Modeling and Simulation of Aircraft Evacuations

by Jingxin Han and Stephen Otunba

Topics

- Goals and Objectives
- Modeling
- 2D Versus 3D
- Exterior Modeling
- Interior Modeling
- VRML
- Software
- Problems Encountered and Future Goals

GOALS AND OBJECTIVES

- In this project, we will simulate an evacuation behavior in an aircraft using a crowd component.

- In passed years, there has only 2D simulation and this application can be used by airlines to simulate emergency scenarios without the use of live actors.

- This will allow airlines to run multiple simulation under a variety of conditions which will save time and lower costs. The application can also be adapted and expanded to other industries.
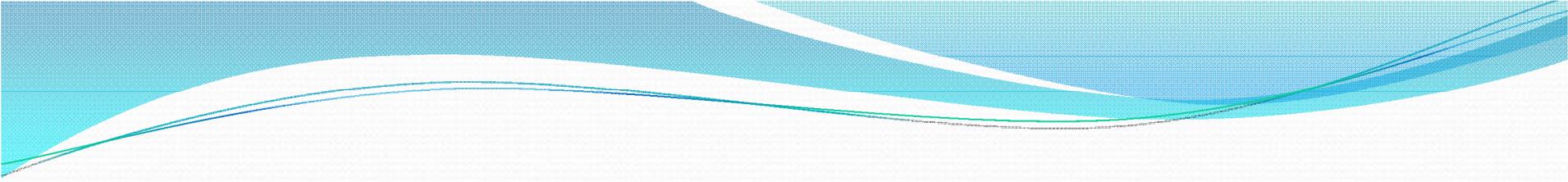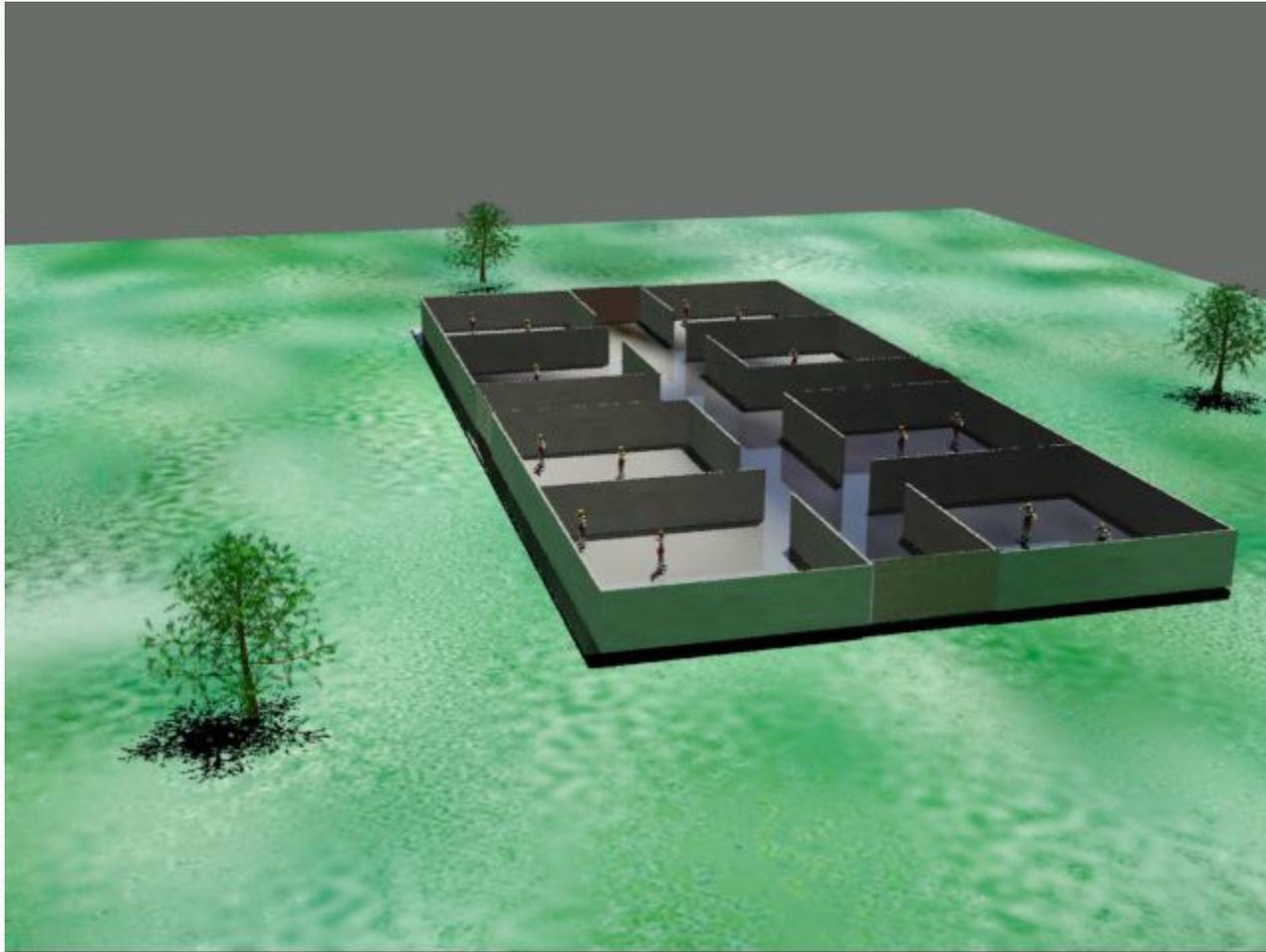
MODELING

