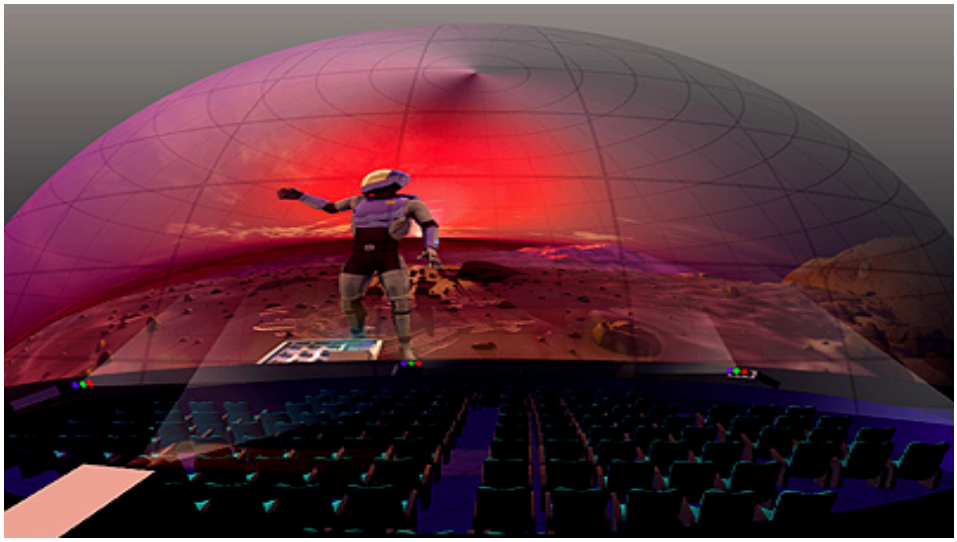
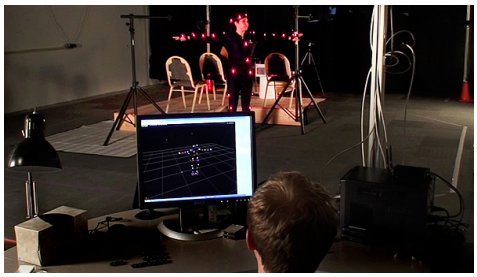
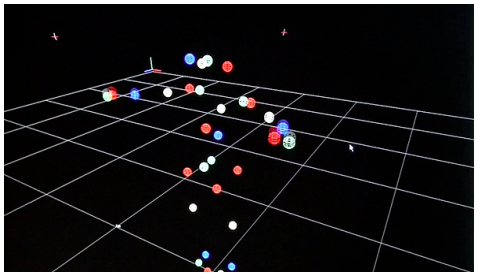
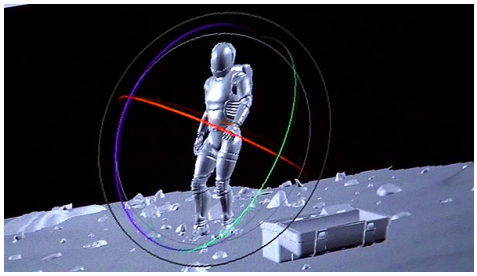
Home Run Pictures

Technical Brief #2 - "Traveler's Guide to Mars " for the Buhl Digital Dome







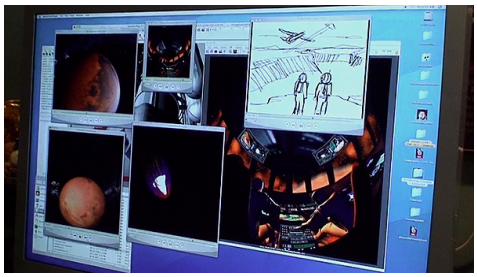


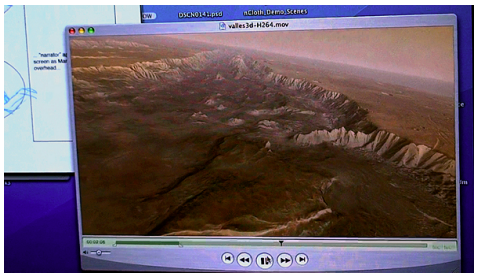
When the Buhl Planetarium acquired their SkyVision fulldome projection system, the topic of choice for the premier show was Mars. An initial meeting with William Hartmann, author of the book, "A Traveler's Guide to Mars," set the stage to begin visualizing the show within the environment of fulldome... as a future manned expedition to the red planet.

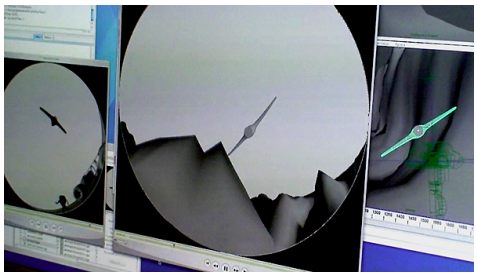
To fully take advantage of the immersive quality of fulldome, any manned visit to Mars would require bringing to life... the astronauts, the Martian landscape, and all the space hardware that would be used. Hardware is easy... realistic astronauts and terrain would be a challenge. It was decided that an approach using motion capture would provide the most believable astronauts and that NASA MOLA (Mars Orbiter Laser Altimeter) data would be the key to creating "real" Martian landscapes.

