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CSC 212 CAT I

1. Discuss Human Computer interaction (HCI) by basing on the following:

# Definition

Human computer interaction means the design and the use of computer technology focused on the interfaces between people and computers

Point of communication between human user and the computer.

It involves the study, planning and design of the interaction between people(users) and computers . Interaction between users and computers occur at the user interface which includes software and hardware.

# Goals

* A basic goal of HCI is to improve the interaction between users and computers by making computers more usable and receptive to the users needs. Specifically HCI is concerned with:

Methodologies and processes for designing interfaces .

Methods for complementing interfaces.

Techniques for evaluating and comparing interfaces.

Developing new interfaces and interaction techniques

Developing descriptive and predictive models and theories of interaction.

* Create usable software-enabled products and user-interfaces.
* Enhance the usability of existing products
* Identify problems and tasks (such as in the workplace) that can be addressed with software products

* Understand – The factor that determine how people use technology.
* Develop – develop tools and techniques to enable building suitable system.
* Achieve – Efficient , effective and safe interaction.
* Put people first – Their needs , capabilities and preferences for conducting various tasks should direct developers in the way that they design systems. People should not change their way they use the system to fit with it instead system should match there requirements

# Design Principles

When evaluating a current user interface, or designing a new user interface, it is important to keep in mind the following experimental design principles:

1. Early focus on user(s) and task(s):

Establish how many users are needed to perform the task(s) and determine who the appropriate users should be; someone who has never used the interface, and will not use the interface in the future, is most likely not a valid user. In addition, define the task(s) the users will be performing and how often the task(s) need to be performed.

1. Empirical measurement:

Test the interface early on with real users who come in contact with the interface on a daily basis. Keep in mind that results may vary with the performance level of the user and may not be an accurate depiction of the typical human-computer interaction. Establish quantitative usability specifics such as: the number of users performing the task(s), the time to complete the task(s), and the number of errors made during the task(s).

1. Iterative design:

After determining the users, tasks, and empirical measurements to include, perform the following iterative design steps:

* 1. Design the user interface
  2. Test
  3. Analyze results
  4. Repeat the iterative design process until a sensible, user-friendly interface is created.

# Methodology

* **Activity theory:**

used in HCI to define and study the context in which human interactions with computers take place. Activity theory provides a framework to reason about actions in these contexts, analytical tools with the format of checklists of items that researchers should consider, and informs design of interactions from an activity-centric perspective.

* **User-centered design:**  user-centered design (UCD) is a modern, widely practiced design philosophy rooted in the idea that users must take center-stage in the design of any computer system. Users, designers and technical practitioners work together to articulate the wants, needs and limitations of the user and create a system that addresses these elements. Often, user-centered design projects are informed by ethnographic studies of the environments in which users will be interacting with the system. This practice is similar but not identical to participatory design, which emphasizes the possibility for end-users to contribute actively through shared design sessions and workshops.
* **Principles of user interface design:**

these are seven principles of user interface design that may be considered at any time during the design of a user interface in any order: tolerance, simplicity, visibility, affordance, consistency, structure and feedback.

* **Value sensitive design:**

Value Sensitive Design (VSD) is a method for building technology that account for the values of the people who use the technology directly, as well as those who the technology affects, either directly or indirectly. VSD uses an iterative design process that involves three types of investigations: conceptual, empirical and technical. Conceptual investigations aim at understanding and articulating the various stakeholders of the technology, as well as their values and any values conflicts that might arise for these stakeholders through the use of the technology. Empirical investigations are qualitative or quantitative design research studies used to inform the designers' understanding of the users' values, needs, and practices. Technical investigations can involve either analysis of how people use related technologies, or the design of systems to support values identified in the conceptual and empirical investigations.

# Display Design

When a computer operates in a manner that is not intended, humans often demonstrate their disgust by striking the monitor. This monitor, or visual display, is simply the portal that allows one to interact with the technology. The dis play (be it visual, auditory, tactile, etc.) is an artifact designed to support the perception of relevant system variables and to facilitate further processing of that information. Before a display is designed, the task that the display is intended to support must be defined (e.g. navigating, controlling, decision making, learning, entertaining, etc.). A user or operator must be able to process whatever information that a system generates and displays; therefore, the information must be displayed according to principles in a manner that will support perception, situation awareness, and understanding

# Principles of display design

(a)**Perceptual principles**

1. Make displays legible (or audible).

A display's legibility is critical and necessary for designing a usable display. If the characters or objects being displayed cannot be discernible, then the operator cannot effectively make use of them.

