



Digital Video

Part I: Introduction & Camcorders



The University of Utah

Student Computing Labs



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We Will Cover

- Introduction to Digital Video
 - What is Digital Video DV
 - History of Analog and DV
 - Digital vs. Analog Video
- Camcorder Overview
 - Features to look for
 - Video Tape Formats
 - Filming Techniques & Tips



We Will NOT Cover

- Video Editing (covered in Part II)
 - iMovie (covered in Part II)
 - Final Cut Pro
 - Other Digital Video Applications
- Video Production Tips (covered in Part II & III)
- Distribution of Videos (covered in Part II & III)



Class Overview

- Video Editing History
- What is Digital Video (DV)
- Video formats
- Personal Camcorders
- Professional High End Camcorders
- Filming Techniques



Video Editing History

- 1990, 13 years ago: \$200,000
- 1995, 8 years ago: \$8,000
- Now: \$1,100 for an iMac and DV camcorder
 - New education price
 - Used/refurbished/demo even cheaper!
 - Quality better than ever before



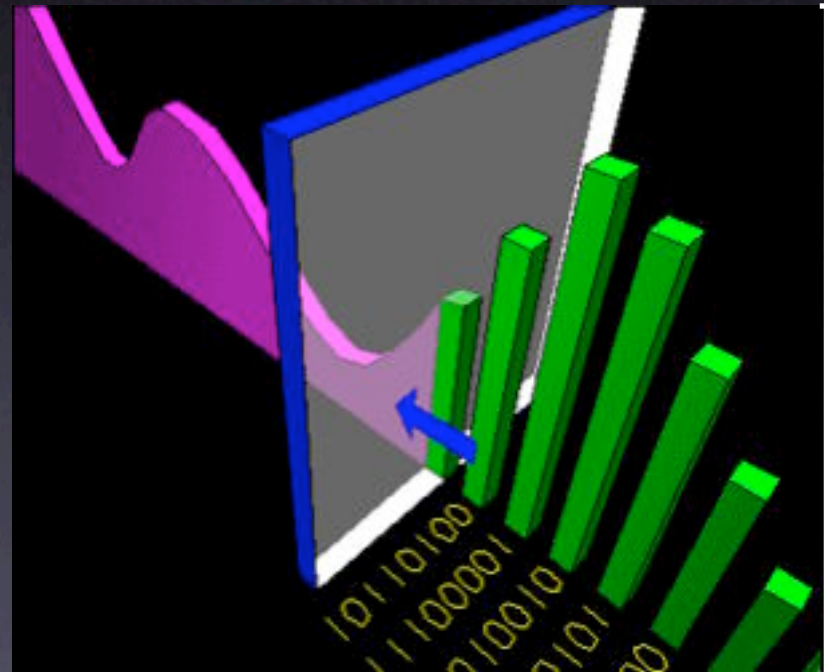
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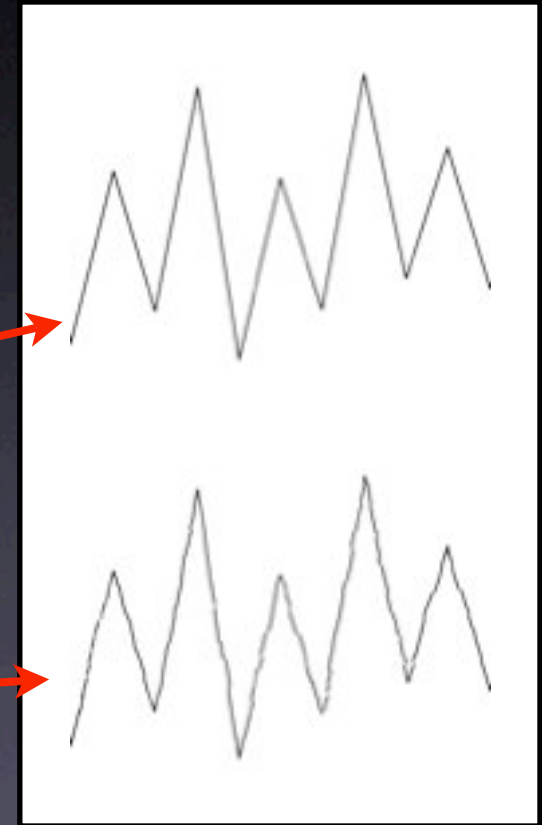
Digital vs. Analog

- Digital
 - 1's and 0's
- Analog
 - Continuous tone
- Why does it matter?
 - Degradation...



What is Analog?

- Analog
 - Continuous tone
 - Rainbow -
All the colors
 - Original
 - After Time



The Analog Problem

- Analog tapes degrade
 - Over time
 - With each play back



What is Digital?

