

HFBUIT : DESIGN AID TOOLS FOR A HUMAN FACTOR BASED USER INTERFACE DESIGN

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Abstract:

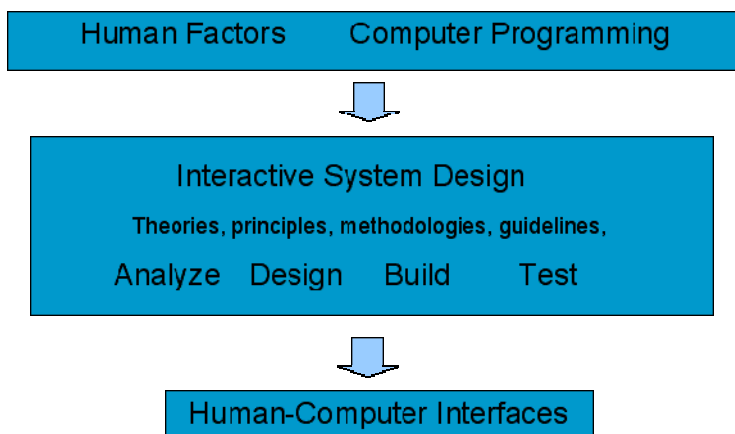
Exploring user interface design and development problems is the core of current HCI research. Although there have been considerable advancements in computer technology, human factors considerations are still lacking. This results in the user frequently becoming confused or frustrated when trying to interact with the software. Designers should utilize the knowledge about the user to configure the interface for different users, i.e. each user may have different skills, level of experience, or cognitive and physical abilities. This paper offers a five phase framework of a tool that might help designers to design a Human Factors based user interface.

Keywords: HBUIT, collection tool, suggestion tool, user interface

1.Introduction

The most important aspect of modern interactive computer systems is the level of support they provide for the underlying human activity. This level of support is encompassed in the user interface (UI) with which the user interacts with the system.

The user interface (UI) of a computer program is the part that handles the output to the display and the input from the person using the program. As Mark Green described that desktop user interfaces inhabit a very predictable environment and traditional user interface tools have taken advantage of this predictability. For example, a desktop application can safely assume that a mouse and keyboard will be available for input and a high resolution colour display for output[Mark Green]. The rapid progress in hardware technology, provided such immense computing power that the research and development of so called 'sci-fi' style state-of-the-art interaction techniques became a reality. Speech synthesis and recognition, gesture recognition, and virtual reality are only a few examples of such techniques[P.A. Cudd , R. Oskouie].During this period the work on new conceptual designs of user interface systems has been carried out in different areas.



In general, a human factor is a physical or cognitive property of an individual or social behavior which is specific to humans and influences functioning of technological systems as well as stability of human-environment . Human Factors focuses on how people interact with tasks, machines (or computers), and the environment with the consideration that humans have limitations and capabilities. It is a general problem that a few important issues have

been ignored in research . Designers of user interface most concentrates on design issues-accessible design features often go unnoticed. There is a clearly a wide range of user groups who have some level of difficulty in using technologies because of their disability. These disabilities can be physical ,cognitive disabilities. The research focus in the field of HCI for the disabled has been on physical disabilities. To date there has been much less research dealing with cognitive disability and appropriate HCI [Ivar Solheim]. Cognitive disabilities are the least understood and least discussed type of disability in research. As a result, developers rarely design interfaces to be accessible to people with cognitive disabilities. The main reason for this neglect is cognitive disabilities are ill-defined domains for research. Such disabilities are sometimes difficult to diagnose and characterize because of the wide variance between the characteristics of people who have similar cognitive disabilities. Some of the main categories of cognitive disabilities include[Ivar Solheim] :

- Memory
- Problem-solving
- Attention
- Reading,linguistic, & verbal comprehension
- Math comprehension
- Visual comprehension

Cognitive disability access is an ill-structured domain which overlaps other ill-structured domains such as usability, hci, and perceptual psychology [Boham, P. & Anderson, S. (2005)].

2.Human Factors Based User Interface Design

Specific applications can sometimes be used with little difficulty by cognitively impaired users. Part of the reason is the designers have very less knowledge about human factors. Source of knowledge for designers are manuals, technical reports or guidelines etc. But mostly designers want computer based design aids which should be intergrated in their design tools. Several user interface tools are available for obvious physical disabilities. To reach the goal designing human factor based user interfaces, the software designer needs excellent **tools**. Especially for graphical and hypermedia user interfaces. These tools should allow the designer to concentrate on the design process and on the quality of the design results. There is a definite need of such tools which help them to design human factor based user interface.

