ICT 116 - HUMAN – COMPUTER INTERACTION 1

Module 2: Styles of HCI and Prototypes for Future HCI

Module Introduction/Rationale:

This module introduces the common styles use in Human Computer Interaction related to design and of the prototypes for the technology that involves Human-Computer Interaction (HCI).

Module Outcomes:

At the end of this module, student will know the common styles of Human Computer Interaction that we are using today. Also, student will have an idea of the future technology under development that relates to Human Computer Interaction.

Lesson 1: Styles of Human-Computer Interaction

Lesson Outcomes:

- Identified the styles of Human-Computer Interaction (HCI).
- Explained on how the technology works.

Lesson Content:

A. Command Line Interface (CLI)

CLI is also known as a Console User Interface, or Character User Interface (CUI). This is a means of interacting with the computer program in which the user types the commands to the program in a form of texts. Programs that uses this kind of interface is called Command Language Interpreter or others call it as Shell.

This interface was the primary means of interaction until the appearance of the video display terminal in the mid-1960s and continued to be used in 1970s to 1980s. The interface was used by Unix Systems, OpenVMS, Micro Soft Disk Operating Systems, Apple Disk Operating Systems and CP/M. The design of this interface uses a command line shell program which accepts commands as texts typed by the user and converts the command to an operating system functions.

Today, many users favor the use of GUI than the Command-line interfaces to computer operating systems, but advance users still prefer to use this kind of interface for they can have a control to a program or operating system since programs that uses command – line interfaces are easy to automate using script/ scripting.

B. Graphical User Interface (GUI)

The GUI is a user interface which enables the user to communicate with the electronic devices using graphical images we call icons and other visual indicators which we call as secondary notation. Handheld mobile devices nowadays and other related technologies use GUI for easy manipulation.

C. Windows, icons, menus, pointer (WIMP)

This design of interaction uses the elements mentioned in its name. This was originated by Merzouga Wilberts in 1980. The term WIMP did not gain acceptance as far as usage is concern but others used it to refer to a GUI since any interface design that uses graphics can be called as GUI and it is where WIMP systems came from or derived. The design was developed at Xerox PARC and was made popular by Macintosh in 1984.

WIMP systems has the following features:

- In a WIMP system, a window runs a self-contained program which isolated from other programs that (in a multi-program operating system) run at the same time in other windows.
- An icon provides a shortcut to an action the computer performs.
- A menu is an icon-based selection system or text that can select and execute programs or tasks.
- The pointer is an onscreen symbol that represents movement of a physical device that the user controls to select icons, data elements, etc.

D. Point and Click

Point and click are actions of a user using a mouse and moving a pointer from one location to another on a screen and then clicking a mouse button or other pointing device (like trackball, touch pads, joystick). This actions are usually done, for example, when opening a link or selecting icon in a GUI. The term point and click means that the interface can be controlled using the mouse or any pointing device without an input from a keyboard.

E. Drag and Drop

Just like Point and Click, Drag and Drop are another series of actions a computer user used when moving or copying a file. It’s like grapping and dragging that file to another location. Drag and drop is done using a pointing device like mouse, touch pad, etc.

F. Window Manager (WM)

As its name implies, WM is a program or a system software (to be more specific) that is responsible for coordinating or controlling all the windows. This includes the

placement and appearance in a GUI. The WM is in charge of how your windows should look like, how windows will display the several applications a user have opened, the maximizing and minimizing as well as closing of the applications. In general, the job of WM is to help the user manage the windows by allowing the user to open, maximize, minimize, restore, cascade, move or resize window(s), keep track of running applications or running windows, etc. using the various utilities like task bars, desktop icons, etc.

G. What You See Is What You Get (WYSIWYG)

This is a system wherein the contents of a document (or web page, slide presentation, etc.) like texts and graphics for example, can be edited and when printed exactly resemble its appearance in the display monitor.

WYSIWYG implies that a user can have a result which is very similar to what the user is seeing on the screen, allowing the user to manipulate the layout of the document without the use or memorizing layout commands.

H. Zooming User Interface (ZUI)

Also known as Zoomable User Interface. This is a graphical environment wherein users can resize or rescale the viewed element or object or the viewed area in order for the user to see more (or less) details. ZUI is a type of GUI where information elements can directly appear on an infinite virtual desktop usually created by using vector graphics, instead of in windows. Users can also pan on the virtual surface to move the object then zoom – in or zoom – out or magnify on the area of interest.