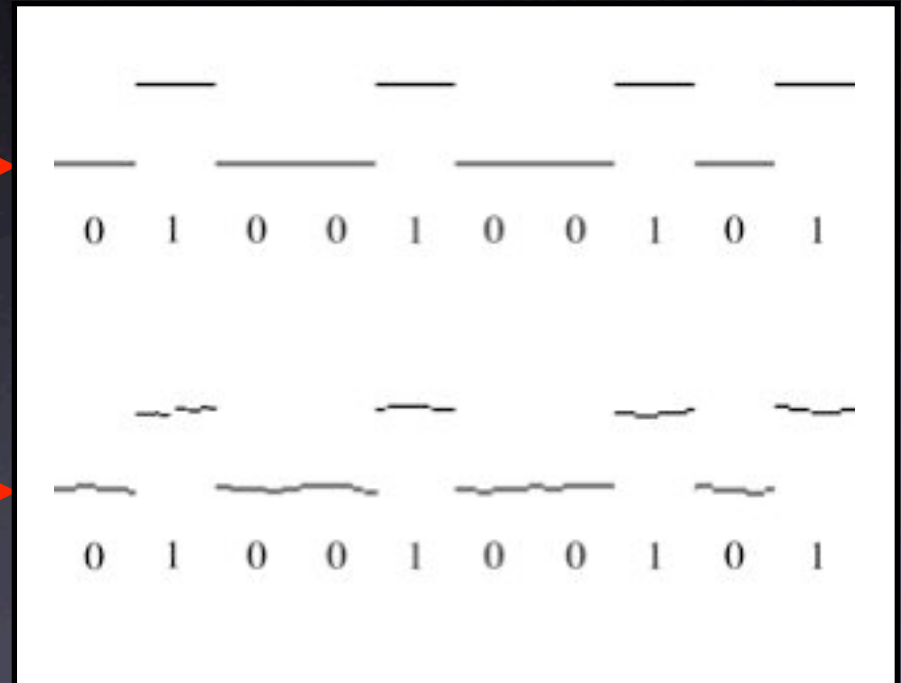
- Digital
 - 1's and 0's

- Original

-

-

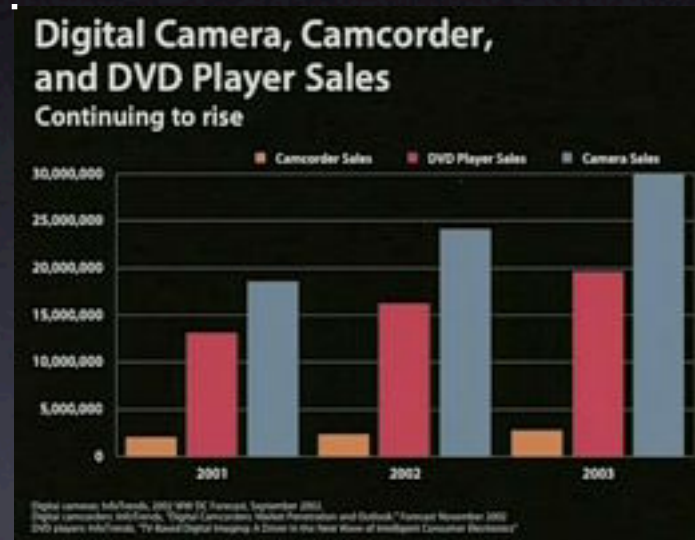
- After Time



Why Go Digital?

- Becoming the most popular consumer purchase
 - Camcorder Sales
 - DVD Player Sales
 - Digital Camera Sales

Analog Tape Scratches & Fades
Digital lasts forever, or ten years,
which ever comes first!”



Why Video Standards?

- What are standards about?
 - Frames per second
 - Pixel resolution
- Several standards
 - NTSC
 - PAL
 - SECAM



