based gesture recognition technique. This paper discusses about continuous hand gesture recognition. It reports a robust and efficient hand tracking as well as segmentation algorithm where a new method, based on wearing glove on hand is utilized. Tracking algorithm is used which based on skin colour of the palm part of the hand i.e. free hand tracking. A finger tip can be segmented for proper tracking in spite of the full hand part. Hence, this technique allows the hand to move freely during the tracking time also. Problems such as skin colour detection, complexity from large numbers of people in front of the camera, complex background removal and variable lighting condition are found to be efficiently handled by the system.

Performance improvement in both humans and artificial systems strongly relies in the ability of recognizing erroneous behaviour or decisions. A hybrid approach for human computer interaction is developed that uses human gestures to send commands to a computer and exploits brain activity to provide implicit feedback about the recognition of such

commands[5]. Automatic artifact rejection techniques are used, taking into account that subjects are allowed to move during the experiment. Moreover, a simple adaptation mechanism is used that uses the EEG signal to label newly acquired samples and can be used to re-calibrate the gesture recognition system in a supervised manner. Offline analysis show that, although the achieved EEG decoding accuracy is far from being perfect, these signals convey sufficient information to significantly improve the overall system performance.

a novel software tool is designed and implemented to simplify the development process of Multimodal Human-Computer Interaction systems[6]. This tool, which is called the HCI<sup>2</sup> Workbench, exploits a Publish / Subscribe architecture to facilitate efficient and reliable inter-module data communication and runtime system management. In addition, through a combination of SDK, software tools, and standardized description / configuration file semantics, the HCI<sup>2</sup> Workbench provides an easy-to-follow procedure for developing highly flexible and reusable modules. Moreover, the HCI<sup>2</sup> Workbench features system persistence and portability by using standardized module packaging method and system configuration files. Last but not least, usability was another major concern. Unlike other similar tool, including Psyclone and ActiveMQ, the HCI<sup>2</sup> Workbench provides a complete graphical environment to support every step in a typical MHCI system development process, including module program development and debugging, module packaging, module management, system configuration, module and system testing, in a convenient and intuitive manner. HCI<sup>2</sup> Workbench is demonstrated with the help of a readily-applicable system developed using this tool. This open-source demo system, which is called the CamGame, consists of an interactive system allowing users to play a computer game using hand-held marker and low-cost camera instead of keyboard and mouse.

Certain usability attributes, especially understand ability attributes can be measured from the conceptual model[8]. Usability is a quality factor which increasingly attracts the attention of Human Computer Interaction developers. It consists on measuring the usability aspects of a user interface and identifying specific problems. It was usually evaluated based on user's perception. The development costs are the main limitation of methods which target the usability measurement. Model Driven Engineering allows migrating to a new challenge: early usability evaluation. In an MDE method, the conceptual model represents an abstraction of the application code. Hence, measuring the usability since the conceptual model can be a promising method to predict the usability of the application code.

Conventionally, the field of Human Computer Interaction was primarily concerned with designing and investigating interfaces between humans and machines[9]. However, with recent technological advances the concept of "enhancing",

“augmenting” or even “redesigning” humans themselves is becoming not only interesting and intriguing but also very feasible and serious topic of scientific research and development. “Augmented Human” is term that use today to refer to this overall research direction. The term “augmentation” has long been used in HCI and AR communities. Augmented Human introduces a fundamental paradigm shift in HCI: from human-computer-interaction to human-computer-integration.

The indirect HCI-based biometrics are events that can be obtained by monitoring users' HCI behaviour indirectly via observable low-level actions of computer software, those include records in audit logs, call-stack data, GUI interaction events, network traffic, registry access data, storage activity, and system calls[10]. These low-level events are produced unintentionally by the user during interaction with different software applications during pursuit of some, potentially mischievous, high level goals. an intrusion detection system based on network traffic analysis is an example of application of indirect human computer interaction-based behavioral biometrics.

#### IV. OVERVIEW OF HCI APPLICATION AREA

Human computer interaction applies to almost every area of human life and basic usage of computer. Its application area includes text editing, video games, Spreadsheets, Hyper Text, Computer Aided Design (CAD), Video Games, Multi-Media, 3-D, Virtual Reality and "Augmented Reality", Natural language and speech.

Financial terminal:

Human computer interaction technology has been useful in too many in Financial terminal (with Automated Teller Machine as an example) design, such as interface design. human computer technology for financial terminals having best example of ATM design on the precious literatures. The user experience test and evaluation of the prototype are reviewed and discussed in details, and we find the defects and the improvement of the ATM design.

