RESOURCE GUIDE

SimEx virtual voyages

OVERVIEW

Designers of simulator rides
and special effects movies
rely on their knowledge
of perception to create
illusions.Ride designers
must possess a deep
understanding of the role
that motion, depth and
perspective, as well as
colour, light and form,
play in perception and
how they can be manipulated
in such a way that they
pass for reality.
The more your senses
are fooled, the more you
believe the experience is real.

DISCUSSION IDEAS

1. What were the most thrilling parts of the simulator ride? Why?

2. Did the simulator ride fool you into believing you were actually experiencing an underwater journey? Did some parts work better than others? Why?

4. Discuss with students the technique of photographing miniatures to create special effects in the simulator ride portion of Sea Trek .

5. What are some reasons that may have caused the designers of Sea Trek to choose miniatures and other special effects in their filming?

6. Ask the students to name and describe the scenes from movies that have made them feel like they were actually in the scene. Discuss ways that movie makers achieve this feeling of being in the scene through special effects, camera angles, and other strategies.

7. Motion simulators come in a variety of shapes and sizes. The motion of a simulator is described in "degrees of freedom" or DOF for short. Use your hand to demonstrate to students the motion of the six possible degrees of freedom:

heave (move up/down)
pitch (tilt forward/back)
roll (tilt side to side)
surge (move forward and back)
sway (move side to side)
yaw (do the twist)

It's the job of the motion programmer to precisely synchronize the motion of the simulator to the motion cues in the ride film, maintaining the illusion of reality.

ACTIVITIES

1 Flip Book

The simulator ride portion of Sea Trek was made using miniatures and models. Using models means the film need not be shot continuously, but each frame can be photographed separately. Models, drawings and even living figures can be animated by photographing frames individually and changing the position of the subject slightly between frames. This is called stop-motion photography.

All filmmakers rely on "persistence of vision", a phrase used to describe the way your brain retains an image for about one-tenth of a second after the image is gone. When you watch a movie in a standard cinema, you're seeing 24 individual pictures or frames per second. During the ride portion of Sea Trek, you saw 30 frames per second.

Procedure

Give each student a pad of paper and a choice of pencils to draw something real or imaginary, and make it move in an interesting way.

Instruct them to begin with the last page of the pad and to make a simple line drawing. Then, on the page that precedes it, they are to draw another picture, very much like the one under it, but changed slightly. Suggest that they start each new picture by tracing the parts of the figure that will not move. Then draw the moving parts in a slightly changed position.

Emphasize the need to keep the designs simple, otherwise students may not have the time or energy to complete the flip books.

Students can make the flip book as long as they like, but there should be a minimum of 15 sheets or drawings.
When they are finished, students exchange their books and flip the pages to see the results.

ACTIVITIES

Question

How many images would you need for a five-second special effects shot? How many would you need for a scene one minute long? For a fully animated feature length movie of 90 minutes?

Discuss movies students have seen that use stop-motion photography, such as claymation films like The Nightmare Before Christmas, or Aardman Animation's Wallace & Gromit, or traditional cell animation like Disney animated features.

2 An Original Idea

Have students think about the best parts of Sea Trek and any other simulator rides they have experienced, and have them design the "ultimate simulator ride" starting with a shooting script.

Next have them draw a storyboard of the key frames in the ride film, with descriptive notes for each frame. Storyboards help to visualize a written script. Stick figures are fine. Comic books are a particularly good source of ideas for camera angles and figure drawing.

3 Shoot it Small

The success of miniature photography partly lies in our ability to run the motion picture camera at faster than normal speeds (called "overcranking"). A two-foot miniature boat, traveling at normal speed, but photographed at four times normal speed, will appear to be four times larger when it is projected at the standard frame rate (and therefore slowed down by a factor of four).

Procedure

You will need a star and a stunt double. This could be a friend and a miniature model in the form of a doll, model or stuffed toy. You will also need a watch with a second hand, a measuring tape and a roll of string.

Measure the height of your star, then pick a miniature. To make things easier, follow this rule of thumb: if your friend is five feet tall, pick a 5 inch tall model.

Find a long stretch of side walk or a long corridor. Have your star comfortably walk that distance. How long did it take?

Now you'll stage this scene in "miniature". Measure out 100 inches of ground, tie a long piece of string around the miniature model of your star, and pull the model along the 100 inches. How long did it take? In order for the miniature version of your scene to be believable, it should take the same amount of time as the full-scale version.

Repeat the procedure until the two times match exactly.

Question

Matching speed of travel is just one element that makes miniature cinematography believable. What are some other factors?

Have students compare an artificial flower to a real one of the same variety, if possible. In what ways does the artificial flower look different from the real one? Why do you think it is difficult to make something artificial look real?

4 Peripheral Vision

When the lights in a simulator theatre dim, you move in synchronization with peripheral images projected around you. Designers of special effects movies and simulator rides make use of our peripheral vision to create illusions.
Not all objects in a special effects movie are created with the same level of detail. Special effects filmmakers need to understand how people pay attention to detail and motion to make a scene realistic.

Procedure

Using coloured chalk, mark a point on the floor that's 1 meter (3.3') away from a wall. Raise your arms straight out to your sides, and look straight ahead, focusing your eyes on a particular spot on the wall.

Procedure

Have a friend walk up from behind your left side, in the path of a circle, just outside the reach of your outstretched arms. Without moving your head, say "stop" when you can see your friend and have that person mark that point in chaulk on the floor. Now do it again on your right. Connect the point you are standing on to the points on your left and right. Given that there are 360 degrees in a circle, what is the measure of your field of vision?

Now repeat the same process, saying "stop" each time you see details on your friend's body and clothes. Have your friend write the details on the floor.

Question

Describe the way in which your eyes see motion and detail.
Did anything surprise you?
When you saw things in detail, where were you looking?

During the underwater scenes of Sea Trek, you passed many objects and organisms. Can you remember them? Describe as many of them as you can in detail.

RESOURCES

Dodsworth, Clarke. Digital Illusion: Entertaining the Future with High Technology. New York: ACM Press, 1998.

Finch, Christopher. Special Effects: Creating Movie Magic. New York: Abbeyville Press, 1984.

Hamilton, Jake. Special Effects in Film and Television. New York: DK Publishing, Inc., 1998.

McCarthy, Robert E. Secrets of Hollywood Special Effects. Boston: Focal Press, 1992.

Samonek, Michael E. Special Effects Cookbook. Narberth, PA: MES/FX Publishing. 1992.

Smith, Thomas G. Industrial Light & Magic: The Art of Special Effects. New York: Ballantine Books, 1986.

Turner, George and Lee, Nora (1993, Aug.) Terabyss takes audience on suboceanic thrill mission. American Cinematographer, pp. 59-63.

Alt.movies.visual-effects
www.users.interport.net/~fletcher/fx-faq1.html

Visual Effects Reference Library
www.visualfx.com/library.htm