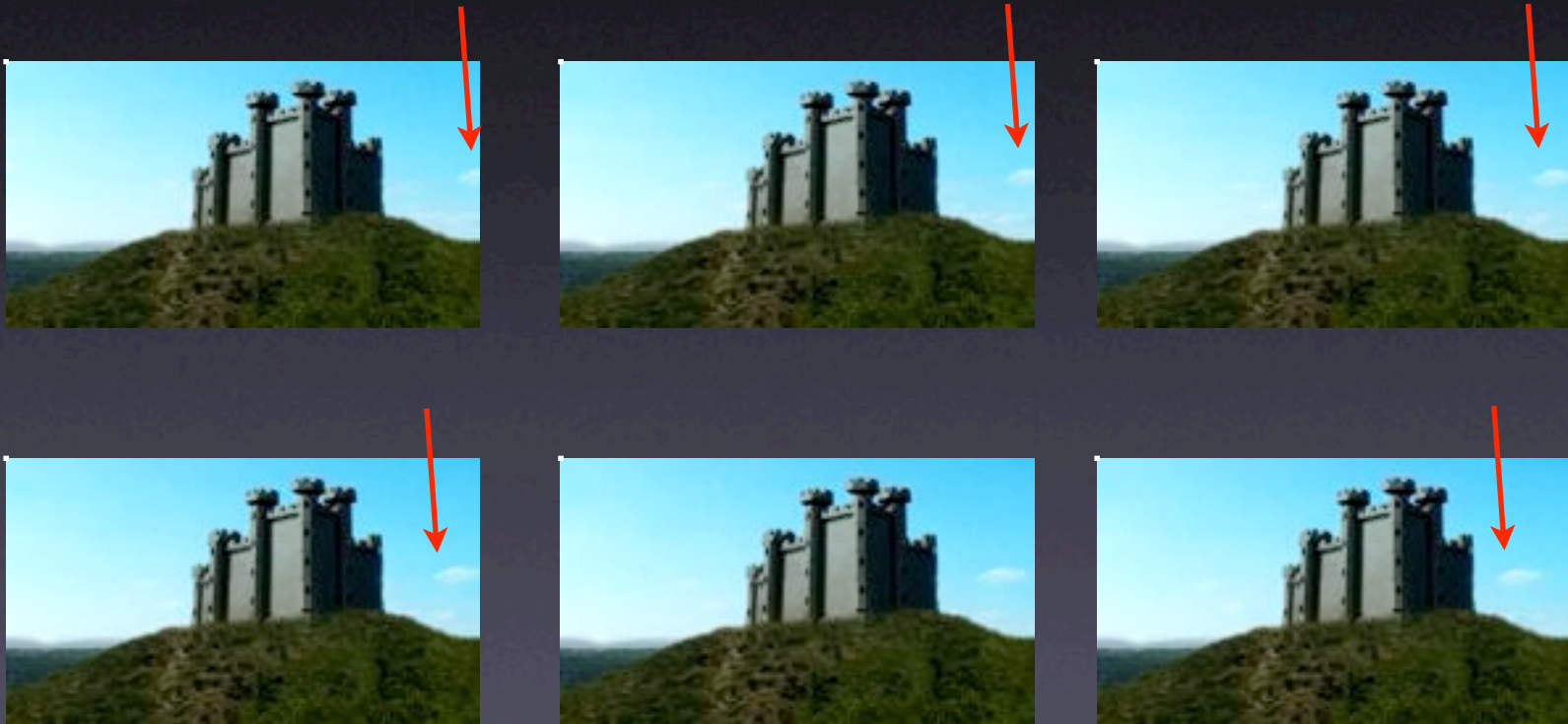
Devices & Standards

- What devices does this apply to?
 - TV's
 - VCR's
 - DVD's
 - Camcorders
 - Computer file formats



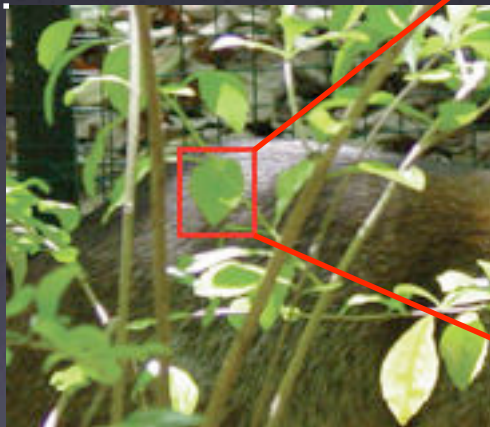
What is a Frame

- What is a frame?



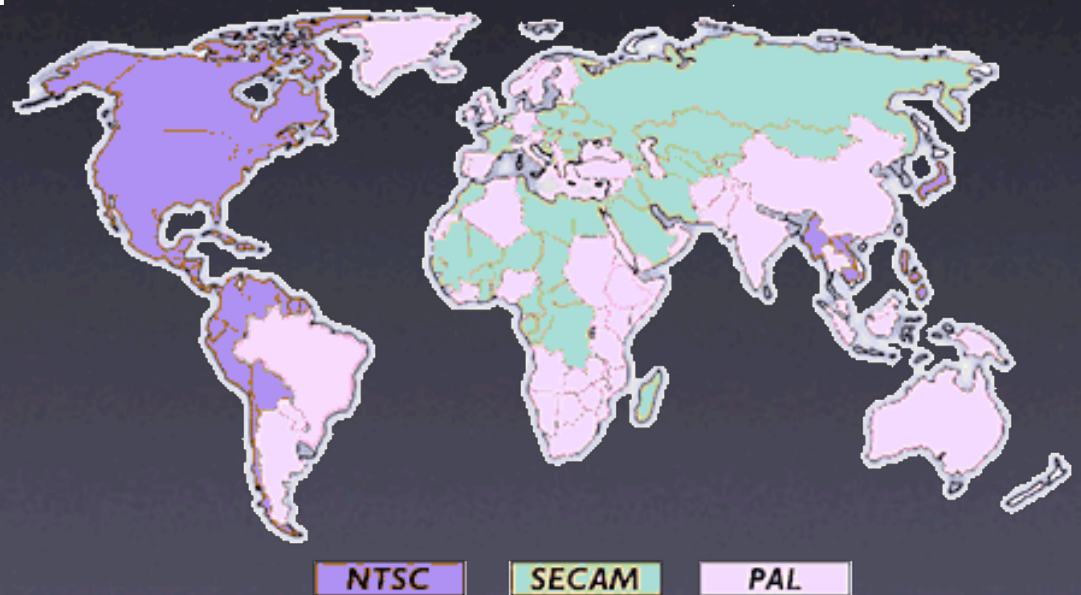
What is a Pixel?

- What is Pixel?
- What is Pixel resolution?



