

Floppy Burt 305 - Interim Report: Game Plan

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Game Design and Implementation Plan

This document outlines the core gameplay mechanics, modes, and control scheme for "Floppy Burt," our FPGA-based Flappy Bird implementation.

1. Main Menu & Mode Selection

- **Initialization:** Upon power-up or reset, the game displays a Start Menu. This menu will show the available game modes.
- **Mode Input:** Game modes are selected using DIP switches SW[1:0]:
 - SW[1:0] = 00: Default/Return to Menu. (From Practice Mode, setting to 00 and pressing "Start" returns to Main Menu).
 - SW[1:0] = 01: Practice Mode.
 - SW[1:0] = 10: Easy Mode.
 - SW[1:0] = 11: Hard Mode.
- **Mode Display:** The numerical value of SW[1:0] (or a representative character like P, E, H) indicating the selected mode will be shown on the 7-segment display, along with the text "MODE".
- **Start Game:** Pressing a designated "Start" key (KEY[0]) will change state to the selected game mode.

2. Game Modes

- **Practice Mode (SW[1:0]=01):**
 - **Objective:** Allow players to hone their jumping skills.
 - **Setup:** Features two static pipes, one directly above the other, creating a fixed vertical gap.
 - **Adjustable Difficulty:** The size of the gap between pipes can be dynamically changed using other DIP switches (e.g., SW[4:2]), allowing practice for narrow passages.
 - **Gameplay Loop:** Upon collision or reaching a screen boundary (if applicable), the bird resets to its starting position for another attempt.
 - **Exiting:** Return to the Main Menu by either pressing the global "Reset" button or by setting SW[1:0] to 00 and pressing the "Start" key.
- **Easy Mode (SW[1:0]=10):**
 - **Objective:** Classic Flappy Bird experience.
 - **Gameplay:** Pipes are generated at random gaps and scroll from right to left. Gravity is constant and pulls the bird downwards.
 - **Game Over:** Collision with a pipe, the ground, or the ceiling ends the game and transitions to the "Game Over" screen.
- **Hard Mode (SW[1:0]=11):**

- **Objective:** Increased challenge for experienced players.
- **Gameplay:** Similar to Easy Mode, but with a gravity inversion mechanic.
- **Gravity Inversion:** Every 5 seconds, there is a chance for gravity to invert (bird "falls" upwards).
- **Visual Cue:** The screen background will invert its colors to clearly indicate the current gravity direction.
- **Game Over:** Collision (relative to current gravity) leads to the Game Over screen.

3. Gameplay Mechanics & Controls

- **Bird Control:** The bird's jump is initiated by a click from a PS/2 mouse. After the click, the bird ascends to a peak height and then descends due to the active gravity.
- **Game Over Screen:**
 - Displayed after a collision in Easy or Hard modes.
 - Shows a "Game Over" message and (if implemented) the player's score.
 - Players can return to the Main Menu by pressing either the "Start" key or the global "Reset" button.

4. State and System Diagram

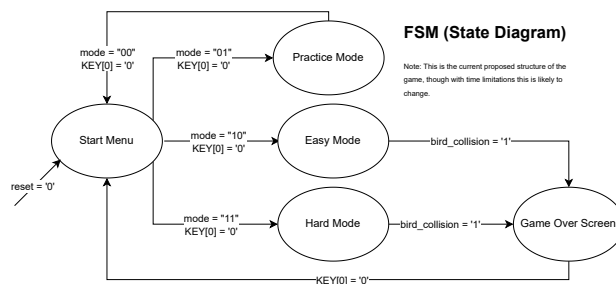


Figure 1: Floppy Burt Finite State Machine (FSM).

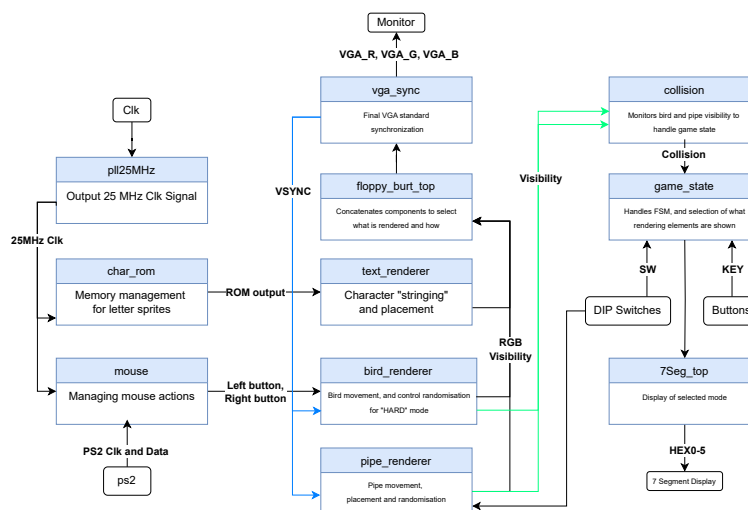


Figure 2: Proposed High-Level System Block Diagram.