- Modeling was done in 3D Studio Max
  - Outer aircraft environment and aircraft model
    - simple models downloaded from 3dviastudio.com were imported into 3ds Max
  - Inner aircraft environment
    - A model of the cross section of the interior of an aircraft as well as the passenger models were also downloaded from 3dviastudio.com
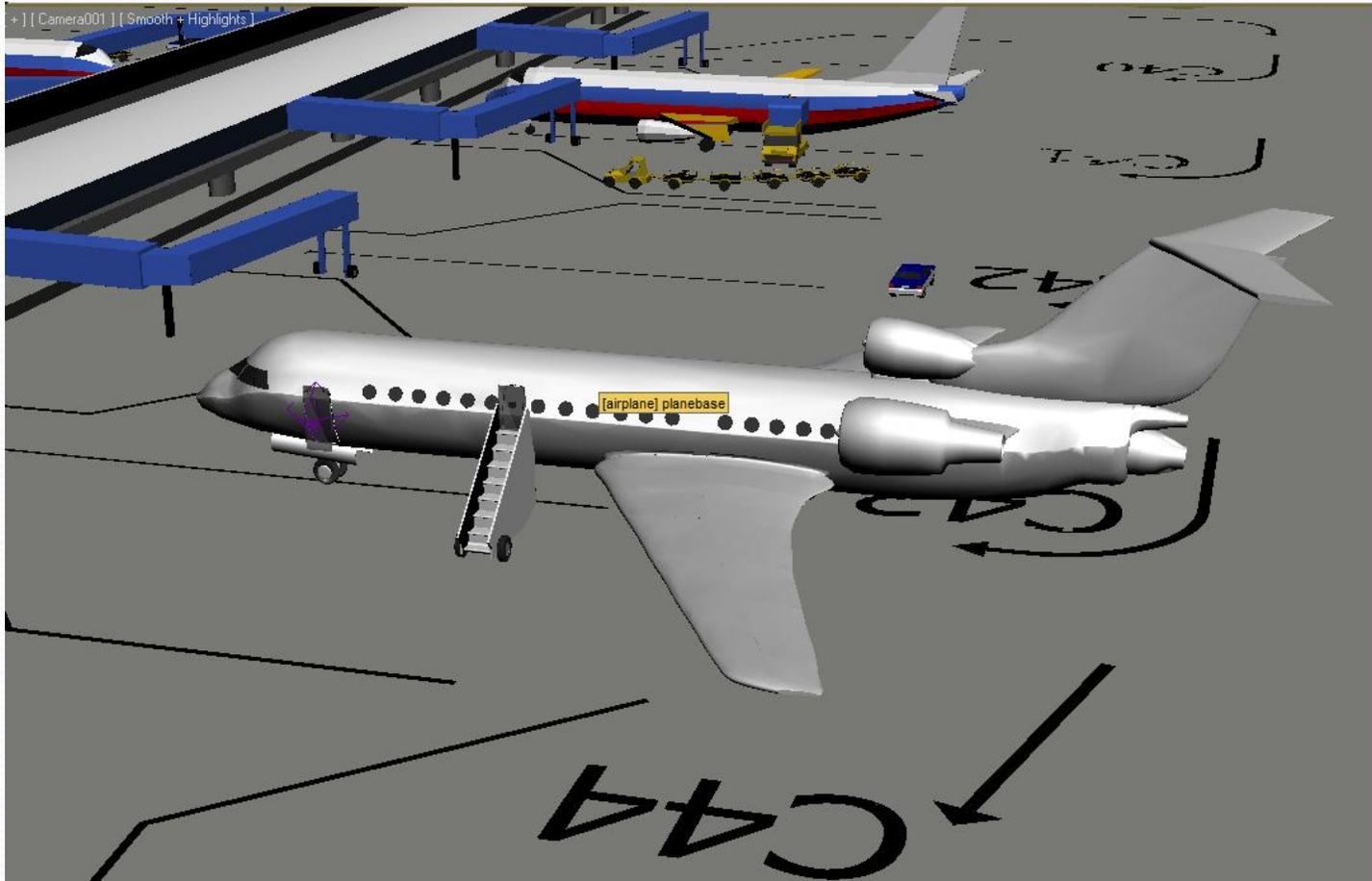   - Biped models were inserted into