Abstract

Human-Computer interaction is usually based on a graphical user interface (GUI) and some auditory warnings. Blind users do not benefit from GUIs, therefore, a sound-based extension is being developed to enhance accessibility.

In a framework called GUIB (Graphical User Interface of Blind Persons) a collection of special sound samples - such as auditory icons, earcons, spearcons, auditory emotions - were developed and based on the target group’s opinion they were categorized, selected and evaluated. The most frequently used programs, icons, functions and events of a computer screen were extended or replaced by auditory events. Sounds of everyday life, specially compressed and speeded up speech samples are there to link visual representations to auditory events. Instead of speech, these signals are language independent, easy to learn, fast to use and sometimes even funny and amusing. On the other hand, spearcons (speech-based earcons) can be created easily for different languages using MATLAB codes (current database includes Hungarian, English, German).

Results show that blind users welcome this idea and sighted users may also benefit from having auditory feedbacks and warnings. Future works includes implementation of the sound.

Introduction

GUIB project: Graphical User Interface for Blind Persons

50 blind and 100 sighted users

The most important functions and applications were selected and results were compared (ICAD 2007, 2008, 2009 papers)

Second part of the investigation included collecting of auditory representations (auditory icons, spearcons etc.), mapping with visual information and evaluation with the target groups.

Auditory signals

Auditory icons – Easy to interpret, to learn, to use
  - Not every event has a good auditory representation

Earcons – Harder to use

Spearcons – Compressed speech samples, often better than earcons and auditory icons

Auditory emotions – Emotions are easily used in e-mails, chat and messenger programs, forum posts etc.
  - Non-verbal human voice samples to represent additional emotional content.
  - Sometimes extended and combined with other sounds in the background. They are realistic and earcons the most.
  - Auditory emotions – just like the visual emoticons - are language independent and they can be interpreted easily.

Signals and evaluation

A length of about 1.5 sec.

Normal sounds that have to be played back once; and sounds to be played back repeated (in loop).

Sound files were recorded or downloaded from the Internet and were edited by Adobe Audition software in 16 bit, 44100 Hz mono wave format.

A collection of wave data of about 300 files was categorized, selected and evaluated. If there was no definite winner or no idea at all, a spearcon version was used (e.g. for “Acrobat”).

http://vip.tilb.sze.hu/~wersenyi/Sounds.zip

Fifty blind and hundred users with normal vision participated in a survey in order to find the most important and frequently used applications, and furthermore, to create and evaluate different auditory representations for them.

These auditory events included auditory icons, earcons, spearcons of German and Hungarian language.

Furthermore, a new class of auditory events was introduced: the auditory emotions. These represent icons or events with emotional content, using non-speech human voices and other sounds (laughter, crying etc).

The previously selected applications, programs, function, icons etc. were mapped and sound samples and are being evaluated based on subjective parameters.

Both target groups liked and welcomed the idea and representation method to extended and/or replace the visual content of a computer screen.