

# MMC 6

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## Unit 6. User Interfaces (5 Hrs)

### 1. Basic Design Issues

- Architectural issues
- Information characteristics for presentation
- Presentation function
- Presentation design knowledge
- Effective human computer interaction

PYQs:

- Discuss the basic design issues in user interfaces of multimedia systems.
- Discuss the user interface design process in multimedia.

### 2. Video and Audio at the User Interface

- Classification of software: system software and application software
- Audio and video at the user interface

PYQs:

- What are the designing issues of video user interface? Explain.
- What are the designing issues of the audio user interface? Explain.
- What are the multimedia interface components?

### 3. User-friendliness as the Primary Goal

- Easy to learn instruction
- Presentation
- Dialogue boxes
- Additional design criteria
- Design specific criteria

PYQs:

- Explain the design guidelines for the multimedia user interface with example.
- Discuss the user interface design process in multimedia.

# Multimedia User Interfaces (MUI)

Multimedia User Interfaces are systems where users interact using multiple forms of media like text, images, audio, video, and animation. The main goal is to improve human-computer interaction (HCI) by making it natural and effective.

## General Design Issues (in Multimedia User Interfaces)

These are the key concerns to be addressed when designing an effective multimedia interface:



## 1. Information Content

- **What to do:** Decide what **exact information** needs to be shown to the user.
- **Why:** Avoid overloading the user with unnecessary data.
- **Example:**  
A weather app only shows current temperature, humidity, and forecast — not the raw data collected from sensors.

## 2. Essential Characteristics

- **What to do:** Focus only on **important features** of the data.
- **Why:** Too many details can distract or confuse the user.
- **Example:**  
A traffic app highlights roadblocks and traffic jams, but hides irrelevant street names.

## 3. Communication Intent

- **What to do:** Clearly express the **purpose** of what is being shown.
- **Why:** Helps users understand the importance of the information.
- **Example:**  
A warning alert uses **red color** and **sound** to grab the user's attention quickly.

## 4. Media Choice

- **What to do:** Select appropriate **media types** (text, audio, video, graphics).
- **Why:** Different types of information are best expressed through different media.
- **Example:**  
Use a **graph or chart** to show sales trends instead of writing a paragraph.

## 5. Media Coordination

- **What to do:** Synchronize and organize multiple media formats.
- **Why:** Poor coordination can lead to confusion or miscommunication.
- **Example:**  
In a **video tutorial**, the on-screen actions must **match the audio or text** instructions.

## 6. Interactivity (Exploration)

- **What to do:** Allow users to **interact**, **explore**, and control the interface.
- **Why:** Increases engagement and understanding.
- **Example:**  
A **virtual museum tour** lets users click to move between rooms and interact with exhibits.

# 1. Architectural Issues

This is about **how the UI system is structured** and how its different parts work together.

- A good interface doesn't just work step by step — it needs to **respond quickly** and **in parallel**.
- Different parts like input handler, display logic, and media selector must **communicate constantly**.
- The system should also think about **user goals** — not just how to show something, but why.

**Example:**

A smart home dashboard should let you turn on lights while adjusting the AC at the same time, not one after the other. Also, it should know whether you're home or outside and change the interface accordingly.



## 2. Information Characteristics for Presentation

This means **understanding the type of data** so that the interface can present it properly.

There are different types of data:

- **Coordinate vs. Amount:**
  - Coordinate = position (e.g., GPS point)
  - Amount = value (e.g., temperature)
- **Interval vs. Ratio:**
  - Interval = time ranges (e.g., dates)
  - Ratio = real values with a true zero (e.g., weight)

Other points:

- **Relational Characteristics:**
  - If A always gives B → it's functional
  - If A gives multiple B → non-functional
- **Multi-domain Data:**
  - Use data from different categories like color + shape + sound.
- **Large Datasets:**
  - Show only summaries or filtered parts so user doesn't get overwhelmed.

## 3. Presentation Function

This refers to the **actual mechanism that shows the content** on the screen, speaker, or device.

- It's **independent of how the data looks** (e.g., style or format).
- Think of it as a **translator** that takes internal data and shows it meaningfully.