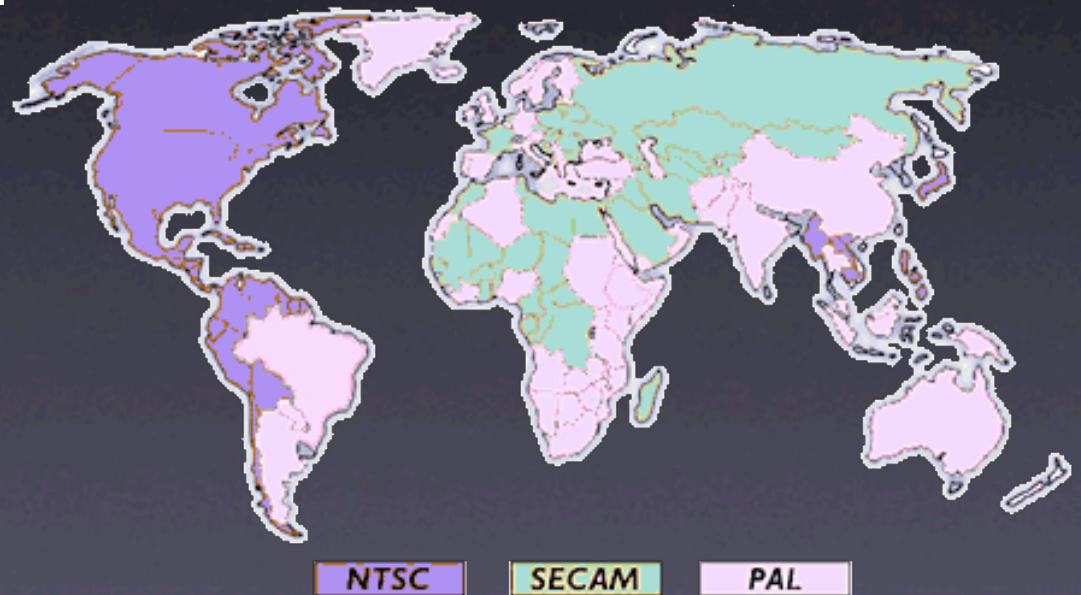
NTSC Video Standard

- NTSC (National TV Standards Committee)
 - America, Japan, 30 others
 - 29.9 fps
 - About 30 fps
 - 720x480 pixels



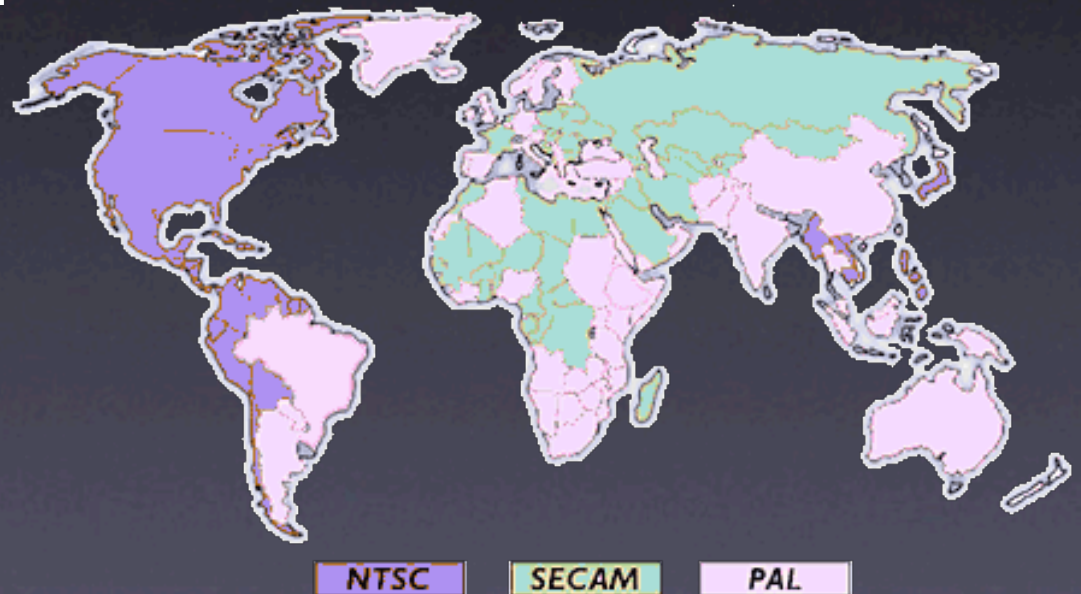
PAL Video Standard

- PAL (Phase Alternating Line)
 - Europe, Africa, Middle East, Australia, China, etc.
 - 25 fps
 - 720 x 576 pixels



SECAM Video Standard

- SECAM (SEquential Couleur Avec Memoire)
 - France, parts of Africa, some Soviet countries
 - Same size as PAL, but not compatible
 - 25 fps
 - 720 x 576 pixels



