Chapter-11

Multimedia System (Pokhara University)

Chapter 11 - Multimedia Application

The availability of multimedia hardware and software components has driven the enhancement of existing applications towards being more user-friendly (known as re-engineering). It has also initiated the continuous development of new multimedia applications. Applications are crucial for the whole domain of multimedia computing and communications because they are the only reason why anybody would invest in this area.

Programs

Several programs for the development of multimedia applications have been established during the last few years, some well known from the US and Europe are:

US

HPCC (High *performance computing and communication)* program accelerates the development of scalable, high performance computers, advanced high-speed computer communication network and advanced software. One of the most significant program components of the HPCC program is IITA program (Information *infrastructure Technology and application).* IITA research and development effort are directed towards National Challenge problems such as civil infrastructure, digital libraries, education and lifelong learning, energy management, environment, healthcare, manufacturing processes and products, national security and public access to government information. IITA technology will support advanced applications such as:

- ✓ Tele medicine
- ✓ Remote education and training
- ✓ Tele operation
- ✓ Information access

Europe

ESPRIT (European *strategic program to research in Information technology)* is a well known scientific program of the European community). Its primary goal is to support development of technology and science similar to the HPCC program. The smaller program RACE (Research *in Advanced Communication in Europe)* is similar to RACE but focuses on communication issues. In the second phase, RACE-II program focused on the residential and small business user market to use multimedia communication applications. The RACE program covers applications such as

- ✓ Tele-interaction
- ✓ Tele-shopping
- ✓ Interactive TV and electronic newspaper
- ✓ Tele-working

Structure

There are many views on how multimedia applications are classified. For example, a market view may divide the current multimedia applications into kiosk applications, educational applications and applications in the area of cooperative work. Another view would be a communication oriented view dividing multimedia applications into interactive or distributive oriented applications. The third possibility is some view derived from the hypertext/hypermedia area.

Media Preparation

Media preparation is performed by multimedia I/O hardware and its supporting software. Therefore, hardware and software are the basic components for introducing media into the digital world of the computer.

New hardware technology is needed for multimedia applications and their interactive experience. Here we want to expand briefly on other devices also available for media preparation.

Audio Support
Some audio support with multiple channel digital sound tracks is already available. For e.g. a six-channel digital sound track (front-left, center, front-right, surrounded-left, surrounded-right and sub-woofer) has been developed. In the area of virtual reality entertainment, sound interaction occurs via a helmet.

Video Support
Video bards and digitizers aim towards a high-resolution picture presentation. The ultimate goal is high resolution and rate of 60 frames per second. Currently, several basic kinds of displays are used in virtual reality applications.

- ✓ Head mounted displays (HDD)
- ✓ Surrounded displays
- ✓ Digital Holography

Scanner Devices
- ✓ Photo scanner
- ✓ Image scanner
- ✓ Photo CD devices

Recognition devices
- ✓ Object oriented character recognition engine (Example: AQUIRE)
- ✓ Image recognition
- ✓ Speech recognition

Tracking devices
Trackers report information about position, orientation, acceleration, pressure or joint angles or tracked objects. There are several technologies which have been deployed:
- ✓ Electromagnetic trackers
- ✓ Ultrasound
- ✓ Optical tracking system
- ✓ Position only tracking
- ✓ Eye tracking technologies

Motion based devices

Media Composition
Media composition involves editing single media. i.e., changing its objects, such as characters, audio, sentences, video frames and attribute such as the font of the character, recording speed of an audio sentence of color of an image.

Different media editors are:
- ✓ Text editors (Deals with font, text styles, text effects)
- ✓ Graphics editors (Deals with graphical objects editing)
- ✓ Image editors (deals with scaling, resolutions, intensity of images)
- ✓ Animation editors (Deals with 2D and 3D animation of graphical objects)
- ✓ Sound editors (Deals with locating and storing sounds, recording and playback, editing)
- ✓ Video editors (Deals with motion video editing)

Media Integration

Media integration specifies relationships between various media elements to represent and manipulate a media object. Integration is still very much dependent on technology i.e. platform-specific and format specific.

Multimedia editors

Multimedia editors support the ability to manipulate multimedia document that include structured text, multi-font text, bitmap image, graphics, video, digitized voice and other modifiable objects. Several design issues need to be considered when implementing editors for multimedia documents.

- ✓ Document structure
- ✓ Media editor integration
- ✓ Multimedia buffers and multiple panes
- ✓ Large documents
- ✓ External representation (The individual media should be stored in their standardized format)

Hypermedia/Hypertext editors

It consists of multimedia and non-linear links among the information. Tools used are: Apple's Hypercard, DynaText, NoteCard of Xerox PARC, Hyperbole, Guide, etc.