Dynamic video tracking monitoring system

One more application of HCI is a Dynamic video tracking monitoring system. This system design is purposed to develop a kind of dynamic video tracking monitoring system involved video tracking technology, 3G wireless transmission network, and intelligent human-computer interaction based on touch screen technology. This design has introduced the intelligent human-computer interaction based on touch screen

technology, which benefits users to lock the target and relocate it when it gets lost. The hardware configurations of this system include monitoring-side and server-side. To increase the detection efficiency and accuracy of this system, this design creatively puts forward the target detection algorithm based on time and space dependence to conduct video tracking at the monitoring-side. Until now, it is rare to see such products or designs that use similar technologies.

Eye gestures recognition system:

This Eye gestures recognition system is develop with the help of human computer interaction. Detecting all kinds of eye gestures (i.e. eye motions) is a key point to successfully realize the eye-computer interaction. In this paper, principles of generating EOG and methods of sampling EOG signals are introduced. Then, eye gestures such as the basic eye shift modes (left, right, up, down), blinking and fixation modes, and relative recognition methods are discussed in detail. So it provides a helpful reference to research and design the eye-computer interaction interface. This interface can help the disabilities live independently.

Vision based human interaction system for disabled

One HCI application is machine vision technique to develop a robust assistive human computer interaction technology for those with physical accessibility problem of controlling mouse and keyboard with hand. Iterative sparse optical flow algorithm computes the pattern of apparent motion between sequential facial image frames captured by the webcam. Adaboost based Cascaded Harr classifier is used to detect face and eye across frames and we have given special attention towards the issues involving drawback regarding misdetection of tilted faces in the image frame inspite of training our datasets with tilted facial images. Left/Right eye blink is used to control the clicking event of mouse. Blink of eye is modelled by fitting the trained data using Spline and Gaussian curve which determines the likelihood function to determine the posterior probability.

#### V. CONCLUSIONS

In this paper, we pointed recent development in human computer interaction. Even the fabulous growth of the World-Wide Web is a direct result of HCI research. Fundamental area of HCI research and application includes text editing, video games, Gesture Recognition, Multi-Media, 3-D, Virtual Reality and "Augmented Reality", Computer Supported Cooperative Work, Natural language and speech.

Current research in the field of Human-Computer Interaction has been amazingly successful. Human-Computer Interaction has fundamentally changed computing.

#### REFERENCES

[1] Gilani, Syed Zulqarnain , Shafait, Faisal , Mian, Ajmal, Biologically Significant Facial Landmarks: How Significant Are They for Gender Classification?, IEEE Conference Digital Image Computing: Techniques and Applications (DICTA), 1 – 8, 2013.

[2] Nunnally, Steven , Walker, Phillip , Chakraborty, Nilanjan , Lewis, Michael , Sycara, Katia, Using Coverage for Measuring the Effect of Haptic Feedback in Human Robotic Swarm Interaction, IEEE International Conference on Systems, Man, and Cybernetics (SMC), pp. 516 – 521, 2013.

[3] Mazumdar, Dharani , Talukdar, Anjan Kumar , Sarma, Kandarpa Kumar, Gloved and free hand tracking based hand gesture recognition, IEEE International conference on Emerging Trends and Applications in Computer Science (ICETACS), pp. 197 – 202, 2013.

[4] Samuel Marcos, Jaime Gómez-García-Bermejo, Eduardo Zalama, A realistic, virtual head for human-computer interaction, science direct Original Research Article on Interacting with Computers, Volume 22, Issue 3, pp. 176-192, May 2010.

[5] Chavarriaga, R. , Biasiucci, A. , Förster, K. , Roggen, D. , Troster, G. , del R Millán, J., Adaptation of hybrid human-computer interaction systems using EEG error-related potentials, IEEE International conference on Engineering in Medicine and Biology Society (EMBC), pp. 4226 – 4229, 2010.

[6] Jie Shen , Wenzhe Shi , Pantic, M., HCI/2 Workbench: A development tool for multimodal human-computer interaction systems, IEEE International Conference on Automatic Face & Gesture Recognition and Workshops (FG 2011), pp. 766 – 773, 2011.

[7] Jie Shen , Pantic, M., HCI<sup>2</sup>Framework: A Software Framework for Multimodal Human-Computer Interaction Systems, IEEE Transactions on Cybernetics, Vol.43 , Issue: 6, pp. 1593 – 1606, 2013.

[8] Ben Ammar, Lassaad , Mahfoudhi, Adel , Kacem, Yessine Hadj, Empirical evaluation of an early understandability measurement method, IEEE Conference on Control, Decision and Information Technologies (CoDIT), pp. 454 – 457, 2013.

[9] Rekimoto, Jun, From augmented reality to augmented human, IEEE International Symposium on Mixed and Augmented Reality (ISMAR), pp. 1, 2013.

[10] Yampolskiy, R.V. , Indirect Human Computer Interaction-Based Biometrics for Intrusion Detection Systems, IEEE Conference on Security Technology, pp. 138 – 145, 2007.