ACM SIGGRAPH 96 - Course #15

Practical Guide to Recording Video Animation from Computer Graphics

Beginning Level

Course Notes Table of Contents

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Practical Guide to Recording Video Animation from Computer Graphics

FULL DAY

Beginning Level

Video has a presence in a growing number of areas of computing. From presentations to scientific visualization to education, video is playing an increasingly important role in our computing environment. The incredible rate of growth in world wide web and other on-line information systems has created yet another outlet for desktop video recording. With the emergence of multimedia desktop systems and multimedia as a "hot" topic in computing, the role of video production is increasingly important. All areas of computer use are turning to video as a medium for the presentation of information. Most of these new users need a basic education about video to increase the quality of the their production, yet this information is not easily obtained.

This course is a basic introduction to video recording of computer graphics animation from a variety of data sources. It complements Dean Winkler's previous SIGGRAPH video course, but his course is not a prerequisite for attendance to this course. Where Dean's course mainly covered video theory and the technical aspects of video production, in this course we will present a practical, nuts-and-bolts, approach to building a computer video animation recording systems. Further, we will discuss subjects which aid in producing a polished, professional looking video.

In order to provide useful information to a large, diverse audience with varying needs and budgets, we will address a wide range of system configurations: from pointing a camera at a computer monitor, to desktop video, to a full studio-quality computer graphics animation/editing system. We will describe in detail and demonstrate several system configurations.

COURSE OBJECTIVE

Our principal objective is to give an overview of setting up a computer based video animation recording system.

This course is directed toward those who want to record computer generated animation (Alias, Softimage, Wavefront, etc.), or animation of scientific and visualization data (AVS, in-house software calculation results, raster images, etc.) onto video tape.

To address the diverse needs and budgets of our audience, we will present a large range of video systems: from pointing a camera at a computer monitor, to a studio-quality recording/editing system, including desktop video. With these systems we will discuss: their advantages and disadvantages, the purpose of the equipment, the function of the hardware and software, and what to look for when purchasing video equipment.

We will also discuss other related topics, such as audio, image compression, copyright laws, the future of video, and the pitfalls to avoid when producing a video.

It is not possible to cover all aspects of this topic thoroughly in a single day, so we have chosen to include detailed technical and theoretical topics, such as the technical description of the NTSC broadcast video signal, as an appendix in the course notes. Information contained in the appendix will be covered quickly during the course. This enables the attendee to learn complex information at their own speed, and it frees up time to include important topics usually not covered in an introductory course. It is our goal to make the course notes a good reference book to be used beyond the end of the conference.

COURSE OBJECTIVE ...

Attendees should leave with enough information to know what to look for in purchasing equipment, how to assemble a system of their own, be knowledgeable enough as to know what hardware and software is needed, and what pitfalls to avoid when producing a video.

INTENDED AUDIENCE

People starting or planning to build a computer based video animation recording system, including desktop video or visualization centers for industrial and presentation uses.

PREREQUISITES

Prior knowledge of the basics of computer graphics is assumed. This course makes few assumptions about any knowledge of video theory, but it would be helpful. Attendees should at least be able to correctly connect a home VCR to a television.

Presenters

Bob Judd - LANL

Jim Costigan - UIC EVL

John Mareda - SNL

Ross Gaunt - LLNL

Andy Martinez - LANL

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SCHEDULE

Session 1 - 8:30 AM to 10:00 AM

Session 2 - 10:15 AM to 12:00 PM

Session 3 - 1:30 PM to 3:00 PM

Session 4 - 3:15 PM to 5:00 PM

Session 1 - 8:30 AM to 10:00 AM

8:30 AM - Overview. Bob Judd
8:40 AM - Video Formats. Jim Costigan
9:10 AM - Basic Systems. Andy Martinez
9:30 AM - Basics of Video Animation Systems Part 1. Jim Costigan

Session 2 - 10:15 AM to 12:00 PM

10:15 AM - Basics of Video Animation Systems part 2. Jim Costigan
10:45 AM - High End Animation Systems - Jim Costigan
11:05 AM - Desktop Video Systems. Ross Gaunt

Session 3 - 1:30 PM to 3:00 PM

1:30 PM - Compressed Digital Video for Low Bandwidth Systems.
    John Mareda
2:30 PM - Computer Generated Animation Software.
    John Mareda

Session 4 - 3:15 PM to 5:00 PM

3:15 PM - Polish. Ross Gaunt
3:45 PM - Pitfalls of video. Andy Martinez
4:15 PM - HDTV . John Mareda

SCHEDULE
Session 1 - 8:30 AM to 10:00 AM

- Overview - Bob Judd
- Video Formats - Jim Costigan
- Basic Systems - Andy Martinez
- Basics of Video Animation Systems - part 1
  Jim Costigan

Session 1

Video Formats

Jim Costigan

For people new to the field, we will describe the wide variety of video formats and discuss their advantages & disadvantages. Topics include: NTSC, Y/C, Y R-Y B-Y, digital video, SMPTE time codes.

