

**Practical Guide to Recording
Video Animation from
Computer Graphics**

Organizer
ROBERT JUDD
Los Alamos National Laboratory

Lecturers
JIM COSTIGAN

ROSS GAUNT
Lawrence Livermore National Laboratory

JON MAREDA
Sandia National Laboratories

ANDY MARTINEZ
Los Alamos National Laboratory

Course **14**
NOTES



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ACM SIGGRAPH '95



Course 14

Beginning Level

**Practical Guide
to
Recording Video Animation
from
Computer Graphics**

COURSE OBJECTIVE

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

We also will explore upcoming horizons in computer video technology, such as MPEG2, multimedia, HDTV, and others.

COURSE SUMMARY

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 their production. Many of these potential video producers are coming to the annual ACM SIGGRAPH conference to learn about the latest techniques in computer animation and multimedia. We feel that the annual ACM SIGGRAPH conference is a perfect place to educate this growing community of novice video producers and hope that this course will begin to accomplish this.

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.

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.

COURSE SYLLABUS

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 references to the detailed technical and theoretical topics, such as the technical description of the NTSC broadcast video signal

SCHEDULE

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

- 8:30 AM - 14.00 - Overview - Bob Judd
- 8:40 AM - 14.01 - Video Formats - Jim Costigan
- 9:10 AM - 14.02 - Basic Systems - Andy Martinez
- 9:30 AM - 14.03 - Basics of Video Animation Systems Part 1 - Jim Costigan

Morning Break - 10:00 AM to 10:30 AM

Session 2 - 10:30 AM to noon

- 10:30 AM - 14.03 - Basics of Video Animation Systems part 2 - Jim Costigan
- 11:00 AM - 14.04 - Desktop Video Systems - Ross Gaunt
- 11:30 AM - 14.05 - Compression Technology - John Mareda

Lunch - Noon to 1:30 PM

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

- 1:30 PM - 14.06 - High End Animation Systems - Jim Costigan
- 2:00 PM - 14.07 - Computer Generated Animation Software - John Mareda
- 2:30 PM - 14.08 - Using Computer Animation in Multimedia (30 minutes). John Mareda

Afternoon Break - 3:00 PM to 3:30 PM

Session 4 - 3:30 PM to 5:00 PM

- 3:30 PM - 14.09 - Polish - Ross Gaunt
- 4:00 PM - 14.10 - Pitfalls of Video - Andy Martinez
- 4:30 PM - 14.11 - HDTV - John Mareda

Additional Course Note Material

Section 14.12 - Video Animation System Operators Manual - SAND92-1624

DETAILED SESSION DESCRIPTIONS

Session 1

- Overview (10 minutes). Bob Judd presenter. Bob will introduce the course and answer the questions: Why would one want to record computer graphics animation, for what purposes is it useful (such as analysis, insight, presentation, training, program development, entertainment), and how tools and techniques differ depending on the data source (scientific calculations, artist animation, CAD-CAM modeling, etc.).
- Video Formats (30 minutes). Jim Costigan presenter. 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 (20 minutes). Andy Martinez presenter. 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 (30 minutes). Jim Costigan presenter. 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.

Session 2

- Basics of Video Animation Systems part 2 (30 minutes). Jim Costigan presenter.
- Desktop Video Systems (30 minutes). Ross Gaunt presenter. 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. Topics include: non-linear editing, and desktop systems.
- Compression Technology (30 minutes). John Mareda presenter. Due to the large size and number of frames in a computer animation, some form of file compression is often used. The amount of compression and image information loss varies between compression algorithms, and knowing the advantages & disadvantages of each is important. Topics include: Run length encoding, JPEG, MPEG 1, MPEG 2, wavelet, fractal, and QuickTime.

Session 3

- High End Animation Systems (30 minutes). Jim Costigan presenter. 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.
- Computer Generated Animation Software (30 minutes). John Mareda presenter. 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.
- Using Computer Animation in Multimedia (30 minutes). John Mareda presenter. Although this topic could be a course by itself, we will present an overview of the main concerns regarding computer animation using a multimedia system. Topics include: compression, animation, system requirements, and recordable CD-ROMS.

Session 4

- Polish (30 minutes). Ross Gaunt presenter. What makes a presentation look professional. Topics include: audio, narration, music and sound libraries, copyrights, titles, transitions, flow and pacing.
- Pitfalls of video (30 minutes). 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 (30 minutes). John Mareda presenter. 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.

COURSE ORGANIZER'S BACKGROUND

Bob Judd
Los Alamos National Laboratory
CIC-6 Customer Service, MS-B251
Los Alamos, NM 87545
Work: 505-667-0690
Fax: 505-665-5817
e-mail: bj@lanl.gov

Bob is a technical staff member of CIC-6 Customer Service group in the Computing, Information and Communications Division of Los Alamos National Laboratory. His technical work has been in the areas of scientific visualization, computer graphics, high-speed networking, and desktop systems support. He recently has been helping K-12 education sites become connected to the Internet. He was the Group Leader of the Computer Graphics Group at Los Alamos for nearly seven years and also founded the first UNDX workstation support group at Lawrence Livermore National Laboratory. Bob was the conference co-chair for SIGGRAPH '93 and Panels Chair for SIGGRAPH '89 & '91. Bob is currently the information manager of SIGGRAPH.ORG. Bob was also the first president and founding director of the International Sun Users Group.

SPEAKER BACKGROUND

Ross Gaunt
Lawrence Livermore National Laboratory
PO Box 808, MS L-73
Livermore, CA 94551
Work 510-423-2533
Home 510-455-5748
Fax 510-423-8704
e-mail: gaunt@llnl.gov

Ross has been involved in video animation of scientific data at Lawrence Livermore National Laboratory for five years. Prior to receiving his degree in computer science, he worked over ten years as an electronic technician in computer and video hardware. He has designed and built three computer video animation and editing systems that are in use at the laboratory. He has presented several computer animation video tutorials at the laboratory. Currently, he is building a multimedia CD-ROM recording facility, and a computer video animation system with real-time recording and graphics effects of uncompressed images stored on SCSI disks.

John Mareda
Sandia National Laboratories
SMTS, Department 1425
PO Box 5800
Albuquerque, New Mexico
Work 505-845-8550
Home 505-296-0135
Fax 505-844-9297
e-mail: jfmared@sandia.gov

John Mareda has been involved in video animation of scientific data at Sandia National Laboratories for over ten years. He has set up several video animation systems that are currently in use throughout the laboratories. He has given numerous presentations on video animation technology including co-chairing a panel session on HDTV at SIGGRAPH '91. John is currently applying his knowledge of computer generated animation to the field of multimedia.

Jim Costigan
Extron Electronics
1230 South Lewis
Anaheim, CA 92805
Work 714-491-1500
Fax 714-491-1517
costigan@extron.com

Jim Costigan is an audio/video professional who deals on a daily basis with a wide variety of video systems and configurations. He is the Sales Manager for Extron electronics.

Andy Martinez
Los Alamos National Laboratory
CIC-8 Distributed Computing Environments, MS-B272
Los Alamos, NM 87545
Work: 505-667-4713
Fax: 505-665-6333
e-mail: aam@lanl.gov

Andy is a technical staff member of CIC-8 Distributed Computing Environments Group in the Computing, Information and Communications Division of Los Alamos National Laboratory. His technical work has been in the area of visualization, computer graphics, and video recording systems. He is the team leader of the graphics and visualization laboratory. He has experience in building video recording systems and then working with a scientist to create a video presentation of their information.