MPEG DTV Video

Public Courses
In memory of COMDEX 2004

FOUR INTENSIVE SHORT COURSES IN

Digital Television, MPEG and Video Compression

■ **MPEG-1 & MPEG-2**

2-day course; November 15 & 16 , 2004

■ **Digital Television (DTV)**

1-day course; November 17 , 2004

■ **MPEG-4 Part 2 and Part 10/AVC/H.264**

2-day course; November 18 & 19 , 2004

■ **Digital Video Basics**
  - analog & digital TV basics and signal processing

2-day course; November 11 & 12, 2004

Instructor: Dr. Jordan Isailovic

Calendar: November 2004

Monday	Tuesday	Wednesday	Thursday	Friday
			11 **Digital Video Basics**	12
15 16 **MPEG-1 & MPEG-2**		17 **DTV**	18 19 **MPEG-4 Part 2 and Part 10**	

Video Design House

Training Department   www.jritechnology.com
www.advanceinteractive.com/jordan

Video Compression   Digital Television   MPEG Short Courses

MPEG-1 and MPEG-2

2-day course   (1.4 CEUs)

Course Focus

How bad is good enough: JPEG, MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21 . . .

The Moving Picture Experts Group (MPEG) was formed to establish an international standard for the coded representation of video and associated audio.

The bit rate is reduced by exploiting the psychovisual properties of the human visual system as well as statistical redundancies in the image data. The MPEG-1 algorithm utilizes motion estimation/ compensation for the reduction of temporal redundancy and discrete cosine transform (DCT) for the reduction of spatial redundancy. To achieve additional compression on video data, variable length code (VLC) is also used. Another characteristic of the MPEG-1 video compression algorithm is the introduction of a bi-directional prediction method.

The MPEG-2 standard is designed for high quality use in broadcast and telecommunications applications. MPEG-2 features CCIR 601 resolution video - similar to D-1 tape (704x480 pixels/frame, NTSC; 704x576 pixels/frame, PAL) at data rates of 3 to 15 Mbits per second, and the concept of scalability. It also provides support for the interlaced format, a 16:9 video aspect ratio, and multiple video and audio channels within the same stream. In addition, MPEG-2 provides an extension ability to HDTV.

Course Overview

This course provides a theoretical, intuitive and practical basis for the coding of images into digital form and their compression. Additionally, this course covers MPEG standards. Compression testing, available tools and major artifacts associated with video compression are surveyed.
"A two-day course will not make anyone an expert in the industry; however, we have found that it will give a person the building blocks for which to advance their knowledge and grow further."

Who Should Attend

The course is designed for scientists, engineers and technical managers involved in design specification, implementation, management, or utilization of video compression systems and others who wish to acquire knowledge of the video compression technology field. This course provides participants with the mathematical and conceptual background required to understand, design, implement, and evaluate video compression systems, in particular the MPEG-2 standard. Patent lawyers should also find it useful.

Attendees will benefit from the in-depth coverage of MPEG-1-2 compression standards. Upon completion of this course, students will be equipped with the background that will help them understand the performance limitations of various compression solutions.

Although video compression is mathematically based, it is not assumed that attendees are familiar with higher level math: modern algebra, fractals, wavelets, etc.

Course Objectives

- Provide background for understanding the MPEG standards
- Introduce the student to both compression standards (MPEG) and proprietary digital video formats
- Acquaint the student with their (standards/formats) capabilities and applications
- Compare the MPEG-2 algorithm with other approaches to video compression
- Consider opportunities and obstacles

Topic Outline

Day 1

Introduction
    Description of Course Structure and Content
    Course Objectives
    Standards Overview
Analog TV: Basic Concepts
Digital TV: Component vs. Composite
Theoretical Base for Compression/Decompression
    Need for Data Compression
    Information Theory Concepts
    Visual Psychophysics
    Predictive Coding
    Motion Estimation
    Transform Coding
    Subband Coding
    Vector Quantization, etc.
Examples of Codec Designs
    p*64 Standard
    JPEG Standard
MPEG-1 Standard
    Functional Block Diagrams
    Syntax and Semantics
    Video Compression
    Audio Compression
    System Layer
    Example: MUX for CD

Want to receive news about MPEG and DTV standards, and new upcoming video courses? Join our mailing list. E-mail to info@jritechnology.com

Day 2

MPEG-2 Standard
    Video Compression
    Audio Compression
    System Layer
    Program and Transport Streams
    Comparison with MPEG-1
MPEG-2 Distribution
    Optical Recording of the MPEG-2 Data Stream
    End-to-end TV Distribution

This Course includes:

Two days of instruction (1.4 CEUs)
Extensive set of notes, which cover all the visuals used in the course
Pre-course preparatory homeworks

Instructor

Dr. Jordan Isailovic, scientist, JRI Technology and California State University , is author of **Videodisc and Optical Memory Technologies** and **Videodisc System Theory and Applications.** He has authored numerous technical articles and holds several patents on digital information storage techniques and video signal processing. He presented the world's first public engineering course on videodisc technology (January 1982) and taught the world's first graduate courses on videodisc and optical memories (CD, CD-ROM, etc.) at UC Irvine and California State University Fullerton. He developed a double density code, the **"Jordan Code"**, on which three US patents are held..