I. Brushing and Linking

In databases, refers to the connection of two or more views of the same data, such that a change to the representation in one view affects the representation in the other. Brushing and linking is also an important technique in interactive visual analysis, a methodology for performing visual exploration and analysis of large, structured data sets.

Specifically, linking refers to a change of parameters (for example a data filter) in one data representation being reflected in other connected data representations. Brushing refers to highlighting, for example selected data, in one view, in other connected data representations.

One example might be a two-part display, consisting of a histogram alongside a list of document titles. The histogram could show how many documents were published each month. Brushing and linking would allow the user to assign a color, green for instance, to one bar of the histogram, thus causing the titles in the list

display that were published during the corresponding month to also be highlighted in green (as defined in https://en.wikipedia.org/wiki/Brushing_and_linking)

J. Crossing – Based Interface

A GUI the uses crossing gestures instead of pointing.

- Goal – Crossing

A pointing task involves moving a cursor inside a graphical object and pressing a button, whereas a goal-crossing task involves moving a cursor beyond a boundary of a targeted graphical object.

Goal crossing has been little investigated, despite sometimes being used on today's interfaces (e.g., mouse-over effects, hierarchical menus navigation, auto-retractable taskbars and hot corners). Still, several advantages of crossing over pointing have been identified:

- Elongated objects such as hyperlinks are faster to cross than to point.
- Several objects can be crossed at the same time within the same gesture.
- Crossing allows triggering actions when buttons are not available (e.g., while an object is being dragged).
- Crossing-based widgets can be designed to be more compact than pointing-based ones. This may be useful for small display devices.
- Goal crossing is particularly natural on stylus-based devices. On these devices, crossing an object back and forth is easier than double-clicking.
- Crossing can be a good alternative for users who have difficulties with clicking or double-clicking.

There are several other ways of triggering actions in user interfaces, either graphic (gestures) and non-graphic (keyboard shortcuts, speech commands).

Lesson 2: Prototypes for Future HCI

Lesson Outcomes:

- Identified the prototypes for future human-computer interaction (HCI).
- Explored other technologies that can be used for HCI design.

Lesson Content:

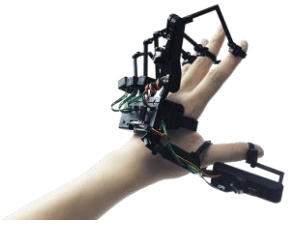
A. Haptic Retargeting

https://mspoweruser.com/microsoft-researchs-haptic-retargeting-trying-enhance-virtual-reality-experiences-full-video/

Haptic retargeting is an HCI for virtual reality (VR). It aims to make the user feel as if he is in the real world. The objects should not only look real but should also feel real.

This interface technology works by tricking a VR user into thinking they aren't interacting with the same prop over and over again. It does this by skewing a user's virtual vision so the object they think they are reaching for in-game is the physical prop they *already* interacted with in meatspace or in real world (as explained in https://www.fastcodesign.com/3059848/8-incredible-prototypes-that-show-the-future-of-human-computer-interaction)

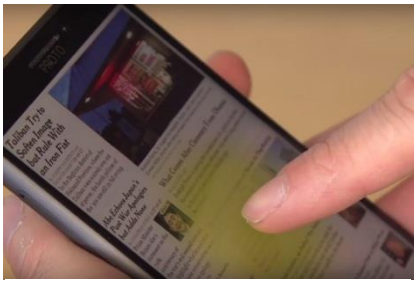
B. Dexta Haptic Gloves



https://virtualrealitytimes.com/2015/03/13/list-of-haptic-controllers-virtual-reality/

Dexta Robotics has come up with a design of an exoskeleton that will do haptic retargeting. This interface technology works by simulating feedbacks by locking and unlocking finger joints if the user will touch digital objects with varying degrees (as explained in https://www.fastcodesign.com/3059848/8-incredible-prototypes-that-show-the-future-of-human-computer-interaction) in the VR world. This technique will enable the gloves to simulate haptic sensations such as hardness, springiness, softness, and more.

C. Pre –Touch



https://www.psfk.com/2016/05/how-pre-touch-screens-want-to-read-your-mind.html

The Microsoft Research is planning to implement this technology in smartphones. Pre – touch sensing could give the impression that the device can read the user's mind by using the technology they called as "pre – touch sensing". The technology will detect how the device is being gripped and will also sense if a finger is approaching or about to touch the screen.

