Multimedia Systems

Introduction

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Multimedia System

Previous session

- Review course website resources
  - Announcements
  - Password
  - Handling large files
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Media

- **Text**
  - sms address to me.

- **Drawing**
  - Let me see the bar chart for this data table.

- **Audio**
  - Can’t chat, I have to call you.

- **Still image**
  - See to believe.

- **Video**
  - Wonder how it works.
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Media

- **Ascii art**
  - Early printers often lacked graphics ability.
- **Ultrasonography**
  - Visualizing subcutaneous body structures.
- **Spectrogram**
  - Audio signal analysis.
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- Computer controlled integration of different media
  - Text
  - Audio
  - Graphic
  - Drawing
  - Still image
  - Video
  - Animation
  - Every other type of data representation forms
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Where multimedia used to be … digitally.

- Represented
- Stored
- Transmitted
- Processed
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HyperMedia

- **HyperText**
  - A text which contains links to other texts
  - Ted Nelson, 1965
  - Non-linear traversal

- **HyperMedia**
  - Can include other media too
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HyperMedia Examples

- WWW
- PowerPoint
- Adobe Acrobat
- iSilo
- Text compression, Hyperlinks, Images, Tables, Formatted text
- ePUB
  - Free and open e-book standard

Tim Berners-Lee
first proposal for www: 1989
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HyperMedia: True generalization!

- **HTML**
  - No version management, no rights management.

- **Project Xanadu**
  - A word processor capable of storing multiple versions, and displaying the differences between these versions.
  - Find more at: http://transliterature.org/

- **ZigZag**
  - Data Model, Database and visualization system
  - See the movie at http://xanadu.com/zigzag/

Computer documents are not just to SIMULATE paper. They should allow us to improve on paper.
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Characteristics

- Computer controlled
- Integrated
  - Seamless
- Data are represented digitally
- Interactive interface
  - End-user is able to control the elements of media
  - Non-linear
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Challenges

- **Digital representation**
  - Analog to digital conversion, sampling

- **Large data requirements**
  - Storage, compression

- **Distributed networks**
  - Bandwidth, QoS

- **Maintaining temporal relationship between data**
  - Sequencing (playing frames in correct order/time frame in video)
  - Synchronization (inter-media scheduling, e.g. Lip synchronization)
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Desirable Features

- **Hardware**
  - Very high processing power
  - Efficient and high I/O
  - Large storage and memory units
  - Network support

- **Software**
  - Multimedia capable file system
  - Special operating system
  - User friendly software tools: Easy to use, Easy to understand
  - Network support
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Components

- Capture device
  - Video camera, Audio microphone, Keyboard, Mouse, Tablet, OCR, different sensors

- Storage device
  - Hard-disk, CD-ROMs, DVD-ROM

- Communication Network
  - LAN, Intranets, Internet

- Computer System
  - Multimedia desktop machine

- Display Device
  - Speaker, Monitor, Printer
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Applications

- World Wide Web
- Video conferencing
- Interactive TV, Video-on-demand
- E-learning, Hypermedia courseware
- Home shopping
- Games, Virtual reality
- Digital video editing and production systems
- Collaborative software, Groupware
- Edutainment, Infotainment
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**Multimedia Data**

- **Format**
  - Raw text, Rich text format
  - Bitmap graphics (Image raster), Vector graphics
  - Time independent (text), Time dependent (video)

- **Size**
  - Typ. PAL digital video: 720 by 576 pixels for each one of 3 color components, 25 frames per sec. $\Rightarrow$ ~30 MB per sec., ~104GB per hour

- **Standards**
  - JPEG
  - MPEG-2, MPEG-4

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Largest capacity of a commercially available HDD at the end of 2010: 3TB
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Graphics Example
Thank You

Next Session: Review of Signals and Systems

FIND OUT MORE AT...

1. http://ce.sharif.edu/~m_amiri/