

QuickTime as an Infrastructure for Vision Research Displays

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Two Parts of Vision Research Programming

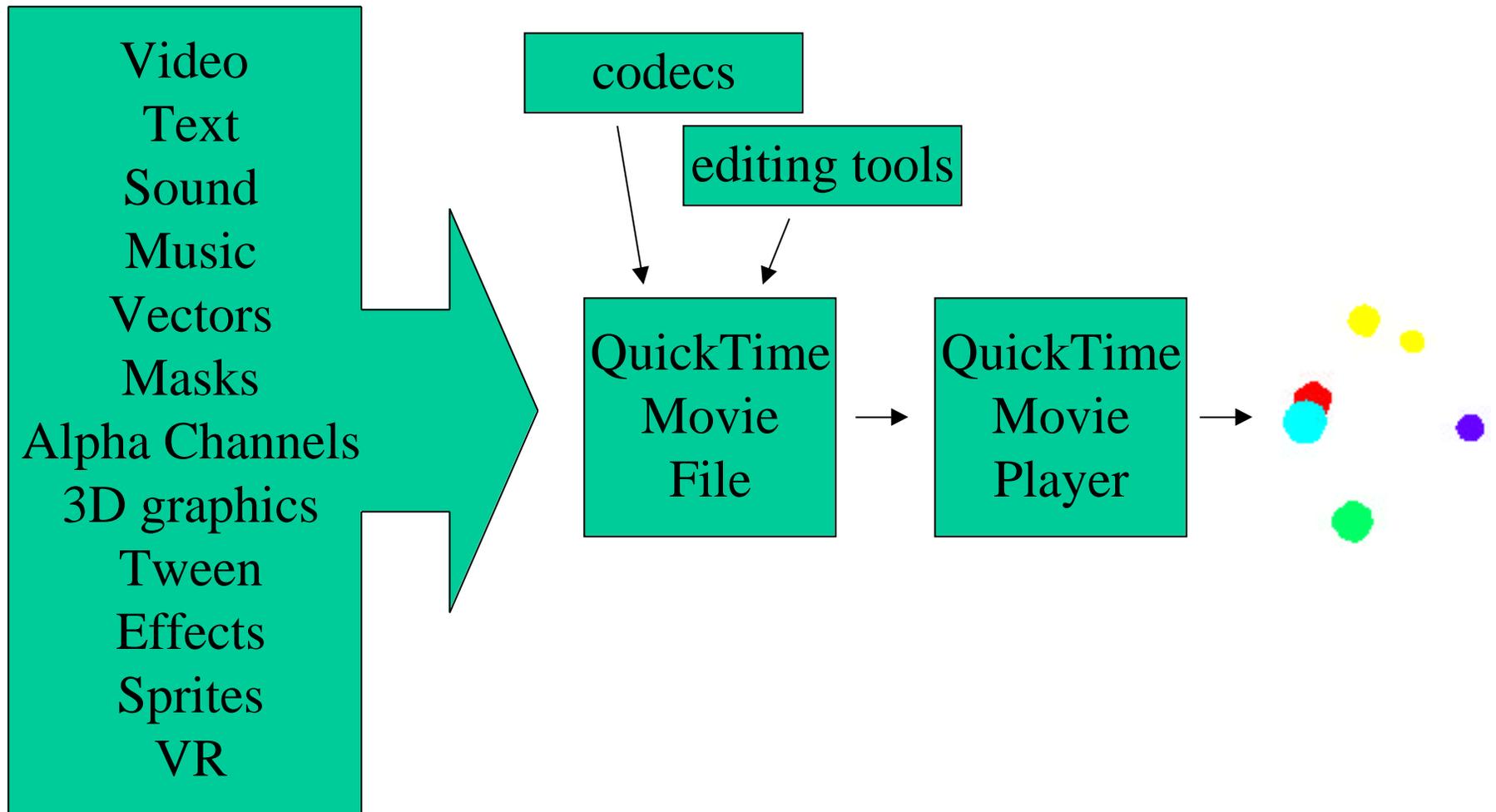
- Calibrated display (Hard!)
- Everything Else (Easy!)
- General Philosophy:
"Let someone else do the hard part"

What's Wrong With What We Have?

(Video ToolBox, MatVis, Cinematica, CRS, VRG,
HIPS, Morphonome, SuperLab, many ad hoc
systems...)