the passenger models to create the evacuation animations.
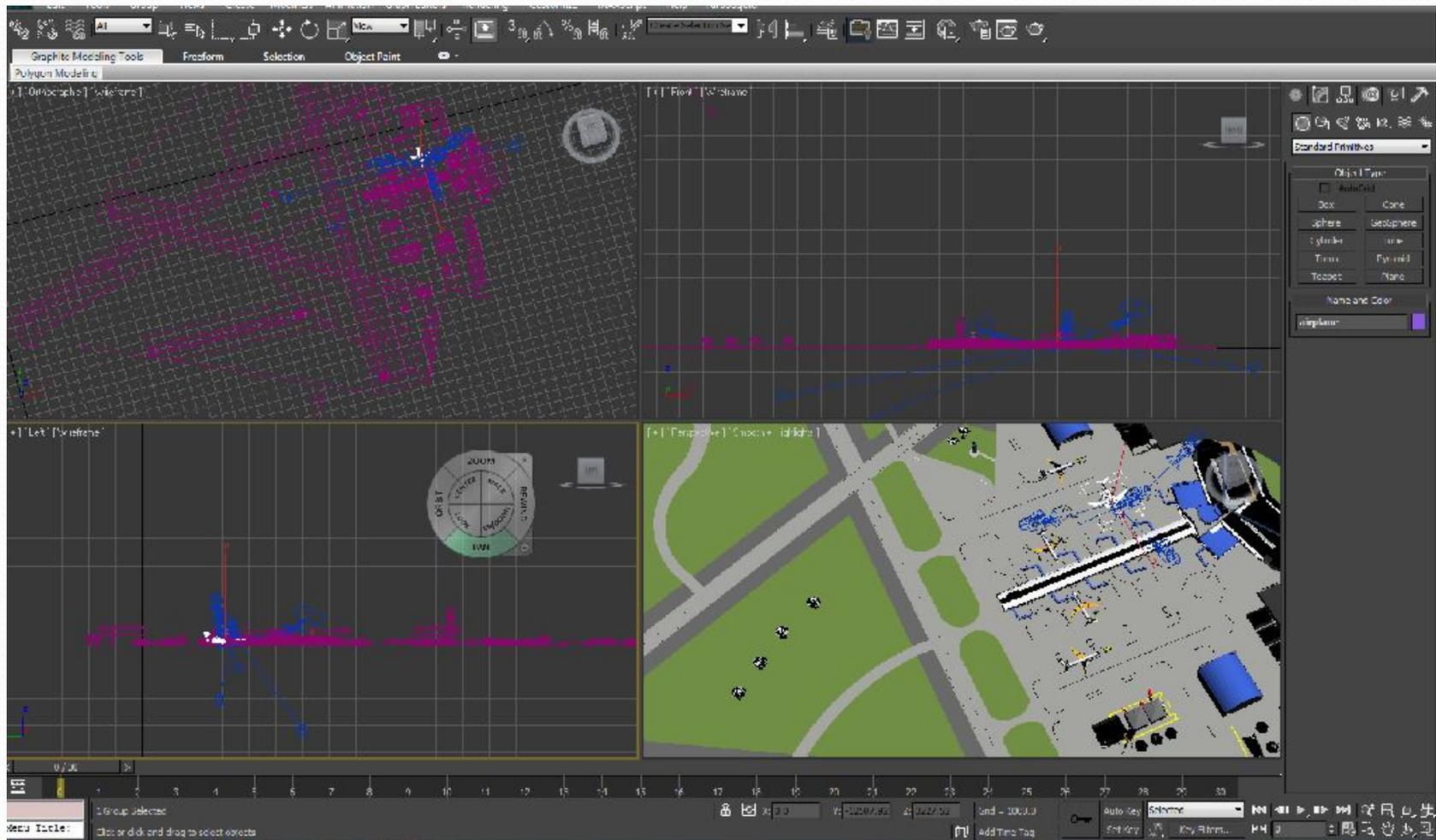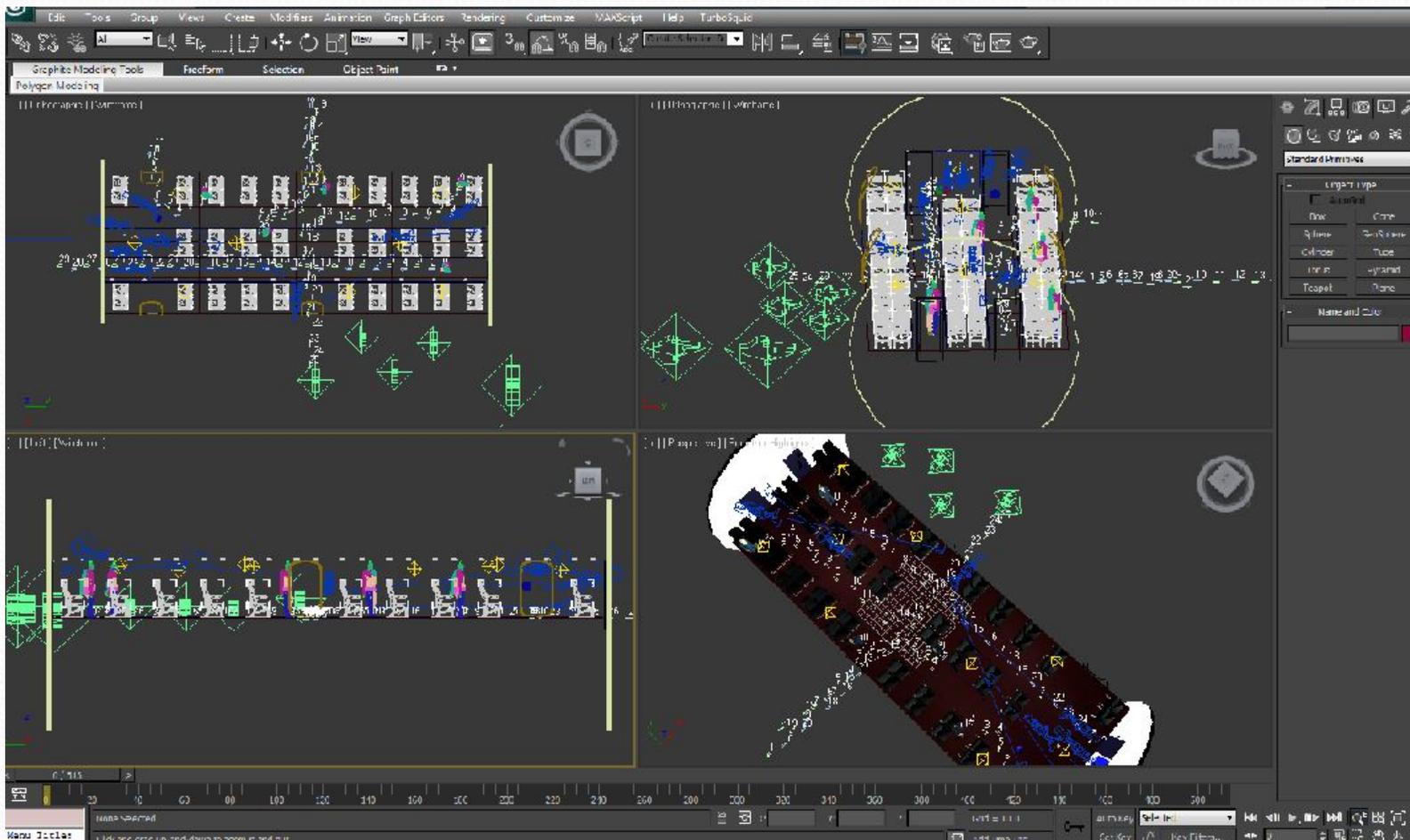
2D versus 3D
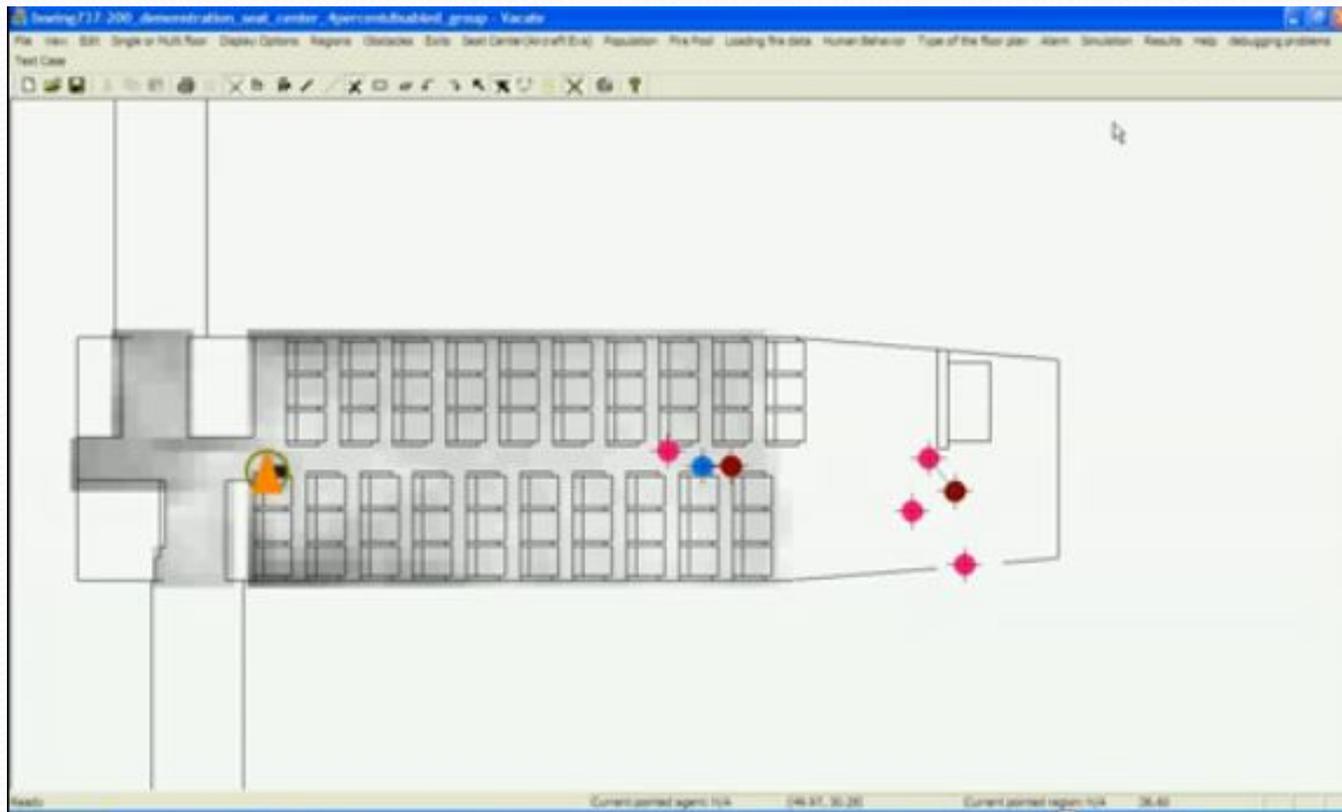
2D versus 3D