There are two main approaches:

- **Goal-Based:**
  - Shows what the user needs to do next.
- **Hierarchical:**
  - Organizes content in layers from broad to specific.

**Example:**

In a recipe app, when you tap “next,” the presentation function decides what to show — image, timer, and audio instructions — all related to the step.

## 4. Presentation Design Knowledge

This refers to the **design experience or rules** that help decide:

- What to show (Content)
- How to show (Media)
- How to combine media (Coordination)

### a) Content Selection:

- Choose only useful and relevant content.
- Limited by screen space and time.

### b) Media Selection:

- Use the **right type** of media.
- Video for motion, text for detailed explanation, audio for quick alerts.

### c) Coordination:

- Sync all media so they don't clash.
- Requires methods for timing, layout, and interaction.

**Example:**

An online learning platform uses text, video, and slides in a coordinated way so students don't get confused or



distracted.

## 5. Effective Human-Computer Interaction (HCI)

This is the final goal: **make the interface easy and natural** for humans to use.

Main principles:

- **Context-Awareness:**  
Interface should adapt to where/how it's used (e.g., mobile vs desktop).
- **Real-World Connection:**  
Show live or linked data (e.g., real-time GPS).
- **Evaluation and Feedback:**  
Keep improving based on user response.
- **Interactive Features:**  
Use buttons, sliders, touch, voice, etc.
- **Separation:**  
UI and internal system should be separate so UI can be changed without breaking the system.

**Example:**

In a voice assistant app, users can speak commands, see text feedback, and change settings — all interactively, without needing to know how the backend works.

## Classification of Software

Software can be broadly classified into two main categories: **System Software** and **Application Software**. Here's a breakdown of each:

### 1. System Software

System software manages and controls the hardware components of a computer and serves as a bridge between the hardware and the user. It is responsible for ensuring that the system runs efficiently and is capable of supporting the execution of other software. It is **machine-dependent** and designed to help manage the system.

**Categories of System Software:**

- **Operating System (OS):**
  - The **OS** is the primary software that controls the computer hardware and provides an interface for users to interact with the system.
  - It handles tasks like memory management, task scheduling, file management, and device control.
  - **Example:** Windows, macOS, Linux.
- **System Support Software:**
  - This includes utilities that help in maintaining and optimizing the computer system.
  - It is not directly involved with the core operations of the computer but enhances system efficiency.
  - **Example:** Antivirus programs, disk management tools, backup software.
- **System Development Software:**
  - This software helps in the development of applications and other system programs.
  - It provides tools to create and manage code, compile it, and debug it.
  - **Example:** Compilers, debuggers, programming languages (e.g., C, Java).

### 2. Application Software

Application software is designed to help users perform specific tasks. It directly solves user problems and is intended to carry out a **particular set of tasks or functions**. Unlike system software, it is **user-oriented** and focused on solving practical issues rather than managing the system.



### **Categories of Application Software:**

- **General Purpose Software:**
  - Designed to be versatile and handle a broad range of tasks.
  - **Example:** Word processors (Microsoft Word), spreadsheets (Microsoft Excel), web browsers (Google Chrome).
  - These tools provide many features, and users can adapt them for a wide range of uses.
- **Special Purpose Software:**
  - Tailored for specific tasks or industries.
  - These applications are designed with a very narrow focus and provide solutions for highly specialized needs.
  - **Example:** CAD (Computer-Aided Design) software for architects, flight simulation software, hospital management systems.

# **Audio and Video at User Interface**

**Continuous Stream Audio and Video** play a crucial role in multimedia interfaces, enhancing user interaction and providing dynamic content. One of the key challenges when presenting continuous media streams (audio and video) is ensuring smooth continuity in time, making **time** a new presentation dimension in the user interface.

## **1. Audio in User Interface**

### **Role of Audio in UI:**

- Audio enhances user interaction by providing feedback, guiding actions, or even allowing control through voice commands.
- **Speech Analysis** is key in interpreting user input via sound.