- Lack of Generality
- Platform/Language/Display Dependence
- Complexity
- Rapid obsolescence
- Fragile support
- Difficult to re-purpose

QuickTime



QuickTime Advantages

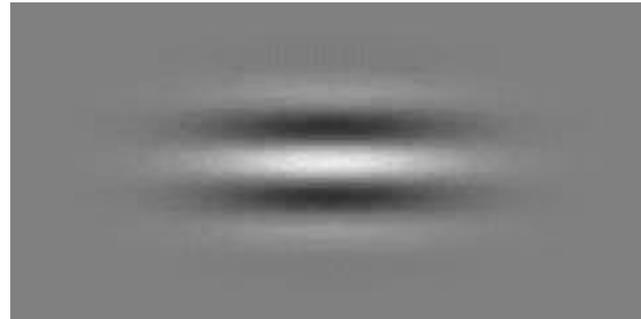
- Very General Format
- Display and Platform Independence
- Piggyback on Industry Efforts
- Transfer to Papers and Presentations
- Web demos, stimulus sharing
- Direct Interface
- Stimulus Creation Tools
- Codecs

The Basic Structure of QuickTime

- QuickTime is an Architecture
- File Format
- Application Program Interface (API)
- Rendering Engine
- Movie, tracks, media, data
- MediaPlayer

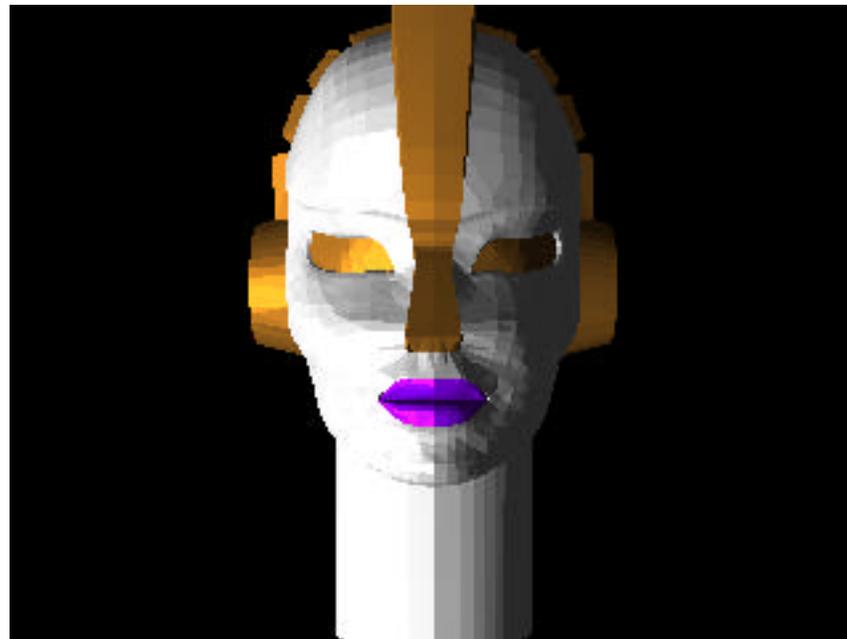
Video Tracks

- Various codecs
 - None, TIFF, MJPEG, MPEG



3D Tracks

- Describe 3D coordinates, surfaces, lights, textures
- Can be animated with "tween" tracks



- Gerbils

Text Tracks

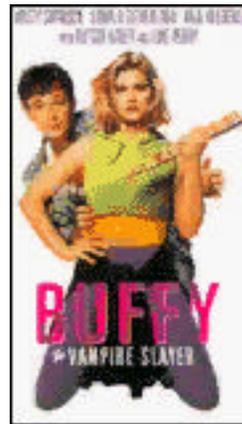
- Useful for instructions, feedback



- Very easy to create
- Full control over font, color, timing etc

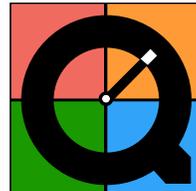
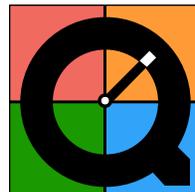
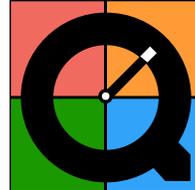
Music Tracks

