A&M Productions

LDraw Animation 101
Simple Movement

Ahui Herrera

Jedi_agh@yahoo.com

February 2003

http://www.geocities.com/jedi_agh

http://am_production.tripod.com

Outline of Presentation

- Team vs. Single Person
- Animation methods
- Stage 1: Storyboarding
- Stage 2: Modeling
- Stage 3: Rendering
- Stage 4: Production
- Additional Information

Team Vs. Single Person

- In movie creation there are many many people involved
  - Director
  - Produce
  - Special Effects group
  - Sound People
  - Marketing
  - Distribution
  - Writers
  - Etc…
- Keep this in mind as you (1 person) deals with all the aspects of creating a film

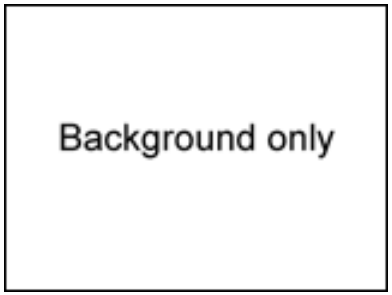
Animations Methods

- 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

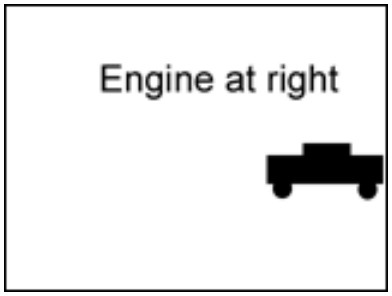
Stage 1: Storyboarding

- 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)

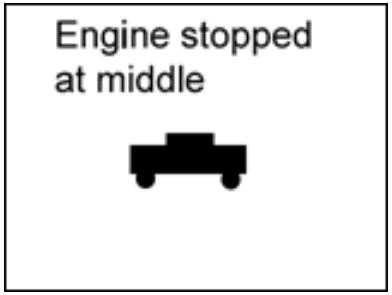
S1: Our Storyboard Images



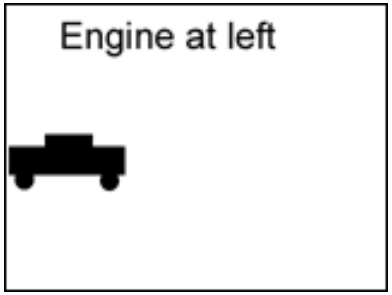
Board 1



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

POV-Ray - C:\Documents and Settings\Administrator\Desktop\Presentation\SimpleMovement-Wrong.pov

File Edit Search Text Editor Insert Render Options Tools GUI-Extensions Help

New Open Save Queue Rerun Show Ini Sel-Run Run Pause 12:44 Tray

[320x240, No AA] POV-Win Scene IRTC CD POV Site IRTC Site

Messages | light-source.pov | Moving Train.pov | SimpleMovement-Wrong.pov

```
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _4593_dot_dat
                matrix <1-SW/8,0,0,0,1-SW/42,0,0,0,1-SW/8,0,SW/-2.47059,0>
                matrix <1,0,0,0,0.707107,-0.707107,0,0.707107,0.707107,10,-168,-10>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _298_dot_dat
                matrix <1-SW/16,0,0,0,1-SW/13.58,0,0,0,1-SW/16,0,SW/11.2231,0>
                matrix <1,0,0,0,1,0,0,0,1,-10,-168,-10>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _4593_dot_dat
                matrix <1-SW/8,0,0,0,1-SW/42,0,0,0,1-SW/8,0,SW/-2.47059,0>
                matrix <1,0,0,0,0.707107,-0.707107,0,0.707107,0.707107,-10,-168,-10>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
// STEP
        object {
                _2865_dot_dat
                matrix <1-SW/160,0,0,0,1-SW/24,0,0,0,1-SW/340,0,SW/-6,0>
                matrix <1,0,0,0,1,0,0,0,1,0,89,-105>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
//
}


object { SimpleMovement_dash_Wrong_dot_ldr #if (version >= 3.1) material #else texture #end { Color7 }


// Floor:
object {
        plane { y, 97 hollow }
        texture {
                pigment { color rgb <0.8,0.8,0.8> }
                finish { ambient 0.4 diffuse 0.4 }
```

S2: Correct Conversion

POV-Ray - C:\Documents and Settings\Administrator\Desktop\Presentation\SimpleMovement.pov

