A & M Productions

Lego Animation 101
Simple Movement

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Outline of Presentation

- Animation methods
- Stage 1: Storyboarding
- Stage 2: Modeling
- Stage 3: Rendering
- Stage 4: Production
- Additional Information

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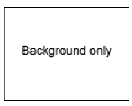
Animations Methods

- Method 1 - Object Movement
  - Camera position is fixed while object moves
  - Think of early cartoons
- Method 2 - Camera Movement
  - Object is fixed while camera moves
  - Think of spaceship movies
- Method 3 – Combination of 1 & 2

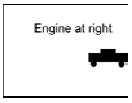
Stage 1: Storyboarding

- Putting ideas on papers
- Simple conceptual drawings will do
  - Draw key moments in the animation
- For our example…
  - To show a train engine moving
  - Three major actions
    - Train coming into the screen (right side)
    - Train stopping in middle of the screen
    - Train leaving the screen (left side)

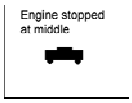
S1: Our Storyboard Images



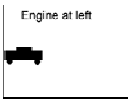
Board 1



Board 2



Board 3



Board 4

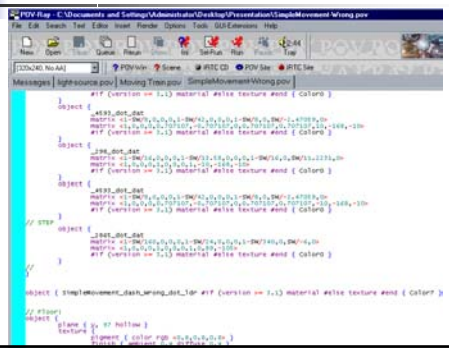
Stage 2: Modeling

- Each object that will move **MUST** have it's own LDraw file
- The final LDraw file will have the sub-models in it plus all the stationary objects
- Why is this needed?
  - Due to the way LDraw & L3P do conversions

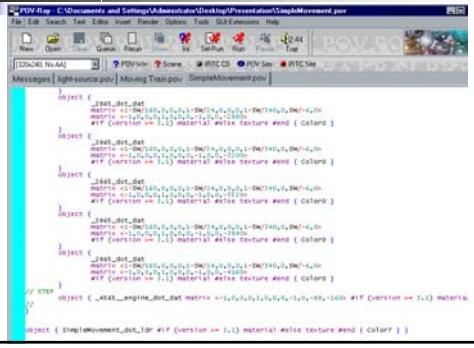
S2: Our Example

- LDraw File 1
  - All pieces to build train & track pieces
- LDraw File 2
  - Track pieces & sub model of train

S2: Wrong Conversion



S2: Correct Conversion



S2: Converting Ldr to POV

- Use L3P with L3PAO GUI
  - L3PAO Ver. 1.3.4 supports the .ldr file format
  - Use the following options
    - -f: Floor – Grey color is okay
    - -bu: Bumps
    - -sw: Seam Width
    - -q: Quality level set to 2
    - -o: Overwrite existing POV file

Stage 3: Rendering

- Create a folder for your project
- Place the POV file in the new folder
- Open the file and SURPRISE!
  - Code, Code, and more Code

S3: Camera Placement

- Camera values
  - Use MLCAD to help determine location
  - Location <870, -700, -3080>
  - Look_at <0,0,-570>
  - This is storyboard 1-2
    - Changes to storyboard to accommodate better view

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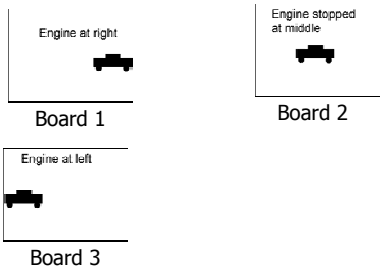
S3: New Storyboard #2



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S3: Moving the Engine

- Engine object values
  - Use the 'translate' command
  - Look for key actions scenes called key frames
    - Position 1 = translate <0,0,0>
    - Position 2 = translate <0,0,-1350>
    - Position 3 = translate <0,0,-2700>

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S3: Adding Sky & Green Grass

- Open the sky.pov file and cut & paste the code into SM.pov
  - Remove the background code
- Change the background from <.8,.8,.8> to <0,1,0> to get green.
  - Notice that you will LOSE the shadow effect of the engine in the green grass.

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S3: Frame-Rates

- You choose but there are standards
  - Movies = 24 fps (23.976 fps)
  - Animation = 25 fps
    - TRON set this standard with a special Kodak film that is still used by animation films
  - NTSC (**N**ational **T**elevision **S**ystems **C**ommittee) 30 fps (29.976 fps)
    - North America, Mexico, Canada, & Japan
    - Due to 60 Hz cycle electrical system
  - PAL (**P**hase **A**lternating **L**ine) 25 fps
    - Europe, Hong Kong, & Middle East
    - Due to 50 Hz electrical system

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S3: How many frames

- Train moves 1 upf @ 30 fps
  - Total frames 2700
  - Total time 90 secs
- Train moves in 10 secs @ 30 fps
  - Total frames 300
  - Total time 10 secs

What is the Difference?

LENGTH OF RENDERING TIME!