Analog Camcorders

- VHS
- S-VHS
- VHS-C
- 8mm
- Hi8



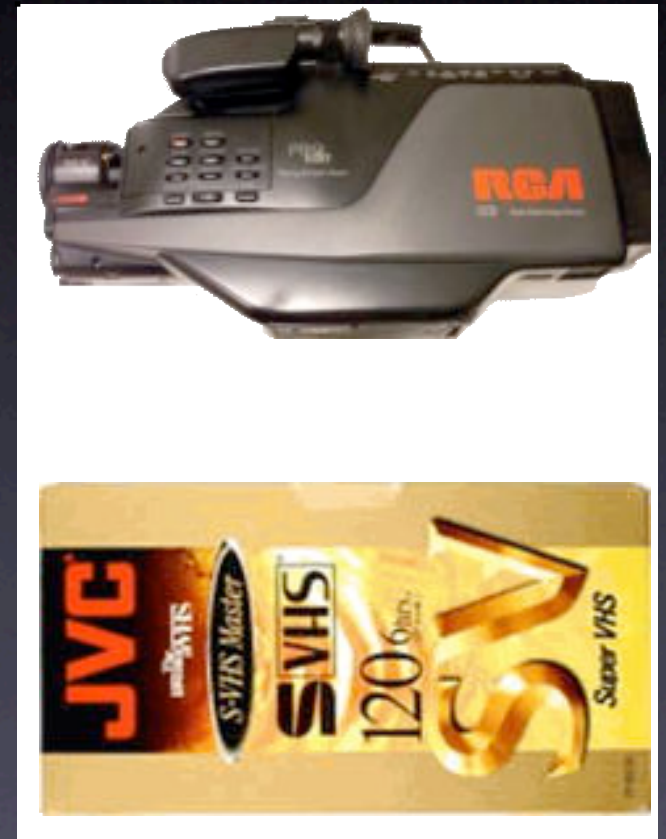
VHS Camcorders

- VHS
 - 1.5 foot long
 - Heavy
 - Shoulder rest
 - Use full size VHS tapes
 - 1980's
 - Only a few sold today



S-VHS Camcorders

- S-VHS (Super-VHS)
 - Uses special S-VHS tapes
 - Requires special, expensive equipment and jacks
 - Sharper video quality than VHS
 - Inexpensive (\$300-\$400)



VHS-C Camcorders

- VHS-C (VHS-compact)
 - Tapes smaller than S-VHS and VHS
 - Requires special adapter
 - Clever but a nuisance
 - Inexpensive (\$200-\$300)



8mm Camcorders

- 8mm
 - Tapes smaller than VHS-C
 - VCR's can't play 8mm tapes
 - Camcorder connects to TV/VCR for playback
 - Inexpensive (\$200-\$300)
 - Popular among people without computers



Audio cassette

8mm



Hi8 Camcorders

- Hi8
 - Higher quality than 8mm
 - Tapes same size as 8mm
 - Inexpensive (\$200-\$400)



Audio cassette

8mm



Converting Analog

- Media Converter
 - Converts analog to digital
 - About \$300
 - Several different manufacturers



Digital Benefits

- Benefits of digital
- Smallest camcorders (size of a walkman)
- Smallest tapes
- Batteries last longer
- Quality better than analog
- Easier to transfer to computer



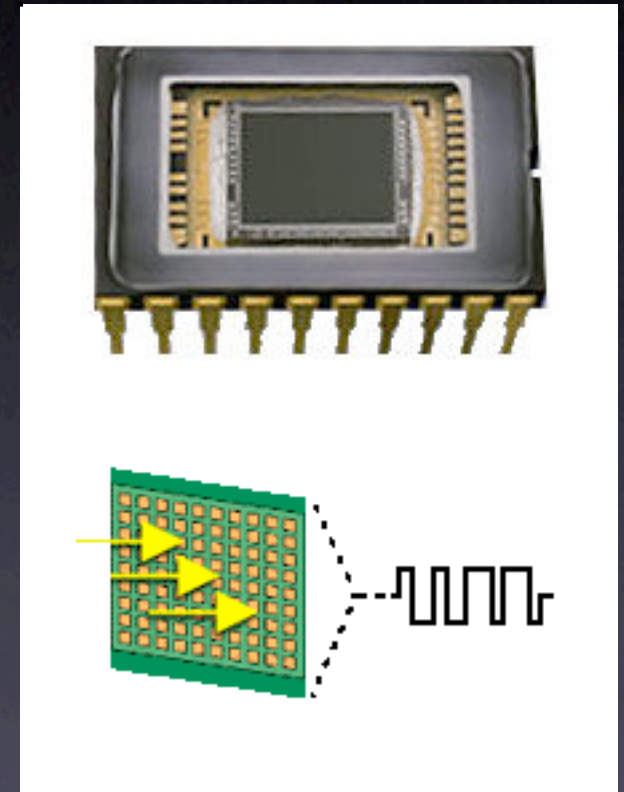
Professional vs. Personal

- 2 families of DV camcorders
 - Professional
 - VERY Expensive (\$4,500+)
 - Very expandable
 - Interchangeable lenses
 - Large
 - 3 CCD
 - Consumer
 - Cheap (\$400-\$800)
 - 1 CCD
 - Limited expandability



CCD

- DV camcorders 1 or more CCD's
 - The eye, aka CCD
(Charged Coupled Device)
 - Personal – 1 CCD
 - Professional
 - 3 CCD - Red Green Blue
 - Better color accuracy
 - Records low light



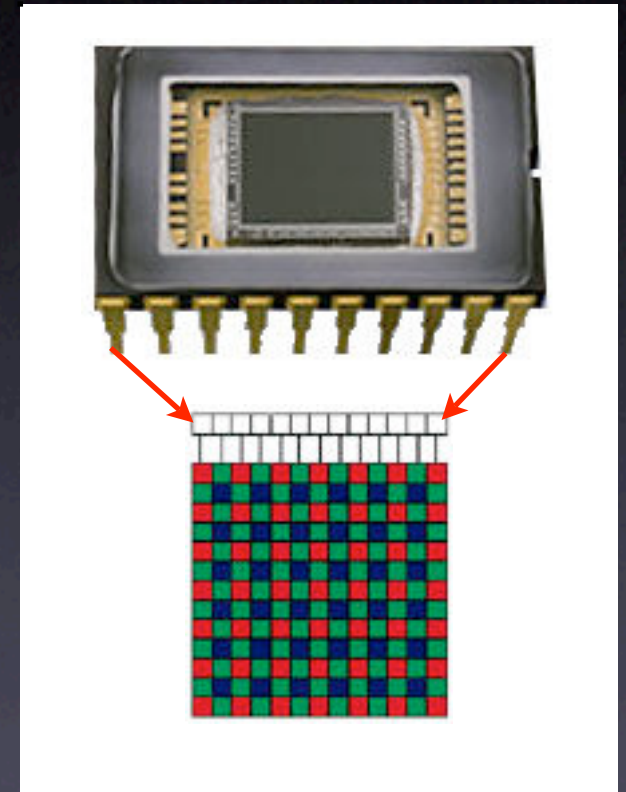
Professional

- Professional DV camcorders
 - 3 CCD - Red Green Blue
 - Better color accuracy
 - Records low light