His research projects include the following areas: three-dimensional optical memories, channel coding for optical recording, machine vision, image processing, testing methodology for visually-lossless compression, etc. For lectures, he has written four manuscripts: *Optical Compact Systems* (including CDs and CD-ROMs), *Advanced Digital Systems Design, Guide to Frame Grabber Design*, and *Multimedia PC Architecture and Design*.

Some of Dr. Isailovic's projects and accomplishments:

This list is in chronological order, and does not include books, invited papers, or other publications

Designed and developed extended play formats (US patent #4499502)

Developed a digital information storage technique for use with a video signal (US patent #4347619)

Developed a double density code, the "Jordan Code" on which three US patents are held (#4204199, #4232388, #4307381)

Developed an adaptive processor for the luminance/chrominance signals separation in the standard NTSC TV signal; successfully developed two systems

Designed a Multiplex Analog Component (MAC) system for videodisc recording

Introduced the visual model for efficient video signal coding and compression

Prepared a study for OPTIMEM: "Code selection for optical recording"

Prepared and published: "OPTICAL MEMORY REPORT"

Designed machine vision system for rare coin grading

Developed a multimedia board with video, audio, and data in the same format

Designed a color and BW quad video monitor with motion detector

Dr. Isailovic's current research primarily focuses on video compression - a subject closely related to his Ph.D. thesis in which, among other things, he established the theoretical limits for TV signal compression based on 3D predictive coding. As a consultant, he has evaluated a great number of MPEG (-1-2-4) encoders and decoders. For Advanced Interactive Inc. he designed the Non-Peg Interactive TV set-top box. He represented Packard Bell-NEC - where he worked as a Video Architect - in the DVD Copy Protection Technical Working Group (CPTWG), represented Lucas Film and Technicolor in MPEG, and is still active on the MPEG committee, SMPTE and CPTWG. He co-chaired MPEG Digital Cinema AHG and the SMPTE working group on DVD Authoring.

Currently, Dr. Isailovic is consulting in the fields of digital cinema and video compression: evaluating/testing compression techniques, proposing system designs, participating in Standards committees on digital cinema, etc. Also, he serves as an expert witness in patent litigation: he assesses and evaluates patents and patent portfolio.

Dr. Isailovic may be reached at jordan@jritechnology.com.

Projects and accomplishments - continue
Selected the optimal channel code for optical recording of an MPEG-2 data stream (presented at the 136th SMPTE conference in October 1994), and published in the SMPTE Journal

Developed a multimedia PC architecture for the MPEG-2 environment

Designed the Non-PEG system (encoder and decoder - set-top box) for the video, audio, and data delivery in the video format.

Feasibility study for the MPEG-2 delivery over a wireless home network

Feasibility study: MPEG-4 in the (Cadence) IC design tools

Designed video converters for the HDTV-to-Standard TV and STV-to-HDTV conversions.

Evaluated codecs for Digital Cinema.

Selected the Stress Test material for the MPEG-4 Cinema Profile feasibility study.

Evaluation and development of the Test methodology for the compression in Digital Cinema.

EFFECTIVE TRAINING. ON SITE, ON TARGET !

On-Site Course Benefits:

- **Tailored to your specific needs**
- **Enjoy confidentiality** - freely discuss your company's needs
- **May be scheduled at your convenience**
- **Significant per attendee savings -** eliminate travel and time away from the office
- **Quality course documentation**

Digital Television (DTV): Next Generation Technology and Applications

1-day course   (0.7 CEUs)

Course Summary

There has been a quantum shift, imperceptible to the viewer, in the technology used to bring television into the home: the winning choice is digital technology. Digital TV (DTV) is the umbrella term used to describe the new digital television system adopted by the FCC in December 1996; DTV is a technology, and HDTV is just one subset of the DTV.