Exterior Modeling

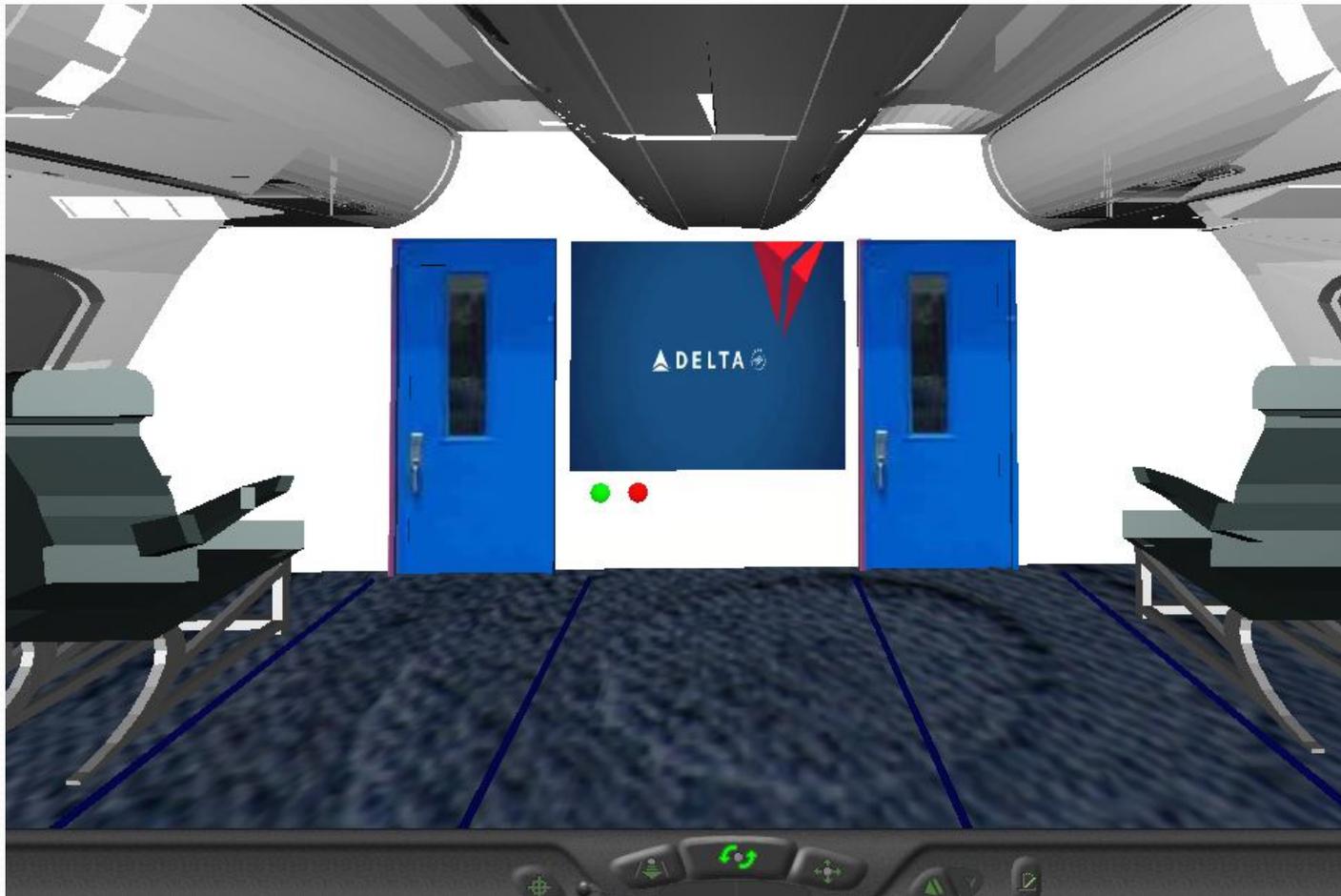# Exterior Modeling in 3ds max

Interior Modeling in 3ds max