Personal

- Personal camcorders
 - 1 CCD
 - All colors
 - Red
 - Green
 - Blue
 - Cheap



Digital Camcorders

- Also called DV Camcorders
 - Digital8
 - DVD
 - MiniDisc
 - MicroMV
 - MiniDV



Digital8

- Digital8
 - Same 8mm tape as Hi8
 - Can play 8mm and Hi8 tapes
 - Data stored digitally
 - Quality better than analog 8mm and Hi8
 - Quality not as good as other digital formats



Audio cassette



8mm



DVD

- DVD
 - Record onto DVD
 - New, not many models
 - 2 - 4 models?
 - Expensive (\$500-\$1000)



MiniDisc

- MiniDisc
 - Similar to DVD camcorders
 - New, only a few models
 - Expensive (\$800)
 - Smaller discs
 - Quality not as good



MicroMV

- MicroMV
 - Sony only
 - New
 - MPEG-2 compressed
 - Tiny tapes 5.3 mm x 3.8 mm
 - Expensive (\$1000-\$1500)
 - Does not work with Macintosh



MiniDV

- MiniDV camcorders
 - The standard
 - Start at \$300 (no price limit)
 - Tape smaller than 8mm
 - Best quality
 - Picture quality better than digital satellite
 - Better audio quality than CD's
 - No copy degradation



MiniDV Features

- Many features
 - Some required
 - Some nice
 - Some useless and even harmful
- Not everyone agrees what is best
- The following is listed most important first (according to us)



FireWire

- FireWire
a.k.a. “DV in/out”, “DV terminal”, “IEEE-1394”, “i-Link”
- Some older European camcorders have DV out but not DV in
- Some companies make cameras with bad FireWire ports
- Stick with the popular ones



4 Pin Unpowered

6 Pin Powered



Analog & S-Video

- Analog Inputs
 - Import/export VHS easily
 - S-Video most common
 - Or RCA



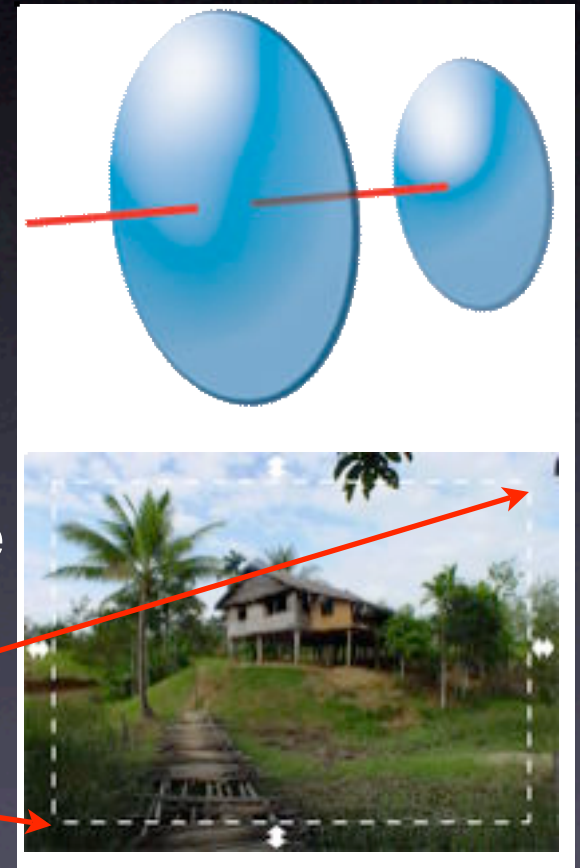
Features – LCD

- LCD
 - Bigger is better
 - 2.5” to 3.5” normal
 - Flexible
 - Reversible
 - Swiveling capability



Features – Stabilizer

- Image Stabilizer
 - Optical - Best
 - Prism that moves opposite direction of shaking camera
 - Electronic - OK
 - Motion sensors try to compensate
 - Digital - Reduces video area
 - Zooms in and crops



Features – Zoom

- Optical zoom
- Actual zoom - telescoping lens
- “12X/300X” - Optical = 12X, Digital = 300X



Full frame



Optical zoom



Digital zoom



Features – Zooming

- Zooming
 - Good
 - Variable-speed zooming
 - Variable knob
 - Bad
 - One-speed zooming
 - 2 buttons



Features – Manual

- Manual override
- Focus
 - When filming through bushes



Wallaby

- Exposure
 - When filming in bad lighting conditions

Features – Manual Focus

- Manual override Focus example



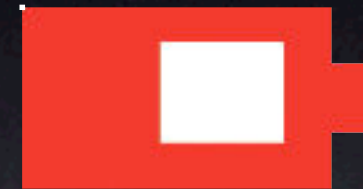
Wallaby Out of Focus



Wallaby In Focus

Features – Battery Time

- Battery indicator
 - Digital icon for battery
 - Digital time-remaining for battery



