Space Explorer

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Goal

- virtual environment to simulate the exploration of our solar system
- 3 Modules
  - ISS Internal Exploration
  - ISS External Space Walk
  - Solar System Exploration
Objectives

- navigate a space craft through the solar system,
- move around inside the space craft, and complete simple task
- leave the spacecraft to conduct a space walk
Modeling

- Downloaded multiple 3D models with texture from NASA website
- Some challenges encountered when importing downloaded models
  - Importing texture were not consistent
  - Some models were too big to be incorporated to the main scene
Vision

- Planets
  - Modeled from scratch
    - Used spheres and textures to build planet models
- Star Maps
  - Created environment map textures to be used in the scene using graphic tools
User Interaction

- Menus are used to switch from one module to another
- Keyboard keys were used to control avatars
- Mouse gestures were used to change view point in some module
Sensors

- Proximity sensors were used to detect proxy events between sensors and targets
Animations

- Animations were used to simulate solar particles
- Animations were used for movement of planets
- Animations were used to simulate solar wave/radiations
Space Walk Module

- **Purpose:** The user will be able to experience a simulation of Space Walk using keyboard controls. The scale of ISS model is proportional to the scale of the astronaut model.
Space Walk Module - Key features

1) The user can control the astronaut using various keyboard keys. The key map of the module is as the following:

<table>
<thead>
<tr>
<th>Key</th>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>'9'</td>
<td>Camera Zoom out</td>
<td>Main view is zoomed out exposing astronaut’s back side</td>
</tr>
<tr>
<td>'0'</td>
<td>Camera Zoom in</td>
<td>Main view is zoomed in as 1st person view</td>
</tr>
<tr>
<td>'w'</td>
<td>Move Forward</td>
<td>Astronaut moves forward</td>
</tr>
<tr>
<td>'s'</td>
<td>Move Backward</td>
<td>Astronaut moves backward</td>
</tr>
<tr>
<td>'a'</td>
<td>Move Left</td>
<td>Astronaut moves left</td>
</tr>
<tr>
<td>'d'</td>
<td>Move Right</td>
<td>Astronaut moves right</td>
</tr>
<tr>
<td>'z'</td>
<td>Move Up</td>
<td>Astronaut moves up</td>
</tr>
<tr>
<td>'x'</td>
<td>Move Down</td>
<td>Astronaut moves down</td>
</tr>
<tr>
<td>'left arrow'</td>
<td>Yaw Left</td>
<td>Astronaut yaw left</td>
</tr>
<tr>
<td>'right arrow'</td>
<td>Yaw Right</td>
<td>Astronaut yaw right</td>
</tr>
<tr>
<td>'up arrow'</td>
<td>Pitch Up</td>
<td>Astronaut pitch up</td>
</tr>
<tr>
<td>'down arrow'</td>
<td>Pitch Down</td>
<td>Astronaut pitch down</td>
</tr>
<tr>
<td>'left ctrl'</td>
<td>Roll Left</td>
<td>Astronaut roll left</td>
</tr>
<tr>
<td>'left alt'</td>
<td>Roll Right</td>
<td>Astronaut roll right</td>
</tr>
<tr>
<td>'pad -'</td>
<td>Speed down by 10</td>
<td>Astronaut’s movement speed is up by 10 unit</td>
</tr>
<tr>
<td>'pad +'</td>
<td>Speed up by 10</td>
<td>Astronaut’s movement speed is down by 10 unit</td>
</tr>
<tr>
<td>'p'</td>
<td>Pause Astronaut actions</td>
<td>Astronaut’s actions are paused</td>
</tr>
<tr>
<td>'o'</td>
<td>Resume Astronaut actions</td>
<td>Astronaut’s actions are resumed</td>
</tr>
</tbody>
</table>
Space Walk Module - Key features - IDE
Space Walk Module - Key features

2) Beautiful background music is played while the user is experiencing the simulation

3) When movement keys are pressed, sound of air jet simulated sound is played
Space Walk Module - Key features

4) A task is given to find an entry point to the internal of ISS. It is marked with yellow down arrow key.
Solar System Exploration

- Purpose: Explore different planet system within our solar system
- Key Features:
  - Users can navigate to different planet using the menu system
  - Users can view different planet regardless of their location
  - Simulate solar particles
  - Simulate movement of planets
Solar System Exploration - screen captures
Solar System Exploration - screen captures
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Solar System Exploration - screen captures
ISS Interior Exploration

- Purpose: Allows users to navigate within the ISS.
- Key features:
  - User task to locate ducks within ISS environment given predefined time limits
  - Keyboard and mouse keys and gestures were utilized to navigate
ISS Interior Exploration
ISS Interior Exploration - screen captures
ISS Interior Exploration - screen captures
ISS Interior Exploration - screen captures
ISS Interior Exploration - screen captures