Cross Section of Plane Interior
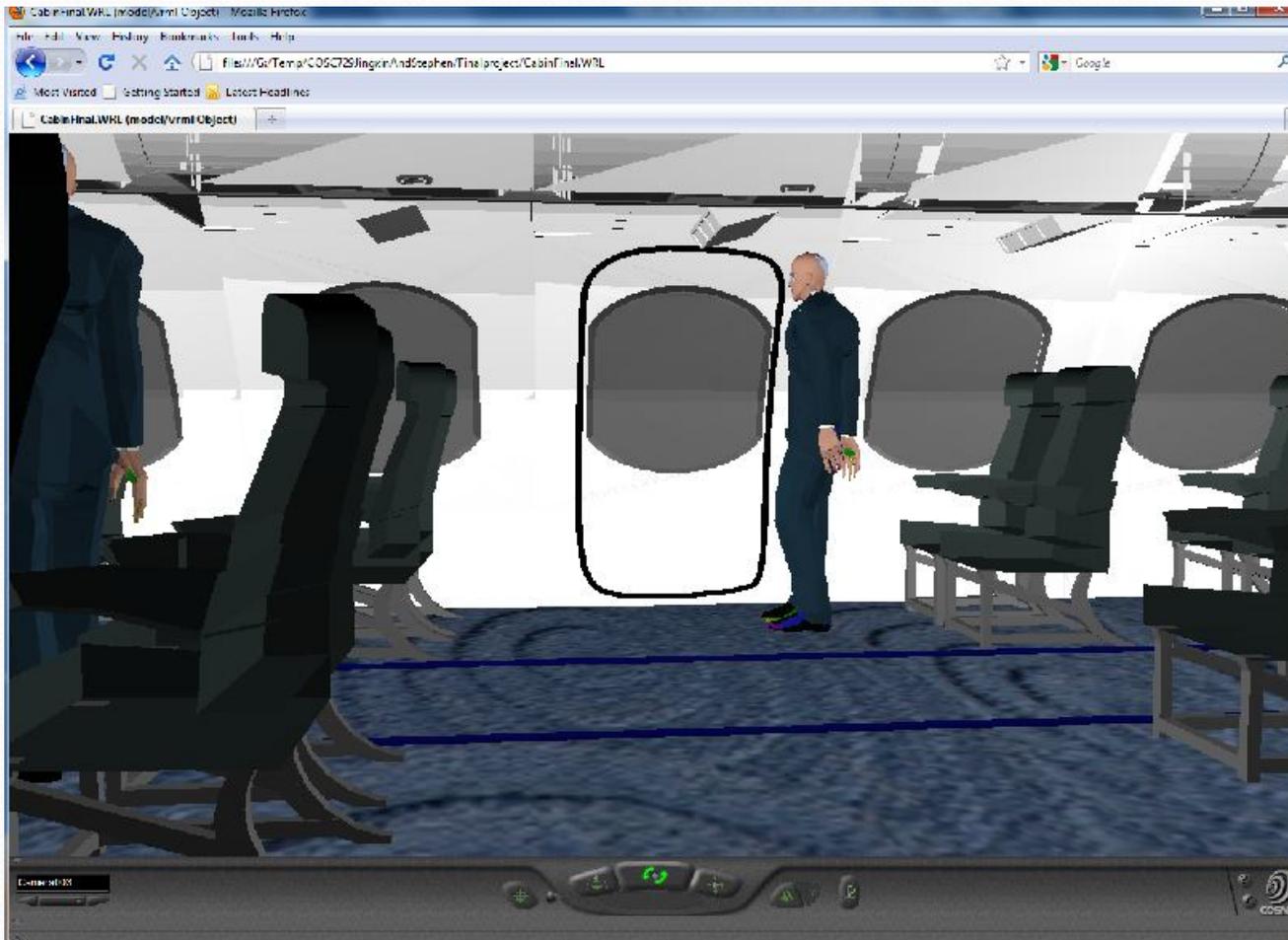
Front of Plane Cabin
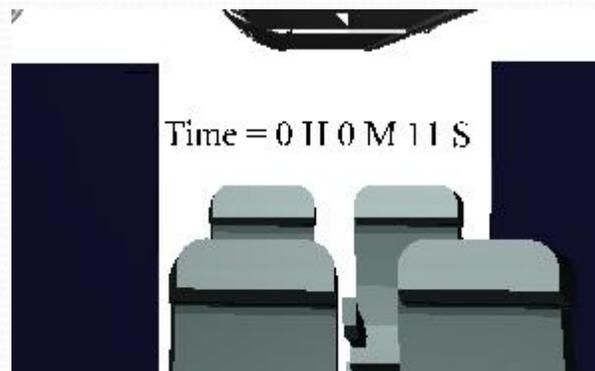
Plane Cabin