File Edit Search Text Editor Insert Render Options Tools GUI-Extensions Help

New Open Save Queue Rerun Show Ini Sel-Run Run Pause 2:44 Tray

[320x240, No AA] POV-Win Scene IRTC CD POV Site IRTC Site

Messages | light-source.pov | Moving Train.pov | SimpleMovement.pov

```
        }
        object {
                _2865_dot_dat
                matrix <1-SW/160,0,0,0,1-SW/24,0,0,0,1-SW/340,0,SW/-6,0>
                matrix <-1,0,0,0,1,0,0,0,-1,0,0,-2880>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _2865_dot_dat
                matrix <1-SW/160,0,0,0,1-SW/24,0,0,0,1-SW/340,0,SW/-6,0>
                matrix <-1,0,0,0,1,0,0,0,-1,0,0,-3200>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _2865_dot_dat
                matrix <1-SW/160,0,0,0,1-SW/24,0,0,0,1-SW/340,0,SW/-6,0>
                matrix <-1,0,0,0,1,0,0,0,-1,0,0,-3520>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _2865_dot_dat
                matrix <1-SW/160,0,0,0,1-SW/24,0,0,0,1-SW/340,0,SW/-6,0>
                matrix <-1,0,0,0,1,0,0,0,-1,0,0,-3840>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
        object {
                _2865_dot_dat
                matrix <1-SW/160,0,0,0,1-SW/24,0,0,0,1-SW/340,0,SW/-6,0>
                matrix <-1,0,0,0,1,0,0,0,-1,0,0,-4160>
                #if (version >= 3.1) material #else texture #end { Color0 }
        }
// STEP
        object { _4565__engine_dot_dat matrix <-1,0,0,0,1,0,0,0,-1,0,-88,-160> #if (version >= 3.1) materia
//
}


object { SimpleMovement_dot_ldr #if (version >= 3.1) material #else texture #end { Color7 } }
```

S2: Converting LDR to POV

- Use L3P with L3PAO GUI
  - 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

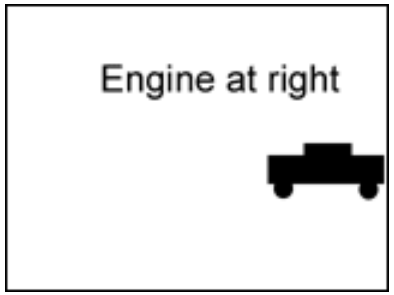
Stage 3: Rendering

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

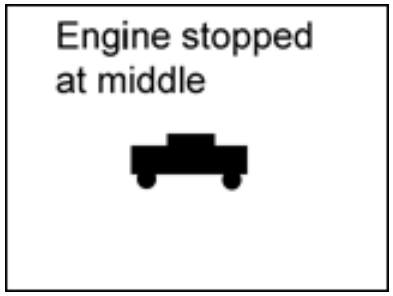
S3: Camera Placement

- 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

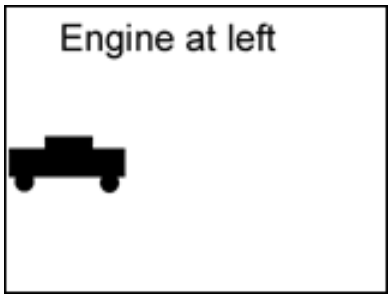
S3: New Storyboard #2



Board 1



Board 2



Board 3

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>

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.

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

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!

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 (DivX 5.0.2)
  - Audio files
  - Audio codec
- What is a codec?
  - Compression algorithm
    - MP3 is a famous codec
  - Why DivX 5.2
    - Produces high-quality small files
    - DivX4.xx and higher 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!

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

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.

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!**

S4: The Differences

MPEG-1

MPEG-2

S4: The Differences

DivX Fast Motion

DivX Low Motion

S4: The Differences

Sorenson

Windows Media 7

S4: The Differences

DivX 4

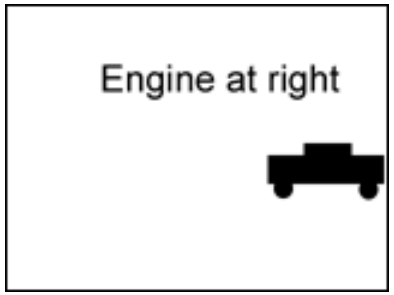
Real Media 8

Sorenson

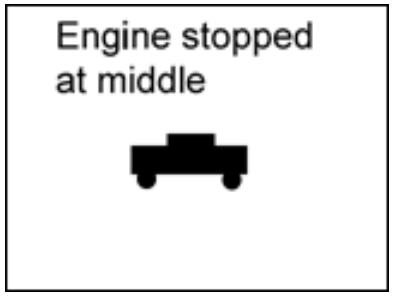
S4: Increase the film length

- 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!

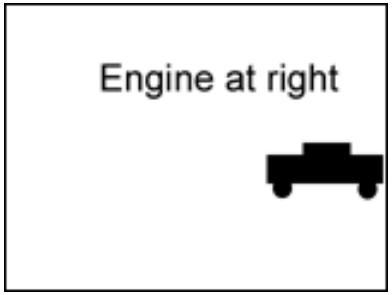
S4: New Storyboard #3



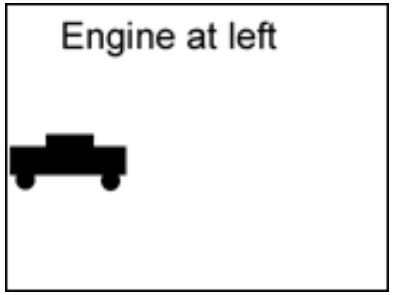
Board 1



Board 2



Board 3



Board 4

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

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.

Questions?

LEGO Animation Sea