### **Types of Speech Analysis:**

- **Speaker-dependent analysis:**
  - Works with a large vocabulary (up to 25,000 words).
  - Requires the system to be trained on the speaker's voice.
  - Example: Voice assistants like Siri or Alexa can recognize and respond to specific voices with a relatively high accuracy.
- **Speaker-independent analysis:**
  - Limited vocabulary (fewer words compared to speaker-dependent).
  - Doesn't require system training and works with multiple speakers.
  - Example: Basic voice commands on many devices (e.g., "Play music").

### **Spatial Audio Dimensions:**

- **Monophony:** Single audio source with one location (e.g., voice assistant speaking).
- **Stereophony:** Two audio sources creating a sense of directionality (e.g., stereo sound in music).
- **Quadraphony:** Four audio sources, adding more depth and spatial awareness.

### **Audio Windows:**

- Graphical representations of audio locations on the screen.
- Moving the audio window on the screen changes the sound's spatial origin.
- Example: A game where sounds (e.g., footsteps) shift as the player moves through the environment.

## **2. Video in User Interface**

### **Role of Video in UI:**



- Video adds motion and visual engagement, used for both static and interactive media.
- Video manipulation is similar to working with still images, but the sequence of images creates motion.

#### **Continuous Video Playback:**

- A video must display at least **15 frames per second** to appear as continuous motion.
- UI allows users to interact with video, pause, skip, or adjust playback speed.

#### **Video Manipulation:**

- Just like still images, individual frames of video can be manipulated (cut, edited, or moved).
- Video is often used in applications that need to show demonstrations, tutorials, or animation.

### **Interactive Media at User Interface**

#### **Why Audio and Video Matter:**

- They are powerful tools in making the interface more interactive, engaging, and informative.
- **Interactive media** means users can influence and manipulate content in real-time, like moving a video window or controlling audio levels.

#### **User Control:**

- Users may pause, play, rewind, or fast-forward videos.
- In audio, they can control volume, mute, or change audio output location.

#### **Example:**

- **Interactive Tutorials:** Where the video might pause after certain actions to allow users to follow along or adjust the speed of playback.

### **Practical Uses of Audio and Video in UI Design**

#### **Audio-Visual Coordination:**

- Combining audio and video can reinforce user actions or create a deeper level of interaction.
- For example, a **video tutorial** may be accompanied by spoken instructions and visual highlights to guide the user.

#### **Real-Time Interaction:**

- In applications like **video games** or **simulation software**, real-time adjustments of audio and video elements enhance user experience.

#### **Example of Multimedia Coordination:**

- In a **driving app**, the video (map) might update in real-time while the audio provides navigational cues (e.g., "Turn left in 500 meters").

## **User-Friendliness as the Primary Goal in Multimedia User Interface (MUI)**

A user-friendly interface allows users to **easily interact** with a system, minimizing confusion and effort. In multimedia systems, this is especially important due to the use of various media like audio, video, icons, and animations.

### **1. Easy-to-Learn Instructions**

- The interface should be **intuitive**, requiring **minimal effort** to learn.
- Users should **remember commands easily** after using them once or twice.
- **Example:** A simple icon labeled " Camera" is easier to understand than a text-based command like open media capture.

### **2. Presentation Variants**

Presentation affects how well users understand the system. Common formats:

<b>Presentation Type</b>	<b>Description</b>	<b>Example</b>
Abbreviated Text	Shortened labels	"Msg" instead of "Message"
Full Text	Complete descriptions	"Click to Start Recording"
Icons	Static graphics to represent actions	 = Delete,  = Search



Micons

Moving icons or animations

A rotating loading icon

- **Note:** Not all users understand icons or micons the same way. Cultural and personal experiences matter.

### 3. Dialogue Boxes

- Dialogue boxes must be **consistent** in layout and behavior.
- Buttons like “**OK**”, “**Cancel**”, and “**Abort**” should appear in the **same position across all pop-ups**.
- This builds muscle memory and avoids user confusion.
- **Example:** In a series of pop-ups, keeping the “OK” button always on the bottom right corner.

### 4. Additional Design Criteria

These are **extra enhancements** that make the interface more friendly and responsive:

Feature	Purpose
Animated Cursor	Shows task progress visually (e.g., rotating fish cursor)
Highlighted Selections	Highlights items when selected (e.g., changes color)
Tooltip Information	Shows details when cursor hovers (e.g., "File size: 2MB")