Cabin & Passengers

Passenger Exit

VRML

- VRML was used to add functionality to the virtual environment through the incorporation of:
  - Touch Sensors
  - Lights
  - Time Counter
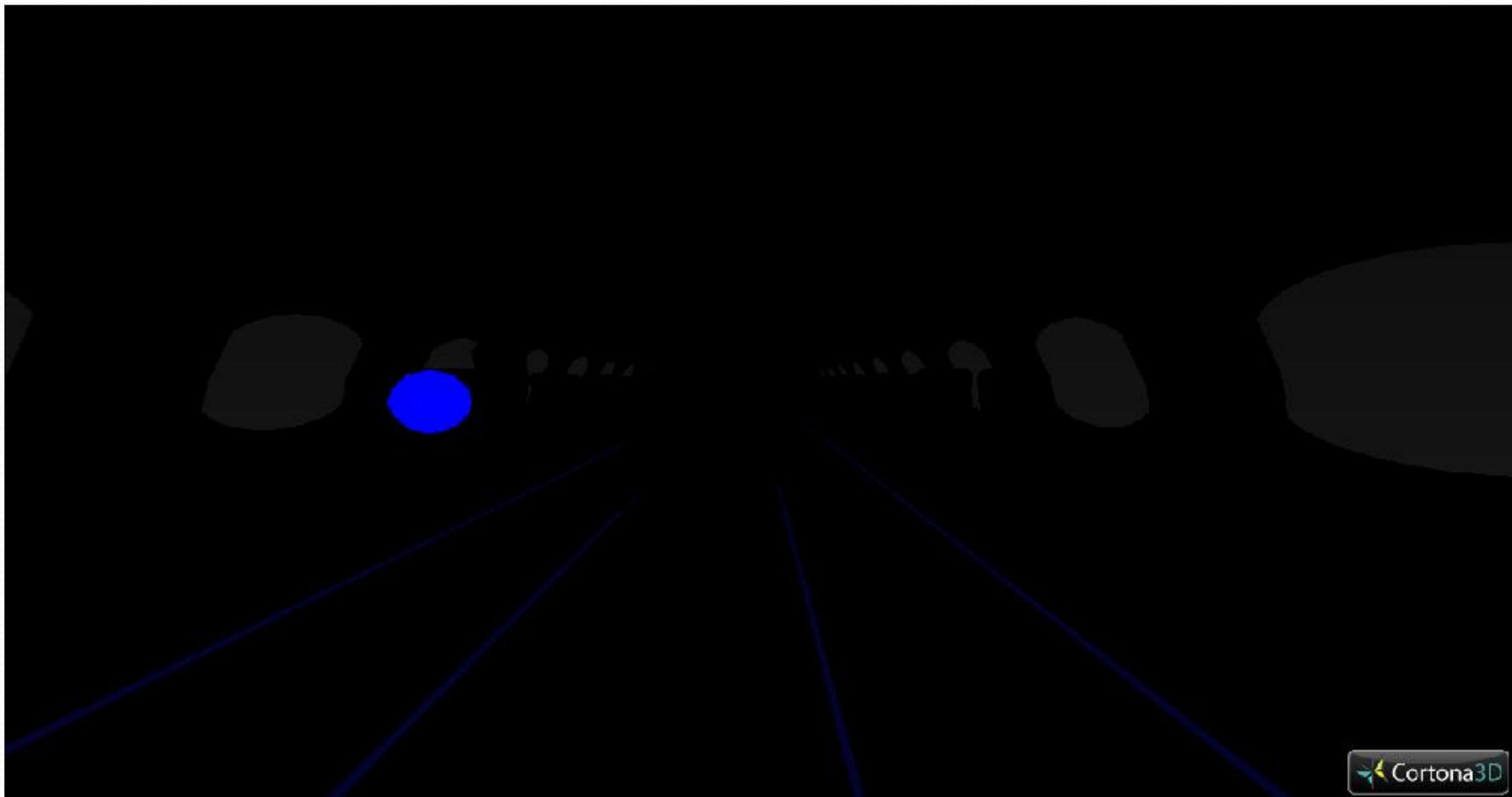 - Interpolators

Time = 0 H 0 M 11 S

Lights

- Outer aircraft we used the standard daylight system that is available in 3ds Max.