Basic Systems

Andy Martinez

We begin with a low-end approach, recording a computer monitor screen with a video camera, and then recording directly from the back of a monitor in real time. We will present examples of each configuration, advantages and problems of each method. Topics include: scan converters, and video recorders.

Basics of Video Animation Systems Part 1

Jim Costigan

This two part section will cover the requirements of a range of animation recording systems. Each new system will build on the previous system. With each configuration we will describe the hardware, discuss their features, advantages & disadvantages, and talk about what to look for when purchasing a device. Topics include: video frame buffers, laser video disk recorders, single frame video tape recorders, monitors, time base correctors, distribution amps, sync generators, cables, waveform monitors and vector scopes.

SCHEDULE

Session 2 - 10:15 AM to 12:00 PM

- Basics of Video Animation Systems - part 2
  Jim Costigan
- High End Animation Systems - Jim Costigan
- Desktop Video Systems - Ross Gaunt

Session 2

Basics of Video Animation Systems part 2

Jim Costigan

High End Animation Systems

Jim Costigan

To maintain quality, and provide the most flexibility, studio quality systems are needed. Topics include: component video recorders, digital disc recorders, time base correctors, synchronization, video switchers, and linear editors.

Desktop Video Systems

Ross Gaunt

Inexpensive computer systems are taking over many functions in video production. While desktop video systems provide some otherwise hard-to-obtain capabilities, they still have many areas that need improvement. We will present an overview of various system configurations, and discuss the advantages of each. Firewire is a new IEEE standard for connection of multimedia systems. We will provide both technical details as well as practical use and interfacing to Firewire. Topics include: non-linear editing, and desktop systems. We also plan to add a live demonstration of a desktop non-linear system if arrangements can be made for a system, software and AV equipment.

SCHEDULE

Session 3 - 1:30 PM to 3:00 PM

- Compressed Digital Video for Low Bandwidth Systems - John Mareda
- Computer Generated Animation Software - John Mareda

Session 3

Compressed Digital Video for Low bandwidth Systems

John Mareda

Although this topic could be a course by itself, we will present an overview of the main concerns regarding computer animation using a low bandwidth system. Due to the large size and number of frames in a computer animation, some form of file compression is often used. In order to transmit video over a network or play it from a CD-ROM, such as the one included with the course notes, the data also must be highly compressed. The amount of compression and image information loss varies between compression algorithms, and knowing the advantages & disadvantages of each is important. Tradeoffs between the popular compression technologies (JPEG, MPEG1, MPEG2, wavelet, Indeo, and Cinepak) will be described. We will also discuss the limitations of playing video over current networks, use of video over ATM, video server implementations, and information on the next generation of network protocols. Topics include: compression, animation, system requirements, and recordable CD-ROMS.

Computer Generated Animation Software

John Mareda

There is a variety of software available for making animation, each having a specific use. It is important to know what software goes with what hardware, and what software is needed for a particular function. Topics include: image conversion, controller software, generating animation from vendor packages, AVS, PV-Wave, in-house software, computer animation packages such as Alias, SoftImage, and Wavefront.

SCHEDULE

Session 4 - 3:15 PM to 5:00 PM

- Polish - Ross Gaunt
- Pitfalls of video - Andy Martinez
- HDTV - John Mareda

Session 4

Polish

Ross Gaunt

What makes a presentation look professional. Topics include: audio, narration, music and sound libraries, copyrights, titles, transitions, flow and pacing.

Pitfalls of video

Andy Martinez

Andy Martinez presenter. Here we cover the problems associated in converting computer graphics into video. Topics include: video color limitations, color correction, safe viewing and title areas, adjacent color problems, resolution, and making copies.

HDTV

John Mareda

An update on the proposed HDTV standard. Topics include: currently available hardware/software, how does HDTV fit into the computer graphic animation process, and an example of a basic HDTV animation recording system.