Case Study: Hyper-Casual Puzzle Game Hyperloop Train Jam (Bus Jam Inspired)

Gameplay

The game is a grid-based hyper-casual puzzle experience inspired by Bus Jam by Rollic Games. The core mechanic revolves around spherical-headed characters of different colors placed within a constrained grid. Each character represents a passenger that must be transported to a station platform and boarded onto a hyperloop-style train of the matching color.

Characters can only move if at least one adjacent tile is empty. Once movement is initiated, the character attempts to traverse a continuous path toward the platform. If a valid path exists, the character automatically follows it and joins the station queue. Characters already present in the queue will immediately board a train if it arrives with a matching color.

Train arrivals are randomized, and each train has a limited number of seats. Additionally, the station queue itself has a strict capacity limit. These constraints require the player to strategically decide the order in which characters are moved, ensuring that paths remain open and queue space is efficiently managed. The combination of spatial reasoning, limited resources, and random train order creates a dynamic puzzle that emphasizes planning over reflex-based interaction.

Problems Encountered

One of the primary challenges during development was implementing reliable and performant character movement in a dense, dynamic grid. Since the grid state changes frequently as characters move, traditional scripted movement quickly became unmanageable and prone to edge cases such as deadlocks and unintended overlaps.

To address this, I implemented the A* pathfinding algorithm to dynamically evaluate whether a valid path existed between a character and the platform. A key design challenge was ensuring that the absence of a path was communicated clearly to the player. Instead of allowing failed movement attempts to feel like bugs, I introduced a deliberate jitter animation when no valid path was found. This transformed a technical limitation into an intentional feedback mechanism.

Another challenge was balancing difficulty under constrained conditions. The limited station queue size combined with randomly arriving trains could easily result in unwinnable scenarios. This required iterative tuning of queue capacity, grid layouts, and spawn distributions to maintain challenge while avoiding player frustration.

Learning

This project closely aligns with the learning objectives of the Game Technologies program at Hochschule Bonn-Rhein-Sieg University of Applied Sciences, particularly its emphasis on applied computer science, real-time systems, and interdisciplinary development.

From a technical standpoint, the integration of the A* pathfinding algorithm as a core gameplay mechanic reflects the practical application of algorithms and data structures within an interactive, real-time environment. Rather than treating pathfinding as a background system, it directly influenced player decision-making, system constraints, and difficulty balancing—demonstrating how theoretical concepts can be translated into user-facing functionality.

The project also strengthened my understanding of system design and state management in games, including grid-based representations, dynamic obstacle handling, queue management, and event-driven logic for randomized train arrivals. These aspects are directly relevant to game engine architecture, simulation systems, and interactive software development covered in applied game technology curricula.

In addition, collaborating closely with a designer reinforced the importance of interdisciplinary workflows, a core focus of the H-BRS program. Technical decisions were continuously evaluated against usability, visual clarity, and player feedback, ensuring that engineering solutions supported design goals rather than operating in isolation.

Overall, this project reflects my readiness for graduate-level study in Game Technologies by demonstrating applied algorithmic thinking, system-oriented problem solving, and the ability to develop complete interactive systems that balance technical rigor with player experience.