3.HFBUIT Framework

HFBUIT Framework is based on GENEX framework The original GENEX framework had four phases- Collect, Relate , Create , Donate :

- **Collect** : Learn from previous works stored in library,the web etc.
- **Relate** : Consult with peers and mentors at early,middle and late stages
- **Create** : Explore, compose and evaluate possible solutions.
- **Donate** : Disseminate the results and contribute to the libraries[Boham, P. & Anderson, S. (2005)].

The HFBUITT framework has much in common with genex but there are important modifications. The science of understanding the properties of human capabilities include cognitive ergonomics ,usability and Human computer interaction etc. HFBUIT in short ,is a fundamental approach to impart human factor knowledge for innovative user interfaces to the designers. The most important reason for concentrating on this issue is the lack of knowledge of the designers in the area of human factors.

Our HFBUIT framework suggests a wider scope for the designers by concentrating on human factors during the development of user interface. This will be done with the help of tools. These tools offers a way to capture knowledge from previous work stored in library. The present paper had suggested a five phase framework of tools that help the designers to develop a human factor based user interface.

HFBUIT framework consists of five tools/phases :

- Collection Tool
- Suggestion Tool
- Quick Designer Tool
- Evaluation Tool
- Documentation Tool

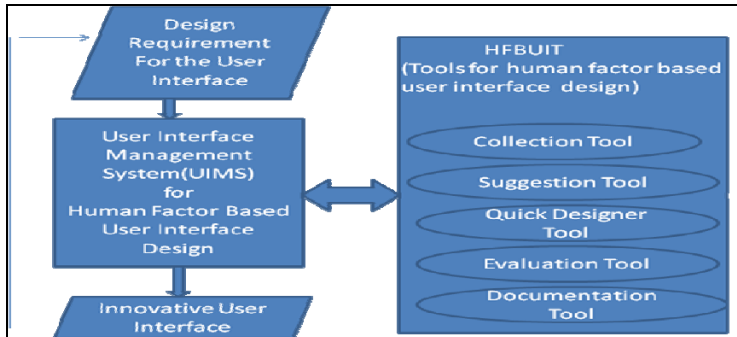


Figure1.HFBUIT Framework

3.1 Collection Tool

The collection tool supports the process of designing the user interface and is based on previous work. With the help of an information retrieval tool the interface designers could search for a information and use it as a part of the user interface. On the basis of previous information the designers will be able to build the final interface which will be easily accessible by the end user.

The main reason behind is, that there is a real need for libraries of previous work that have been developed and tested. This would lead to increased productivity by reusing the software, and by providing necessary information to the designers to develop a useful user interface.

3.2 Suggestion Tool

This tool presents the designers the human factors knowledge. If the designers need support in the area of human factors design they can get suggestions with the help of documents and an expert system. If the supposition mechanism of the expert system detects some design shortfall a list of comments is generated automatically. It shows the designers the analyzed shortfalls and presents them the relevant human factors knowledge in form of a hypermedia document or shows them a relevant interaction object of the library. With the help of these instructions the designers could improve the user interface.

3.3 Quick Designer Tool

Prototyping is now recognized as a cornerstone of the successful construction of the user interface . This prototyping tool will help the designer to develop a prototype. Before proceeding to the development phase this prototype can be tested with users and user can check whether the system upto the mark or not.If not then again changes can be made. Early user involvement can be very beneficial.The end user can describe the problems associated with the system to perform their task. The use of prototyping feature will help to detect problems with the UI itself and architecture before programming starts.

3.4 Evaluation Tool

Each prototype will be tested by set of users and evaluated by Evaluation Tool. The result of this evaluation will be some comments that show the defects in the system and give some suggestions to the designers to rectify those defects. This tool will help designers to point out undesirable features among user interface units. This tool will check whether newly designed interface is upto the mark.

3.5 Documentation Tool

Writing the document on application Programming interface (API) is essential. The document on the API, which we call the API documentation, is mainly read by programmers who want to develop their applications on top of that framework . The documentation Tool will generate the API documentation of a framework

Conclusion

Our HFBUIT framework will be very effective and provide wider scope for creativity. By making easy access to previous work, there is a possibility that more innovative ideas will come and frustration of the user will be suppressed. The reviews with users of their requirements ,use of prototypes and the design of the final product in an iterative manner makes the user an active part of the process and results in a higher level of the system usability and user satisfaction, since designers are continually working according to their needs.

This paper was designed to be introductory and Conceptual in scope, leaving out the technical details and more elaborate examples of HFBUIT. Our objective here is to lay out the foundation of Tools for the design of Human Factor Based User Interface, in order to tackle usability issues of modern systems .

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