Authoring tools

When a multimedia application is produced via an authoring system, the author goes through several stages, they are: Concept, design, content collection, assembly, testing. Some of the authoring products are: Mediascript OS/2 pro, IconAuthor, ToolBook, Authorware Professional, InfoDesigner 2, Powepoint, MovieWorks, etc.

Media Communication

Media communication denotes applications which exchange different media over a network via Tele-services (e.g. video conferencing, cooperative works, mailing etc) to multimedia application end users.

The advantage of Tele-services in multimedia is that the end users can be located in different places, and

- ✓ Still internet closely in a quite natural way or
- ✓ Operate on remote data and resources in the same way as with local data and resources.

The disadvantage is that the delivery time of the Tele-services is longer than the processing time of local multimedia application.

Tele-services

Tele-services are services provided by communication system which are based on and make use of audio and video data. It can be *Interactive services* or *distribution services.*

Interactive services

Interactive services include an exchange of control data between remote sites to influence the presentation of continuous media data. Communication of between the sender and receiver can be performed either synchronously or asynchronously. With respect to their task, interactive services are roughly divided into:

- ✓ Conversational services (e.g. video conference)
- ✓ Messaging services (e.g. used in mailing)
- ✓ Retrieval service (e.g. used in document retrieval)
- ✓ Tele-operation services (e.g. Tele-robotics system)
- ✓ Tele-action services (to act in distance)

- Transaction processing system (e.g. credit card, lottery, ATM etc.)
- Alarm and surveillance (e.g. fire, smoke, environment, disabled)
- Business automation (e.g. real state listing, information access)
- Utility resource management (e.g. automatic meter reading etc.)
- Control and command (Tele-metric services) (e.g. industrial equipment monitoring)
- Interactive video support (e.g. home shopping)

Distribution services
Distributive services are services for the distribution of information to different remote sites. For e.g. TV or radio broadcasting use distributive services. There are two kinds of sub-process of distributive services: *without individual user presentation control* and *with individual user presentation control.* E.g. video on demand, Pay-per-view, etc.

Media Consumption

Media consumption is the act of viewing, listening or feeling multimedia information. Viewing and listening are the most common ways user consume media. Feeling multimedia information can be experienced in motion-based entertainment for e.g. through virtual reality.

Viewing multimedia documents
Multimedia document can be viewed (consumed) in two modes:

- ✓ Browsing
- ✓ Detailed media consumption

Browsing means that the user goes quickly through the document to get an overview of what the document includes. Example: user reading only the title of articles in the newspaper, table of contents of book, etc.

Detailed media consumption means a detailed reading, viewing, or listening of the multimedia entity.

Kiosks
Kiosk systems are the public information services located in the public areas, accessible to the visitors or customers. Response time is short and user interface is simple and easy to handle. Example: airport or train station kiosks with maps of terminals, arrival/departure times and gate numbers; cinema information kiosks with information of upcoming movie preview clips, trivia, etc.

Media Entertainment

Virtual reality entertainment, location-based entertainment, motion-based simulators, large screen films and games are applications that used multimedia for entertainment and bring a different and more involved entertainment experience that what is available with a standard TV or movie theatre.

Virtual reality (VR)
The term VR promises far more than our technology can currently deliver. It has been variously used to describe user interfaces ranging from synthesized physical environments presented or head-mounted displays to or ordinary CRTs. Computer based VR system are 3-dimensional interactive as opposed to passive and use one or more devices in an attempt to provide the user with a sense of presence of real situation.

Interactive video

- ✓ Interactive TV
- ✓ Video on demand (VOD)

Interactive audio (Example: CD-on-demand, thematic audio channel, etc)
Games (Example: tele-games)

Trends in multimedia application

- ✓ Applications are going from reengineering of existing applications to establish new application domain. The new applications may require reengineering of user-interface, new integration technologies etc.
- ✓ Multimedia applications are moving from a single PC environment to either a multiuser environment or to a personalized user environment.
- ✓ Multimedia applications are developed less and less for local environment only and more and more for distributive environment.
- ✓ The solutions of current application are often platform specific and system dependent. The trend is going toward open solution so that, applications are portable across various platforms.
- ✓ Media consumption is going from the passive mode of user-computer interaction to an active-mode of interaction.
- ✓ Technical improvements and changes in multimedia application improve productivity through better collaboration opportunities', visualization of different manufacturing processes etc.

References:

- ✓ Multimedia: Computing, Communications and Applications", Ralf Steinmetz and Klara Nahrstedt, Pearson Education Asia
- ✓ "Multimedia Communications, Applications, Networks, protocols ad Standards", Fred Halsall, Pearson Education Asia
- ✓ "Multimedia Systems", John F. Koegel Buford, Pearson Education Asia

Assignments:

(1) Explain different aspects of Virtual Reality as a Multimedia Application.