

CS 152A Final Lab Proposal: Flappy Bird

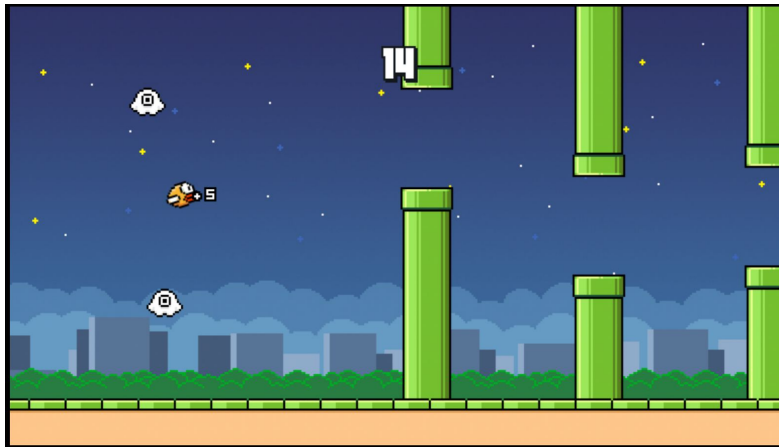
Group 7

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Overview

For our project, we will create Flappy Bird on the FPGA board. A button will be used for the bird to jump. A switch will be used to pause the game so that the user can take a break. Unlike the picture below, the user's score will be shown on the seven segment display. The goal of Flappy Bird is to let the bird move forward without touching the pipes. The bird will move forward automatically, at a constant speed. The number of pipes passed will be the score.



It will look something similar to this

Design Description

The rules of Flappy Bird game are the follow:

- The bird will go up a little bit when it jumps. Otherwise, it will fall down to ground due to gravity.
- When the bird touches any hard surface (i.e. the ground or pipes), the user loses.
- When the user loses, the game enters the a separate state.
- The game score increments every time the bird passes through a pipe opening.
- Get as much score as you can before the bird touches the ground or a pipe.
- The player can pause the game to take a break.

We will be using the following components on FPGA board to design the game.

- **Pause Switch:** The switch controls the operation mode. If off, the game flows naturally, and if on the game pauses.
- **“Fly” Button:** The button controls the height of the bird. When tapped, the bird will slightly moves up.
- **Reset Button:** When tapped, resets the game after the user loses.
- **Segment Display:** The seven segment display will show the score of the user at any point in time.
- **VGA:** The VGA is used to display the game graphics.

Design Milestones and Grading Rubrics

- **Moving Background (15%) :** The background moves backward at a constant rate, and presents pipes of varying lengths, but with a fixed opening.
- **Gravity (15%):** The bird moves (fall) downwards at a fixed rate when the “fly” button is not tapped.
- **Jump Functionality (15%):** Tapping the button must make the bird move up, for a fixed amount.
- **Collision Detection (15%):** When touching the ground or any of the pipes, the user loses.
- **Pause after loss (10%):** After the user loses, the game enters a separate pause state
- **Score Tracking (10%):** Every time the bird passes through a pipe opening, the score shown on the seven segment display is incremented by 1.
- **Drawing (10%):** The graphics are drawn pixel by pixel, for better resolution.
- **Pause Functionality (5%):** When the pause switch is turned on, the game enters pause state
- **Moving Pipes (5%):** This is an unique feature we will add to our game. When the user turn on a switch, the pipes will keep moving in vertical direction.