- In the aircraft we used multiple point lights to illuminate the interior of the cabin.

- Emergency guide lines were added on either side of the aisles.
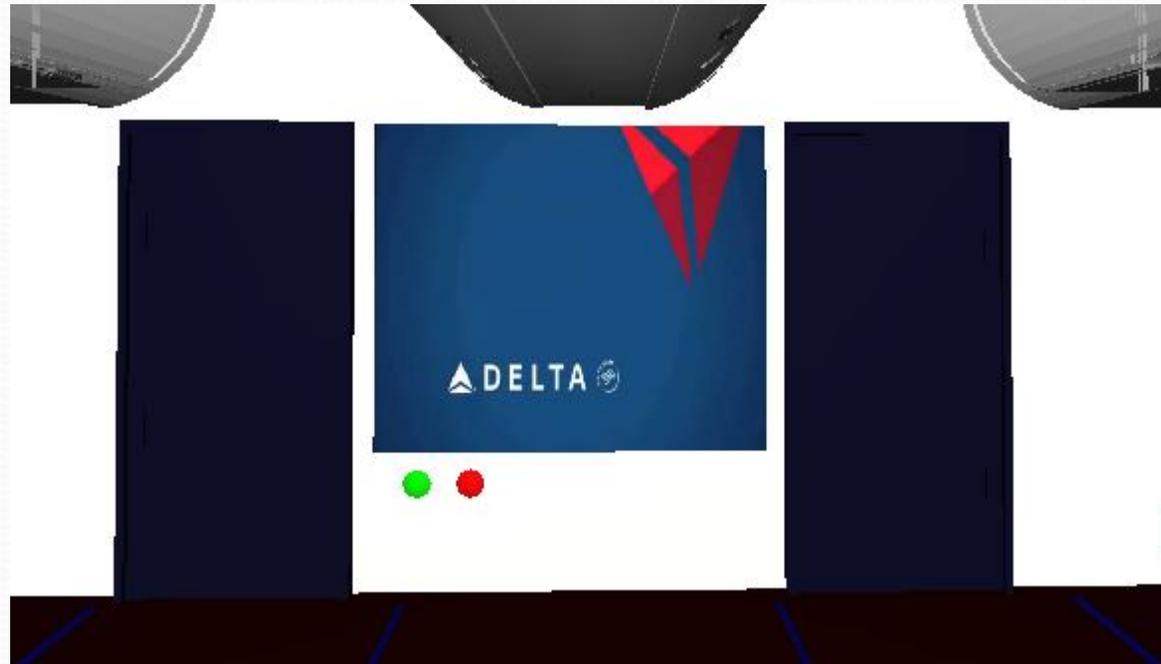
Light

Sensors

- Touch sensors were placed on the emergency button, the outer aircraft doors, the buttons controlling the television screen, as well as on the heads of each of the passengers.
  - The touch sensors controlled video and audio playback as well as animation.

- A time counter was placed on the back wall of the aircraft cabin to keep track the total elapsed time for the evacuation.

Interpolator

- A scalar interpolator was applied to the television screen and triggered by touch sensors to turn the screen on and off.
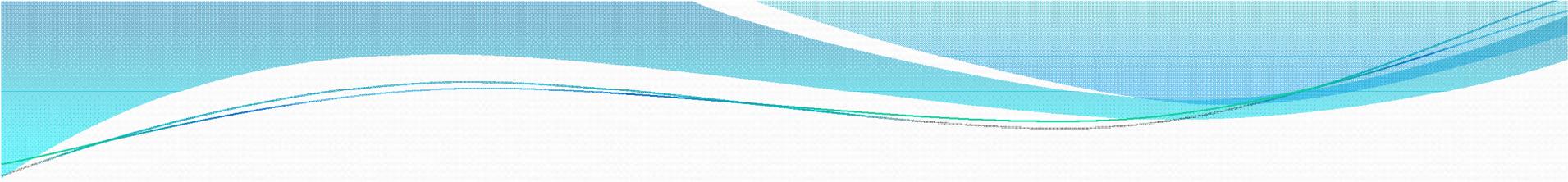
VMRL pad

Software

- Autodesk 3ds Max 2011 64-bit
- Autodesk Maya 2011 64-bit
- Cosmo player
- Vrml Pad
- Windows 7 Enterprise 64-Version
- FBX Converter
- Mac OS
- Virtools (if we can find a way to import/export files)

Evacuation Video

Demo

- PlaneOutside.WRL