The objective of the course is to bring the participants gracefully through all the DTV structure, features, and theory…then give them more practical information on subjects such as decoding issues, display problems, conversion, baseband data stream handling, etc. The course will also provide an in depth and structured introduction to the technology, its uses, opportunities/ possibilities, and limitations. Digital TV is not simply the numerical equivalent to traditional analog television: the issues of becoming digital are covered, as well as the relevant compression technologies.

Participants will enhance their knowledge of the principles of transmission, as well as problems and opportunities of data delivery through terrestrial, satellite and cable networks. Insight is also provided on the receiver issues and how they will handle format conversion as well as conditional access. Participants will gain a point-by-point understanding of the DTV layered architecture, DTV transmission requirements, multiplexing, MPEG switching, audio components, compatibility with today's analog TV, and more.

Course Objectives

- Provide background for understanding the DTV standards
- Discuss enabling technologies
- Review the fundamentals of underlying modulation techniques
- Discuss specifics of ATSC, DVB-B-C Systems
- Discuss critical design issues
- Discuss technical aspects related to copy protection
- Discuss basic problems in the system integration
- Discuss opportunities and obstacles

Who Should Attend

The course is intended for video engineers who will have to use the technology. The mathematics of compression techniques are discussed briefly, but the focus of the course is on providing a qualitative understanding of the processes involved rather than their detailed analysis. If you are looking for real world answers and direction toward solutions, this course is for you.

Topic Outline

Day 1

Introduction
  Description of Course Structure and Content
  Course Objectives
  Standards Overview
Standard TV - Analog: Basic Concepts
Standard TV - Digital: Component vs. Composite

Day 1 (cont.)

Introduction to DTV/ATSC
MPEG-2 Distribution
  DTV-Broadcast/ATSC

Satellite and Cable TV Distribution
(DSS, DVB - Broadcast/Cable, ATSC)
System and Service Information (SSI)
  PSIP Fundamentals
Critical Design Issues
  DSP vs. Dedicated MPEG-1-2 IC's
  Hardware vs. Software Solutions
  Clock Recovery and Synchronization Issues
  Sampling Strategies and Structures
  CCIR-601 4:2:2 and 4:2:0; Interlaced/Noninterlaced
  VLSI Implementation
  MPEG Processing Architecture and Implementation
  Architectural choices
  Format Conversion

MAJOR ARTIFACTS ASSOCIATED WITH VIDEO COMPRESSION
Subjective evaluations of digitally compressed video

ATSC/DVB STANDARDS UPDATE
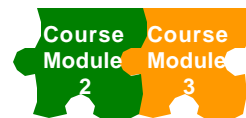**Applications**
  What is Available – Current Products
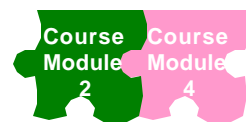 Present and Future
    Future A/V Standards

5 Day Full Course
(money savings, and covering all MPEG, DTV basics in one course!)

4 Day Intensive DTV, MPEG-4, -7 Course

4 Day Intensive Digital Video and DTV Course

To schedule an on-site course, contact us today.

To discuss your training needs, call our Video Training Department at (714) 921-2286 or send email to info@jritechnology.com

MPEG-4 Part 2 and Part 10/AVC/H.264

on-site 2-day course   (1.2 CEUs)

Course Description

MPEG-4 is ISO/IEC standard developed by MPEG (Moving Picture Expert Group). MPEG-4 provides the standardized technological elements enabling the integration of the production, distribution and content access paradigms of the three fields: digital television, interactive graphic applications (synthetic content), and interactive multimedia (WWW; distribution of and access to content). An in-depth coverage of MPEG-4 is presented in this Course, including AVC/Part-10/H.264. First, the theoretical base – tools, concepts, principals – required for the understanding MPEG-4, is covered. Next, Video coding is discussed in details. After that the rest of the MPEG-4 Standard is reviewed. Applications, opportunities and obstacles are covered.

Course Objectives

At the completion of this course, students will have a basic understanding of how MPEG-4. They will be familiar with the various compression algorithms and technologies. Students will learn to identify common problems with digital video quality, their causes, and solutions. In addition, students will learn MPEG-4 basics and terminology.

Who Should Attend

The course is intended for video, R&D engineers who need to use the technology for developing the next generation audio-visual products, and for systems devlopers, decision makers and others who seek a detailed understanding of new technoghies in the MPEG area.