1. Avoid absolute judgment limits.

Do not ask the user to determine the level of a variable on the basis of a single sensory variable (e.g. color, size, loudness). These sensory variables can contain many possible levels.

1. Top-down processing.

Signals are likely perceived and interpreted in accordance with what is expected based on a user's experience. If a signal is presented contrary to the user's expectation, more physical evidence of that signal may need to be presented to assure that it is understood correctly.

1. Redundancy gain.

If a signal is presented more than once, it is more likely that it will be understood correctly. This can be done by presenting the signal in alternative physical forms (e.g. color and shape, voice and print, etc.), as redundancy does not imply repetition. A traffic light is a good example of redundancy, as color and position are redundant.

1. Similarity causes confusion:

Use distinguishable elements. Signals that appear to be similar will likely be confused. The ratio of similar features to different features causes signals to be similar. Mental model principles

1. **principles based on mental modes** 
   1. Principle of pictorial realism.
      1. display should look like the variable that it represents (e.g. high temperature on a thermometer shown as a higher vertical level). If there are multiple elements, they can be configured in a manner that looks like it would in the represented environment.
   2. Principle of the moving part.

Moving elements should move in a pattern and direction compatible with the user's mental model of how it actually moves in the system. For example, the moving element on an altimeter should move upward with increasing altitude. Principles based on attention

1. **Principles based on attention**
   1. Minimizing information access cost.

When the user's attention is diverted from one location to another to access necessary information, there is an associated cost in time or effort. A display design should minimize this cost by allowing for frequently accessed sources to be located at the nearest possible position. However, adequate legibility should not be sacrificed to reduce this cost.

* 1. Proximity compatibility principle.

Divided attention between two information sources may be necessary for the completion of one task. These sources must be mentally integrated and are defined to have close mental proximity. Information access costs should be low, which can be achieved in many ways (e.g. proximity, linkage by common colors, patterns, shapes, etc.). However, close display proximity can be harmful by causing too much clutter.

* 1. Principle of multiple resources.
     1. user can more easily process information across different resources. For example, visual and auditory information can be presented simultaneously rather than presenting all visual or all auditory information. Memory principles (d) **Principle based on memory**
  2. Replace memory with visual information: knowledge in the world. A user should not need to retain important information solely in working memory or retrieve it from long-term memory. A menu, checklist, or another display can aid the user by easing the use of their memory. However, the use of memory may sometimes benefit the user by eliminating the need to reference some type of knowledge in the world (e.g., an expert computer operator would rather use direct commands from memory than refer to a manual). The use of knowledge in a user's head and knowledge in the world must be balanced for an effective design.
  3. Principle of predictive aiding.

Proactive actions are usually more effective than reactive actions. A display should attempt to eliminate resource-demanding cognitive tasks and replace them with simpler perceptual tasks to reduce the use of the user's mental resources. This will allow the user to focus on current conditions, and to consider possible future conditions. An example of a predictive aid is a road sign displaying the distance to a certain destination.

* 1. Principle of consistency.

Old habits from other displays will easily transfer to support processing of new displays if they are designed consistently. A user's long-term memory will trigger actions that are expected to be appropriate. A design must accept this fact and utilize consistency among different displays

1. Discuss the internet basing on the following:

# Definition

Is a utility connecting localized computer networks within computer networks that extends across a wider area such as a region a continent or the whole world.

# History

The Internet started off with research into what was then known as packet switching as early as the 1960s. Packet switching was thought of a better and faster method to transfer data than the hardware solution to the problem, i.e., the circuitry. The packet switching technology was essential to the development of ARPANET by the United States Military. ARPANET is considered the first known group of interconnected computers aka the internet. This system was used to transfer confidential data between the Military. This data sharing technology was then opened to educational institutes in the United States to allow them to access to the government’s supercomputer, first at 56 kbit/s, then at 1.5 Mbit/s, and then at 45 Mbit/s. Com Internet service providers began to arise in the late 1980s and the internet was fully commercialized in the US by 1995

# Basic components of the web

1. **Web servers**

Which are computers that hold information for distribution over the Internet. In the example application in the diagram, one Web server might hold the text and graphics of the online magazine What's on in Bungoma, and another server might hold information on which seats are available for a particular concert. The magazine would be formatted using the Web's own publishing language, HTML (HyperText Mark up Language). The data on available seats and their price would be held in a database with links to specific forms that are published using HTML.