- Useful for warning tones, feedback
- Use MIDI codes



Sound Tracks

- Useful for warning tones, feedback, speech



QuickSpeech
Input

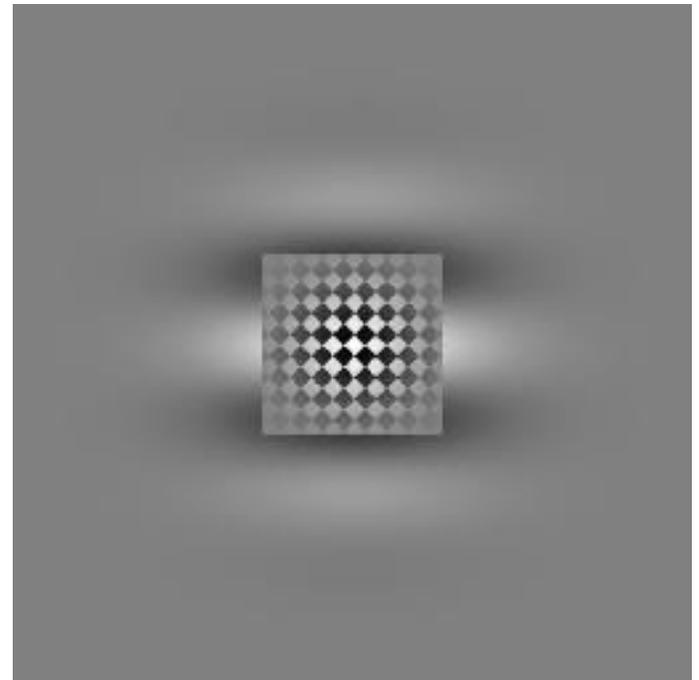
QuickSpeech
Demo

Sprite Tracks

- *Animated fragment of image or video*
- *Moving stimuli*

Effects

- Filters, Transitions, Special effects
- Open architecture
- "Operators" on movies
 - Motion
 - contrast change
 -?



How does Psychophysics interface to QuickTime?

- Requires a calibrated movie player
- Extension to high level language
 - Mathematica (available)
 - MatLab
 - Visual Basic

ShowTime:

A simple calibrated QT movie player

- A Mathematica function
 - ShowTime[filename, options]
- Options:
 - HoldLastFrame -> 0.
 - CLUT -> Automatic
 - Background -> {128, 128, 128}
 - Monitor -> 1
 - Rate -> Normal
 - Sound -> ""
 - Scale -> 1
 - Clear -> False

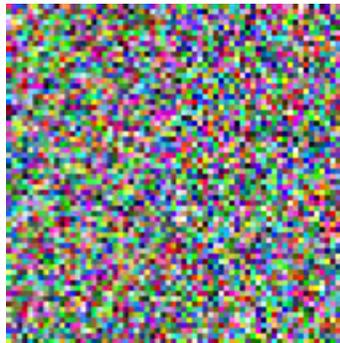
Calibration

- Measure gamma function for R, G, B
- Create CLUT
- Can be used to modulate in various color directions
- Can be used with channel mixing
 - (eg ISR Attenuator)

Creating a Stimulus in Mathematica

```
movie = Table[Random[Integer, {1, 255}],  
             {4}, {64}, {64}, {3}];
```

```
QuickTimeWrite["noise.mov", movie]
```



Movie Construction Tools

- C
- Mathematica
- Matlab
- Photoshop
- LiveStage
- Electrifier
- GoLive
- Premiere
- Final Cut
- Media Cleaner
- SpeechToSound
- QuickSpeech

Some Limitations

- Stimuli are created in advance (but...)
- Overhead
- CLUT animation?
- Loss of "control"

Available Now

- `ShowTimeDemo` application (Mac)
- `ShowTime` Mathematica function (Mac)
- `QuickTimeWrite` Mathematica function (Mac)
- Source code
- <http://vision.arc.nasa.gov/showtime/>

Future

- Windows versions
- More than 8 bit/color
 - Dithering on digital LCDs
- Effects Maker
 - Contrast variations
 - Scrolling
 - ?
- "Open Source" effort

References

- *Quicktime Pro 4.0 : Visual Quickstart Guide* . Stern, J. & Lettieri, R. A. (1999). Peachpit Press.
- *Discovering Quicktime : An Introduction for Windows and MacIntosh Programmers*. Towner, G. (1999). Academic Press/Morgan Kaufmann.
- <http://vision.arc.nasa.gov/showtime/>
- <http://www.apple.com/quicktime/>