This technology could explore more possibilities in user interface that can be applied in mobile devices by improving the precision of tapping on small on – screen elements and dynamically adjusting what on-screen interface a user sees according to how they're holding their device–or if a finger is approaching the screen. For more detail, read our full article on the new touchscreen here (https://www.fastcodesign.com/3059848/8-incredible-prototypes-that-show-the-future-of-human-computer-interaction).

D. PaperID

https://www.youtube.com/watch?v=DD5Wnb0f1rg

This technology will use paper as an interactive touchscreen. This was studied by the researchers from the University of Washington, Disney Research, and Carnegie Mellon University. It will use a printable antenna and can be linked to an e – book. Imagine that when you turn a page in the real world, it will also turn the page of your e – reader or a page of sheet music as the conductor is waving it's wand over it. PaperID has the ability to sense its surroundings and responds to gesture commands and connect to the network of things (as explained in

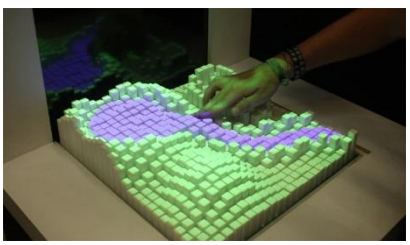
E. Skintrack

http://4pda.ru/2016/05/06/296034/

Skintrack is developed by the Human – Computer Interaction Institute Future Interfaces Group. This technology will expand the user's smartwatch's touch screen with the use of a specially designed ring.

The user will be able to use his palm to make a call with his smartwatch by hovering a finger over his hand, functioning like a cursor. With this interface, the user can also play video games using his wearable.

F. Materiable

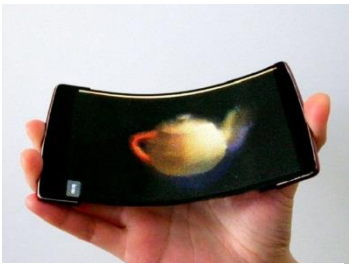


https://hi-news.ru/technology/materiable-prototip-taktilnogo-interfejsa-menyayushhego-svoyu-formu.html

This is a physical interface of moving pixels and it was developed in 2013 by MIT's Tangible Media Group. It has the ability to mimic the tactile qualities of "real – world" materials such as sand, water, rubber, etc. Its individual Inform pixel will have an ability to detect pressure and respond with simulated physics, it can be described as a big block of shape – shifting clay and depending on its settings its

surface may cause the pixels to ripple or quiver like jelly or bounce like a ball when touched or flicked.

G. Holoflex



http://tayna24.ru/sproektirovan-noviy-smartfon-holoflex-gibkiy-i/

Holoflex is the next generation of the bendable screen designed by Co. Design. The user can communicate with the device by bending it and its display is truly holographic making the users view a 3D object in a correct perspective.

The Holoflex will accomplished this by projecting 12-pixel-wide circular blocks through more than 16000 fisheye lenses (as explained in https://www.fastcodesign.com/3059848/8-incredible-prototypes-that-show-the-future-of-human-computer-interaction)

H. Sparselight

https://www.heise.de/newsticker/meldung/Microsoft-SparseLight-mit-erweitertem-Sichtfeld-gegen-Simulatorkrankheit-3201582.html

Augmented reality headsets allow users to see the physical and the digital at the same time but the lenses has small field of view that limits the visual effects of the headset, and Microsoft's answer to this is the Sparselight. This technology will be able to do its task by augmenting the field of view in head-mounted displays like the augmented reality headset by putting cheap grids of LEDs in the user's peripheral vision.

The LEDs will match the object's brightness and color and will create an illusion that the user is seeing the whole thing. This technology can be applied to both virtual and augmented reality headsets.

Teaching Delivery (TLAs):

- Lecture and Class Discussion (Synchronous and Asynchronous)

Assessment:

Assignment No. 1. Make a research on the other top ten (10) emerging prototype technologies for future Human-Computer Interaction (HCI). Submit it in a long size bond paper. The first page should contain the title: **Prototype Technology for Future HCI** with your name, course, year and section, and your Instructor's name. Send it through your Instructor's email address with subject name, e.g. "ICT116_ Assignment1_yourFirstLastName".

References:

- Dix, A., Finlay, J., Abowd, G.D., & Beale, R. (2004). Human –Computer Interaction, 3rd Edition. Hillsdale, NJ: Prentice Hall

- https://en.wikipedia.org/wiki/Outline_of_human%E2%80%93computer_interaction#Styles_of_human.E2.80.93computer_interaction