1hr 43 mins

- Digital icon for battery
 - Not very helpful



Features – Built-in Light

- Light
- Built-in light

- External light attachment



Features – Seldom Used

- Available on many camcorders
 - Exposure Options
 - Backlight mode
 - FlexiZone
 - Night-vision mode
 - Progressive-scan
 - Still-camera mode



Features – Exposure

- Exposure Options
- Preprogrammed exposure options
 - Canned focus/shutter speed/aperture, etc
 - Spotlight
 - Sports
 - Sand/Snow
 - Low Light



“Low light” mode off



“Low light” mode on



Features – Backlight

- Backlight mode
 - Turns auto exposure off
 - Picture will be overexposed



Backlight mode off

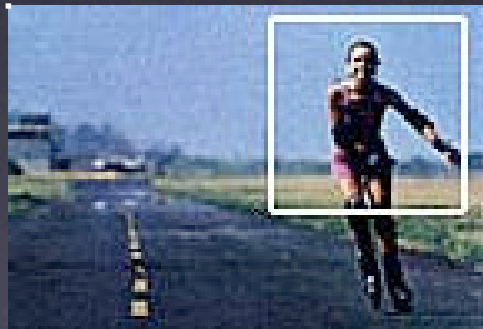
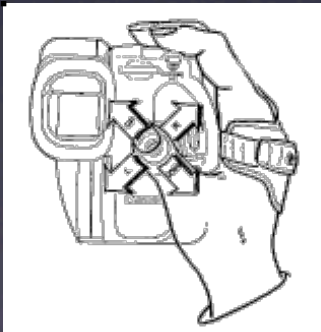


Backlight mode on



Features – FlexiZone

- FlexiZone (a.k.a. PushFocus)
 - Lets you move the camera's point of focus
 - Great for follow moving objects
 - background doesn't change



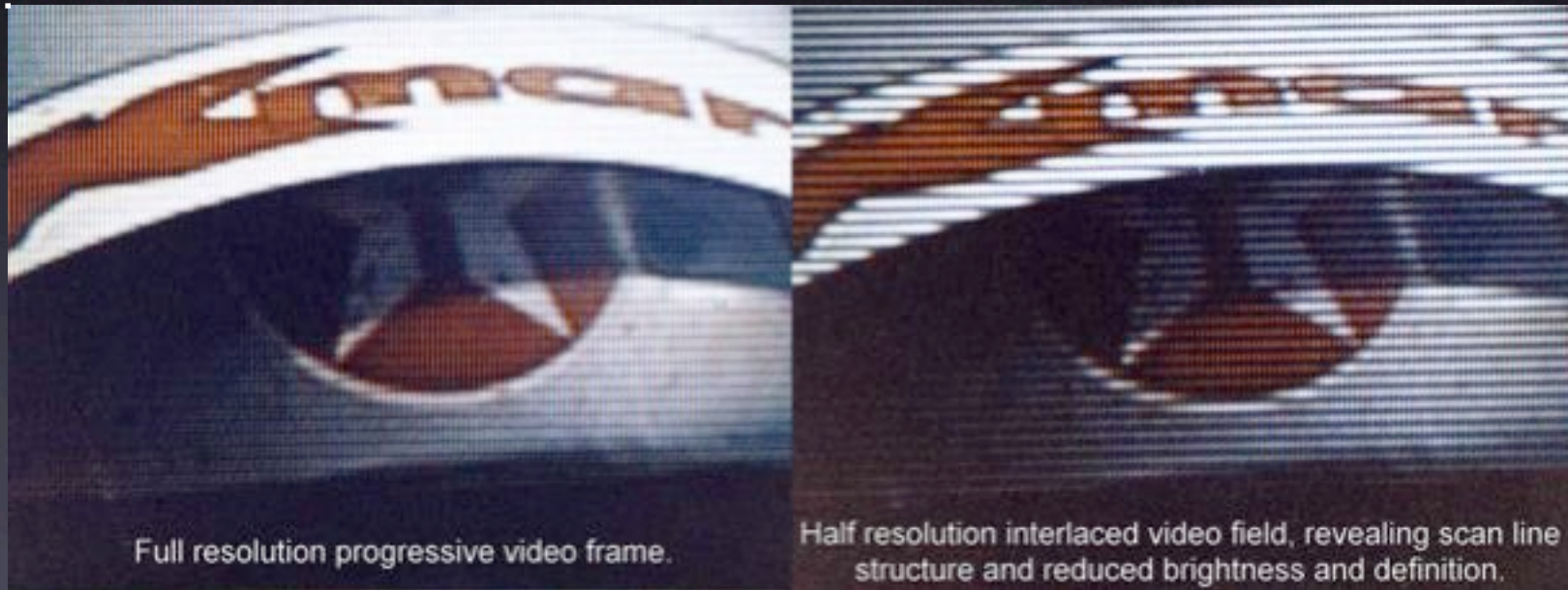
Features – Night-Vision

- Night-vision mode
- Expect this to improve



Features – Progressive-scan

- Progressive-scan CCD (vs. interlaced)



Progressive scan

Interlaced



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Features – Still-Camera

- Still-camera mode
- Most DV cams are a miserable
 - 640 x 480 pixels
 - (0.3 megapixels)



