Technical Documentation

System Architecture

This hybrid system integrates three rule-based engines: a context-free generative grammar for narrative structure, a word-level Markov chain for atmospheric texture, and an L-System renderer for procedural alien visuals. A biome detection layer scans generated text for keywords and selects the matching L-System ruleset and color palette, connecting narrative to image. An interactive mode lets users select mood, grammar, and chain at runtime.

Rules, Grammars, and Models

Two grammars are implemented: a Mission Grammar (17 non-terminals, 73 productions) covering characters, locations, encounters, discoveries, and status reports, and a Planet Grammar (6 non-terminals, 26 productions) for sky, terrain, flora, and atmosphere. Two order-2 Markov chains trained on original sci-fi text provide a Space Log corpus (176 states) and an Alien World corpus (203 states). Three L-System rulesets produce Spiral Flora, Crystal Spire, and Bioluminescent Tendril patterns paired with four color palettes (frozen, bioluminescent, crystal, volcanic). A mood system (dread, wonder, tension) reweights Markov candidates to shift tone.

Generative Process Analysis

Variation is controlled through temperature sampling, mood biasing, and biome detection. Low temperature (0.6) keeps output coherent; high temperature (1.6) increases diversity. Mood biasing triples the weight of words matching a curated vocabulary. Biome detection scores keywords across the combined output and selects the best visual match automatically.

Challenges and Solutions

Small corpora made coherence difficult. Order-2 chains with lower temperatures preserved source syntax while generating novel sequences. Biome detection used cumulative keyword scoring to avoid false matches. Weighted grammar productions ensured structural variety, and mood biasing added tonal control without external libraries.

Creative Statement

Creative Goal

The goal was to build a system that feels like intercepting transmissions from deep space. Each run produces a mission log, atmospheric field notes, and a visual of the alien world described in the text, all coherently linked through biome detection.

Inspiration and Design Process

The project draws from sci-fi themes of isolation, alien ecosystems, and first contact. Both corpora were written from scratch with sensory details so the Markov chains would reproduce that texture. L-System visuals resemble alien vegetation and crystal formations using neon-on-dark palettes that reinforce the otherworldly tone.

Reflection on Results

Each system handles what it does best: grammars give structure, Markov chains add unpredictable language, L-Systems create organic visuals. Mood biasing shifts the emotional register between runs from the same training text. The biome connector ensures visuals are always tied to the story. The interactive mode lets users explore how parameter combinations shape the output.