Topic Outline

Day 1

MPEG-4 Standard Overview Version 1, Version 2
Theoretical Base: tools, concepts, principles
    Summary - MPEAG-1-2 bases
    Arithmetic coding
    Shape representation: binary and gray-scale (alpha) planes
    Mash (object plane) based presentation
    Shape-adaptive DCT and DWT
    Global and local motion compensation
    RVLC, etc.
MPEG-4 Video
    Natural video coding
    Texture coding
    Synthetic video
Advanced Video Coding (AVC) - H.264
    Overview

Visit us on the Web:
www.jritechnology.com
www.advancedinteractive.com/jordan

Day 2

Advanced Video Coding (AVC) - H.264
Compression tools
Prediction:
        Prediction of Intra Macroblocks
Prediction of Inter Macroblocks
Transform and Quantization
Reconstruction filter
Interlaced Video
Flexible Macroblock Ordering (FMO)
ENTROPY CODING
(Universal) Variable Length Coding
Content-Based Adaptive Arithmetic Coding (CABAC)
Switching P and I slices

Future extensions
Applications: Opportunities and obstacles
Markets, Patent obligations, Testing tools

This Course includes:

- Two days of instruction (1.2 CEUs)
- Extensive set of notes, which cover all the visuals used in the course
- Pre-course preparatory homeworks

Powerful modularized course design meets your needs...

4 Day Complete MPEG Course

Also available:
Interactive course on CD: Video Compression and MPEG Technology Fundamentals
Copy Protection Seminar (1 or 2 days)
DVD Course (3-days)

To schedule an on-site course, contact us today.

To discuss your training needs, call our Training Department at (714) 921-2286 or send email to info@jritechnology.com

Digital Video Basics - analog & digital TV basics and signal processing

2-day course   (1.2 CEUs)

Course Description

Digital television is about re-invention of the television industry via digital technology, just like digital computer re-invented the computing and documenting industries. This course is about Analog and Digital TV basics and relevant signal processing. The course covers the fundamental technology that lies at the heart of compression - particularly MPEG - and high definition television (HDTV), and Digital TV in general. It is recommended as an introductory course for the MPEG-2 or DTV course.

Course Objectives

At the completion of this course, students will have a basic understanding of how analog video is digitalized, carried, and tested. Students will gain an understanding of the processes involved in video encoding and decoding. They will be familiar with the color space and colorimetry, gamma processing, etc. Students will learn to identify common problems with digital video quality, their causes, and solutions. In addition, students will learn basic analog and digital video standards, principles standards are based on and terminology.

Who Should Attend

Although technical in content, this course is intended for a wide audience. The course is designed for scientists, engineers, analysts, and technical managers involved in the design, specification, implementation, manufacturing, marketing, or evaluation of digital video products or systems and others who wish to acquire knowledge of the digital video technology field.
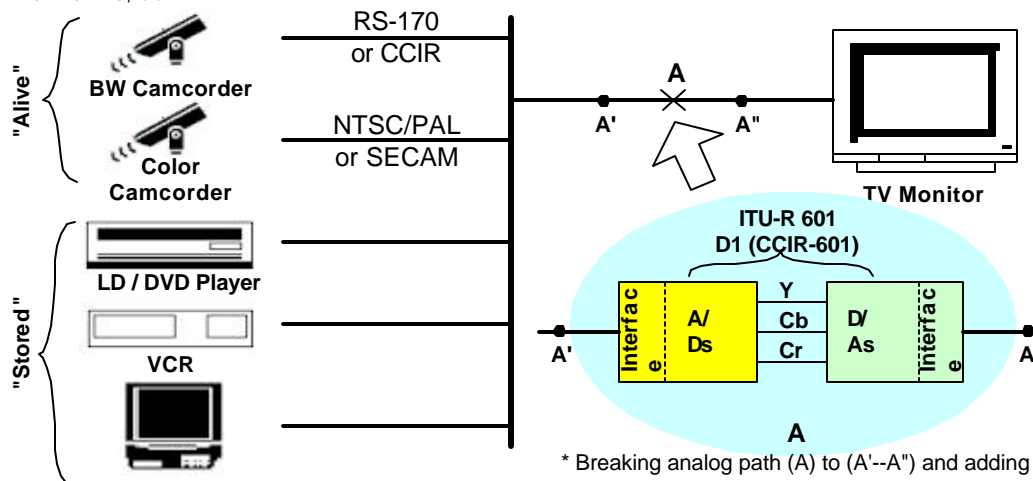
Topic Outline
Day 1

ANALOG TV: BASIC CONCEPTS
BLACK-and-WHITE TV SIGNAL
    Raster scan concept
    Interlacing (vs. progressive scanning)
        Frame and
        Field
    Time Domain:
        SYNC: vertical and horizontal; composite
        (ACTIVE) video signal
    Spectrum
    STANDARDS: RS 170, CCIR

Day 1 (cont.)