1. **Servers**

which can be PCs, Macintosh systems or UNIX workstations: it is the server software that makes them special, rather than the computer itself. That said, servers need to be fairly up-market machines. Servers do need to be left on all the time, so that people can access the information on them whenever they want. Another important point about servers: they are relatively difficult to set up. If you are a non-technical person who wants to publish on the Web, the best thing to do is to rent some space on someone else's server.

1. **Web clients**,

which can be PCs, Macintoshes and other computers that are connected to the Internet and which can retrieve information from Web servers. A Web client is the computer on your desk. PCs, Macintoshes, UNIX workstations and even simple terminals can run client software. Different client software is marketed (or is given away free) for different platforms. Thus, Mosaic has both a Macintosh and a PC implementation.

1. **HTTP protocol**

which is used to transmit files between servers and clients. When you click on a hypertext link or fill out a form in a Web document, the results need to be sent across the Internet as quickly as possible, and then to be understood by a server at the other end. Instructions such as `send me this file' or `get me that image' are carried by the Web communications protocol, HTTP. This protocol is the `messenger' that fetches files to and from servers, and then delivers results to your computer every time you click with a request. HTTP has its counterparts in other Internet services: FTP, file transfer protocol, and Gopher are protocols that obtain different sorts of information from across the Internet.

1. **Browser software**

which is needed by a Web client for displaying text, images, video clips and so on. This is supplied under the umbrella name `browser', of which Mosaic,

Microsoft Corp.'s Internet Explorer and Netscape Communications Corp.'s Navigator and Communicator browsers are probably the best-known examples. Browser software gives you the ability to scan information retrieved from Web servers, as you would browse through a book. It also gives you facilities for saving and printing information obtained on the Web

# URL (Universal Resource Locator)

Is a standard way of easily expressing the location and data type of a resource. It takes the form ”protocol:”//address.

URL specifies the exact location of a webpage on the internet example [http://www.microsoft.com.site.asp](http://www.microsoft.com.site.asp/)  URL elements http – identifies the protocol necessary to retrieve the resources. www – Indicate that the site is on the world wide web.

Microsoft – Indicates the name of the website.

.com – Indicates the domain type of the web

.site / .asp – specifies the path of the file stored on the web servers hard disk.

**XML.**

XML stands for **E**xtensible **M**arkup **L**anguage.

It is a text-based markup language derived from Standard Generalized Markup Language (SGML).

XML tags identify the data and are used to store and organize the data, rather than specifying how to display it like HTML tags, which are used to display the data. XML is not going to replace HTML in the near future, but it introduces new possibilities by adopting many successful features of HTML.

There are three important characteristics of XML that make it useful in a variety of systems and solutions −

* **XML is extensible** − XML allows you to create your own self-descriptive tags, or language, that suits your application.
* **XML carries the data, does not present it** − XML allows you to store the data irrespective of how it will be presented.
* **XML is a public standard** − XML was developed by an organization called the World Wide Web Consortium (W3C) and is available as an open standard.

## IMPORTANCE OF XML

* XML can work behind the scene to simplify the creation of HTML documents for large web sites.
* XML can be used to exchange the information between organizations and systems.
* XML can be used for offloading and reloading of databases.
* XML can be used to store and arrange the data, which can customize your data handling needs.
* XML can easily be merged with style sheets to create almost any desired output.
* Virtually, any type of data can be expressed as an XML document.

## XML DECLARATION

The XML document can optionally have an XML declaration. It is written as follows –

<?xml version= ”1.0” encoding= ”UTF-8”?>

Where *version* is the XML version and *encoding* specifies the character encoding used in the document.

# HTML

**HTML** stands for **Hyper Text Markup Language**, which is the most widely used tagging language that composes document that will be viewed in a web browser.

IMPORTANCE OF HTML

* **Create Web site** - You can create a website or customize an existing web template if you know HTML well.
* **Become a web designer** - If you want to start a career as a professional web designer, HTML and CSS designing is a must skill.
* **Understand web** - If you want to optimize your website, to boost its speed and performance, it is good to know HTML to yield best results.
* **Learn other languages** - Once you understand the basic of HTML then other related technologies like JavaScript, php, or angular are become easier to understand.