DV cam “still camera” mode
640x480 pixels
(0.3 MP)



Real digital still camera
2272x1704 pixels
(4.1 MP)



Rarely Used Features

- Features rarely used
 - Control-L or LANC



NEVER Used Features

- NEVER use these features
 - Undesirable features
 - Title generator
 - Fader
 - Audio dubbing
 - Special effects
 - Date/time stamp
 - Built-in editing
 - Why
 - Permanent edits
 - easier to do on a computer than a camcorder



Brand Names To Choose

Companies with a good reputation

Canon

JVC

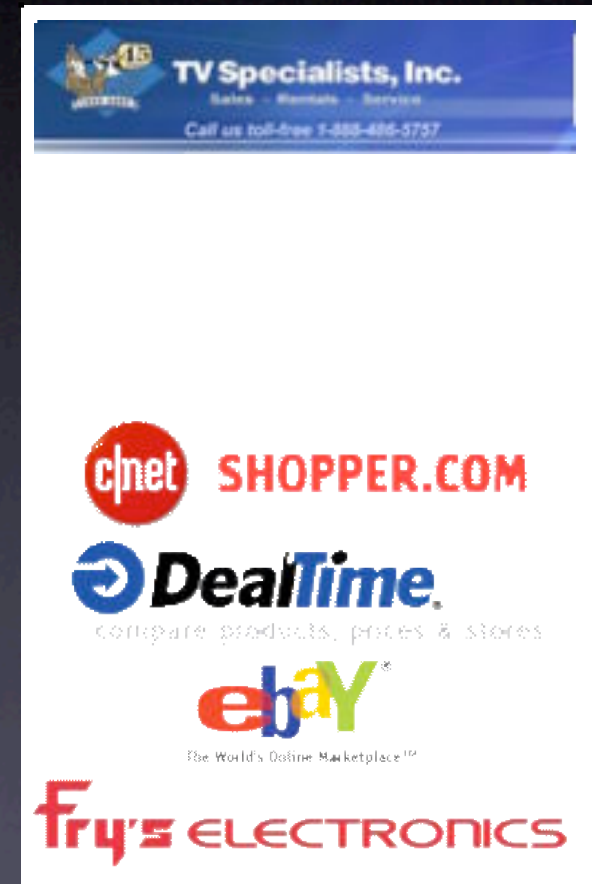
Panasonic

SONY



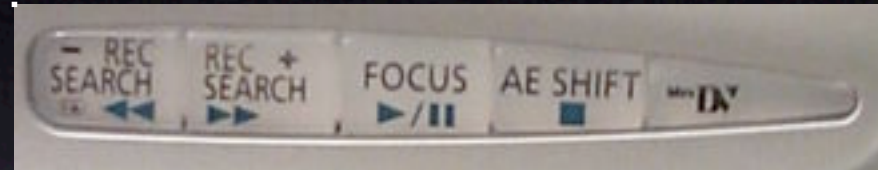
Where To Purchase

- Local Stores
 - TV Specialists
 - State employees get a discount
- Online
 - <http://www.shopper.cnet.com>
 - <http://www.dealtime.com>
 - <http://www.eBay.com>
 - <http://www.frys.com>



Camcorder Operation

- 2 Modes
 - VTR (VCR)
 - Play
 - Rewind/fast-forward
 - Stop
 - Camera
 - Record
- READ THE MANUAL!!!!



Audio Tip – External Mic

- External microphone



Video Tip – Stabilizers

- Stabilization
 - Use tripod, monopod, or clamp
 - Put left hand UNDER camcorder
 - Use image stabilization
 - Stay zoomed out



Video Tip – Panning

- Panning
 - Only do when needed
 - Linger; pan; linger
 - Start on good scene, end on good image
 - Practice panning
 - Pan towards right
 - Follow moving objects or visual "lines"
 - Turn image stabilizer off



Video Tip – Zooming

- Zooming
 - Don't zoom while recording
 - Instead, use dolly shots, with a wheelchair or bike or whatever
 - Or, record and linger; pause recording and zoom; record and linger
 - Exceptions: zoom as slow as possible, zoom when panning
 - (practice these techniques)



Video Tip – Lighting

- Lighting
- Make sure there is enough, but not too much
- Setup extra lights if needed
 - Three point light system
 - Front, Side & Background
- Use backlight mode if needed and if camcorder has the feature
- Learn the camcorder exposure settings



Video Tip – Focus

- Focus
 - Auto focus is OK most of the time
 - Manual focus
 - When there are no defined edges
 - When there are objects between the camcorder and the subject



Video Tip – Angles

- Angles
 - Use a variety of angles
 - Don't break the 180-degree rule
 - Unless the camera is rolling whole time



Finishing Up

- Your turn to test drive the camcorders
 - But first...
 - Next class
 - Survey
 - Contact information
 - Questions and answers
 -



Next Class

- Digital Video - Part 2

Friday November 14, 2003

9:00 AM — 10:00 AM

MMC 1745

- Introduction to editing and distribution
 - How to import
 - How to edit
 - How to publish



Survey

How did we do?

Please take a minute to fill out the survey.



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Contact Information

- Web — www.macos.utah.edu
- Email — mac@scl.utah.edu
- Offices — Multimedia Center (Room 1705), ask at the service counter for someone from the “Mac Group.”



Questions & Answers



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