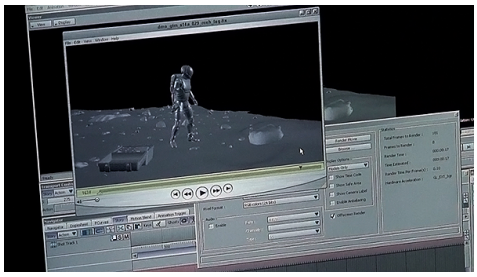
First, a storyboard of the various scripted scenes was produced. To lock the timings, a "workbook" was edited to a rough sound track... the storyboard frames assembled together linearly allowing exact duration and frame counts for each scene.

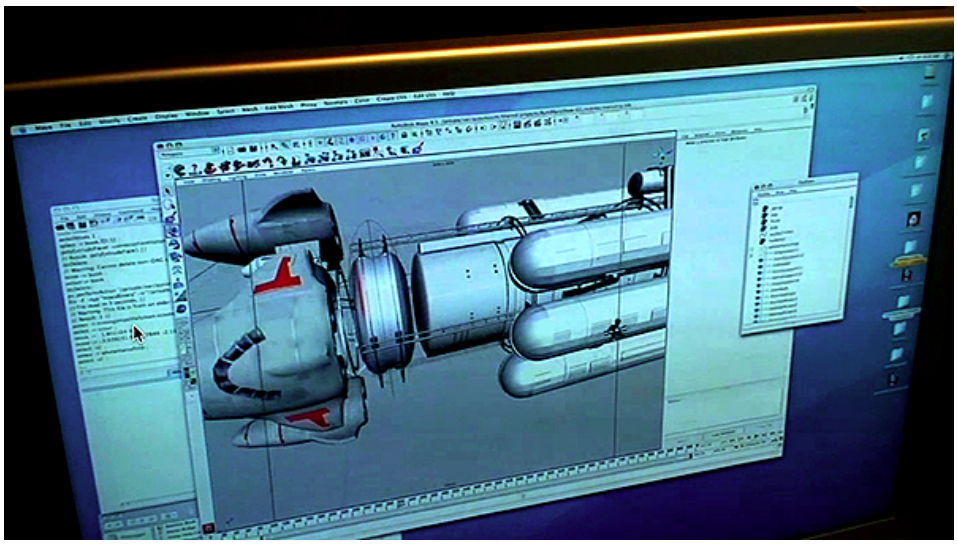
High resolution MOLA data was used to create the various locations our expedition would visit. The raw numerical radar data was imported into a terrain generating application to create displacement, normal and color textures for use in a 3D rendering package. Special code needed to be written to impliment this.

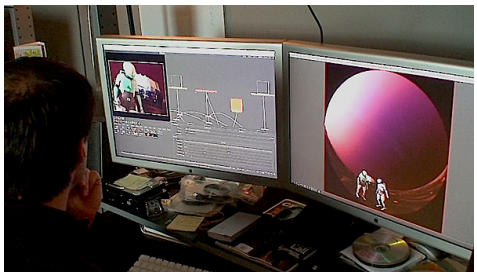


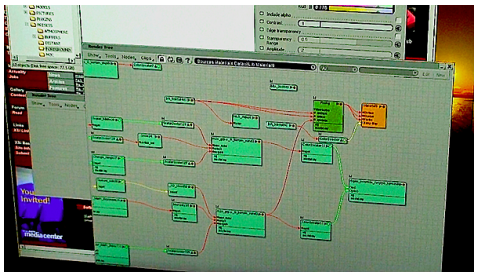












The astronaut scenes were choreographed and mock sets were created to give the "mo-cap" actors an environment to move within... one that matched the terrain being generated. A multi-camera rig was used to record the actors movements, LED markers on their bodies providing the 3D space data. This motion data was then tranferred to computer modeled astronauts (based on an MIT designed spacesuit) to animate their movements in a realistic way. The rendered astronauts could then be composited in to the background terrains generated from the MOLA data, atmospheric effects also added in.

Various futuristic space hardware was designed based on input from NASA... a Mars spaceship, atmosphere entry shuttles, a land rover, and a Mars plane. These rendered models would again be placed in the Martian terrain backgrounds.

An "ipod-like" device that the astronauts carry was designed... sort of a futuristic guide book. A "guide" was video-taped in a green-screen studio to layer in to the device's screen and serve as the show's narrator.

Various scenes included a vidoe-game-like rover ride across a Mars plain, a soaring plane ride through part of the vast Valles Marinaris canyon, a shuttle atmospheric entry over Olympus Mons, and various other geological points of interest.

A combination of Macintosh, Windows and Linux worstations were used for production. Animation was created using both Autodesk Maya and Softimage 3D applications. Rendering was accomplished using a "virtual refracting lens" technique on a wide variety of render farm CPUs. Some frames would take several hours each to fully render at final fulldome resolution. All scenes were rendered as individual multi-pass layers (color, texture, normal, glow, etc.) and final compositing and effects layering was handled in Shake and AfterEffects to allow tweaking of the look for the dome projection system.

The 20 minute show also included a variety of NASA imagery from Mars orbiting probes and surface rovers.

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