Lunar Descent Module

Game Design Document Version 0.9

Land on the moon before your fuel runs out

Table of Contents

1 Game Concept

Control the Apollo 11 Lunar lander to locate a suitable landing spot, then touch down gently without running out of fuel.

2 Rules and Mechanics

You have a finite amount of fuel and can thrust as long as fuel is available. Lunar gravity is a constant downward force on the module. You must find a flat area large enough to place the module on, using the thruster and gyros. Using the thruster, you must ensure the craft is not falling too fast when you touch down (and the craft must be horizontal as well). Acceleration from thrust depends on both the amount of thrust (which has a maximum value) and the mass of the craft, including remaining fuel. Score points for the amount of fuel remaining when you land, winning the game. Lose the game with no points if you crash or with a small number of points if you achieve escape velocity and leave the moon (it is not yet determined if the latter is even possible). Exiting the landing region automatically triggers the abort function, which may result in a crash or escape depending on velocity and amount of fuel left. High score will be stored.

2.1 Controls

Thrust axis is adjustable from 10% to 60%, or can be set to max with the Abort button. Attitude is adjustable with respect to two horizontal attitude axes. The third, vertical axis of rotation, is ignored in this game.

2.2 Specifications

The landing module is 10334Kg, including 8200Kg fuel initially, and the fuel has a specific impulse of 3050 Ns/Kg, giving a total delta-v of 2500 m/s. The maximum thrust is 45040N. It can be throttled between 10% and 60% max, or set to max (abort). Thrust is downward relative to the LM, but the attitude (yaw, pitch, and roll) can be adjusted with gyroscopes. A 1.707 meter long proximity probe on all but one leg indicates nearness to ground.

3 Asset Requirements

The game requires lunar terrain, a lunar lander module, and a HUD with controls and readouts, as well as supporting screens like the title screen, game over screen, instructions screen, an options screen, and a pause screen. Sound and music are in the game.

3.1 Terrain Assets

The terrain requires a heightmap of the Sea of Tranquility on the Moon, as well as a moon-rock material. It should be large enough for a reasonable game.

3.2 Landing Module Assets

The landing module has at least two meshes, for the lander and the ascent modules, and possibly a third for the landing gear. It should also have a realistic UV-skinned material.

3.3 HUD Assets

The HUD requires a fuel gauge, thrust gauge, proximity indicator, attitude indicator, and abort indicator.

Helpful but unrealistic would be a height indicator, and indicator that module is above a suitable landing spot, and velocity gauge. These would be removed in Advanced mode.

3.4 Audio Assets

Sounds for thrust, land, crash land, gyro movement, warnings for out of fuel and proximity. Slow, soft, spacy music.