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S3: Rendering time

- Train moves 1 upf @ 30 fps
- 640 x 480 Video Size
- Total render time 2700*19 = 51300 sec (14.25 hours)

- Train moves in 10 secs @ 30 fps
- 640 x 480 Video Size
- Total render time 300*19 = 5700 sec (1.6 hours)

Note: You can reduce the time with a 320x240 video size

S3: Creating the ini file

- Lets POV know the following
  - What file to render
  - Number of frames to render
  - Size of frames
  - Output file type
  - Clock values
    - This is the most important item as it does the animation!
    - Change the pov file to use this.
      - Translate <0,0,0> to translate <0,0, clock>

S3: Decreasing Render Time

- Under Render options
  - Set GUI priority to lowest
  - Set render priority to highest
- Close ALL open applications except POV
- Close background applications
  - Anti-virus, scheduler, etc

Stage 4: Production

- Use the avi file format to house
  - video files (images from POV)
  - Video codec (DivX4.12)
  - Audio files
  - Audio codec
- What is a codec?
  - Compression algorithm
    - MP3 is a famous codec
  - Why DivX4.12
    - Produces high-quality small files
    - DivX4.xx are LEGAL versions & can play all previous versions. DivX3.11a/DivX3.11Alpha is cracked version of Microsoft's original DivX3

S4: The Basics – The MPEGs

- MPEG-1
  - Pro: Oldest codec can be played on any PC
  - Con: Not suitable for web
- MPEG-2
  - Pro: Ideal for high quality video
  - Con: Not suitable for web
  - Con: CPU HOG!
- MPEG-4
  - Pro: Can handle a variety of codecs (DivX is here)
  - Pro: Suitable for web based delivery
  - Con: CPU HOG!

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S4: For Apple users

- Sorenson Video 2.1
  - Pro: High Quality video and small flies
  - Pro: Lots of custom control given to user
  - Con: Proprietary to QuickTime (Win or MacOS)
  - Con: CPU HOG!
  - Con: Developer's version NOT Free

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S4: For Web Distribution

- RealVideo 8
  - Pro: Ideal for web distribution of 320x240 res. animations
  - Pro: RealAudio (sound codec) gives very crispy sound compression
  - Pro:Great color retention, especially of solid colors
  - Con: No good at 320x240+ resolutions
  - Con: RealMedia conversion "not really" possible to other formats.

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S4: Which is best?

- Depends on your need You must decided on
  - Quality Level
  - File Size
  - Distribution
- For Highest Quality DVD-like use DivX
- For Cross Platform compatibility use Sorenson
- For web distribution use RealVideo 8
- This is for cartoon videos **ONLY!**

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S4: The Differences

MPEG-1

MPEG-2

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S4: The Differences

DivX Fast Motion

DivX Low Motion

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S4: The Differences

Sorenson

Windows Media 7

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S4: The Differences

DivX 4

Real Media 8

Sorenson

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S4: Increase the film length

- Increase by 13 seconds
- Re-use footage
  - At middle stop for 3 seconds
  - Then go back to start (5 seconds)
    - You can reuse frames or render an additional 150 frames
    - Frame reuse is best but time-consuming in MediaStudio
  - Go forward until off screen (10 seconds)
- New total time
  - 5 sec (start to middle) + 3 sec (stopped) + 5 sec (middle to start) + 10 sec (start to end) = 23 seconds!

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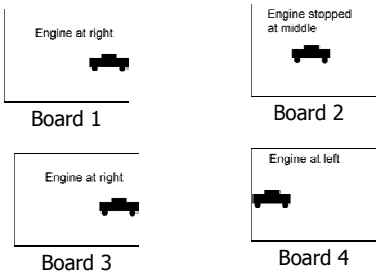
S4: New Storyboard #3



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S4: Frame Order

- Storyboard 1 going to 2
  - SM001 - SM150
- Storyboard 2
  - Use SM150 for 3 seconds
- Storyboard 2 going to 3
  - SM150 – SM001
  - *SM001 – SM150 (From 2nd Render)*
- Storyboard 3 going to 4
  - SM001 – SM300

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S4: Adding Credits

- Opening & Closing credits are optional but a good idea
  - They provide copyright protection for you
- Adding credits increasing the file size very very quickly!
  - Using DivX4.xx Codec experience only
  - Our final animation with credits = 4.18MB
  - Our final animation without credits = 1.97 MB

S4: The Timeline

- Video goes in
  - Va, Vb, V1, V2, V3
  - Fx is for special effects/ transitions between video sections
- Audio for
  - VA is Aa, Vb is Ab, etc…

Additional Information

- Additional Tutorials
  - http://www.ldraw.org (click on tutorial section)
- Video Standards
  - http://168.144.91.167/nickyguides/interlace.htm
- Video Compressions for Cartoons
  - http://www.geocities.com/lukesvideo
- Digital Film Resources (Sound Files)
  - http://brickfilms.topcities.com/resources.html
- LUGNET (CAD and Publishing groups)
  - http://www.lugnet.com

Final Thoughts

- Use low quality levels 0 or 1 to save time when figuring things out.
- Change one line of code at a time!
- Post questions at LUGNET
- Experiment, Experiment, Experiment…
  - Worse you can do is render one 'bad' frame at a time! This is better than rendering 3 'bad' hours.

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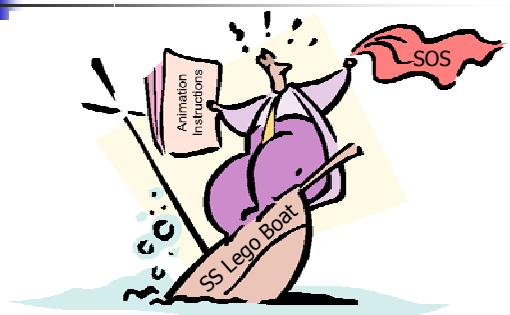
Questions?



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