INTRO to COLORIMETRY
COLOR TV SIGNAL
    Component: R G B; L-U-V; L-I-Q; L-Cr-Cb
        LUMA/LUMINANCE
    Composite
    Gamma - Correction
    Inerleaving
        CHROMA/CHROMINANCE
        COLOR SUBCARRIER (fsc)
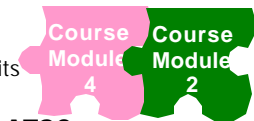   Standards: NTSC (RS 170A), PAL, SECAM
    Color Bar

Day 2

DIGITAL TV
    Digitizing Video
    Component Digital
    Composite Digital
    Aspect Ratios
    Features & Benefits
    Signal processing
Introduction to ATSC
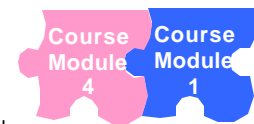
4 Day Digital Video and MPEG Course

3 Day Digital Video & DTV Course

This Course includes:

- Two days of instruction (1.2 CEUs)
- Extensive set of notes, which cover all the visuals used in the course
- Pre-course preparatory homeworks

* Breaking analog path (A) to (A'--A") and adding sampling for digital video

General Information

Registration Fees:
Two-Day course - $1300
One-Day course - $800
Group Discounts: 10% discount for group of three or more from one organization registering at the same time for the same course.
Payment due in U.S. funds prior to the course. Company checks, purchase orders, and personal checks are all acceptable forms of payment.

Course Fee and Payment: The course fee includes tuition, course materials, and refreshments. Checks should be made payable to JRI Technology.
Pre-registration deadline is Monday, November 1, 2004 for the **"In memory of COMDEX 2004"** Video Compression Technology courses.

Payment in full is required prior to the course start date.

Please mail check to:
      JRI Technology
      4497 E. Pepper Creek Way
      Anaheim, CA 92807

The lawyer's corner
Refunds: Cancellations are subject to a 20% service charge. The course fee (less a 20% service charge) will be refunded if cancellation is received at least one week prior to the first day of the course. Substitutes may be made at any time. Registrants who do not attend and do not cancel by written notification 7 days prior to the seminar date are liable for the full registration fee: no-shows will be charged the full registration fee.

Returned Checks: A $20 fee will be charged for returned checks.

Changes and Re-scheduling: JRI Technology reserves the right to cancel, re-schedule, or change location (nearby) at anytime. JRI Technology's liability is limited to the return of the registration fee. JRI Technology reserves the right to modify the agenda after the date of publication, if it is necessary.

Location: Orange County, California, US
California State University Fullerton
Spectrum Seminar and Conference Center
8659 Research Drive, Irvine, CA 92618;
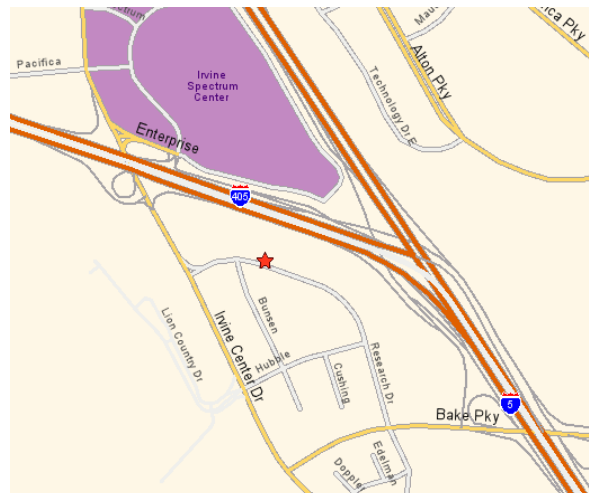Tel: 949/585-9137

Hotels in the vicinity:
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http://www.doubletreeirvinespectrum.com
The Hyatt Regency
www.hyatt.com
The Marriott
www.marriott.com

JRI TECHNOLOGY Registration Form

for the
"In Memory of COMDEX 2004 Courses"

If you have any questions, please call JRI TECHNOLOGY at (714) 921-2286.

Pre-registration deadline is Monday, November 1, 2004 for these courses.

Please select the course(s) you will attend, check appropriate box(es):
Location: Irvine, CA (Orange County)

Select	Course Name	Course Dates	Fee
	Digital Video Basics	November 11 & 12, 2004	$1300
	MPEG 1-2	November 15 & 16, 2004	$1300
	Digital TV	November 17, 2004	$800
	MPEG 4 Part 2 and Part 10 AVC/H.264	November 18 & 19, 2004	$1300

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