Donkey Kong

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Project Introduction

- Recreated Donkey Kong video game
  - Used A7 FPGA board and VGA
- Implemented all the features the original game provides
  - Moving forward and backward and climbing up and down ladders to reach end of the level
- Shows many ways in which engineering can be used not only to create solutions to real world problems, but also to create new ideas in the entertainment industry
- Incorporates ideas/techniques used in many other video games and previous labs/homework assignments
- Chose this project because Donkey Kong is a game we are both familiar with and interested in
- Wanted to learn more about creating the visual components of the game
- Use the visuals as well as inputs to create desired output

Overview of User Interface

Inputs:

BTNU - Move up if overlapping ladder

BTND - Move down if overlapping ladder

BTNR - Move right

BTNL - Move left

BTNC - Pause / Unpause

Outputs:

Move Up Ladder - Mario moves up ladder to reach floor above and continue advancing towards goal or stay between floors

Move Down Ladder - Mario moves down ladder to reach floor below or stay between floors

Move Right - Mario moves in the positive x-direction

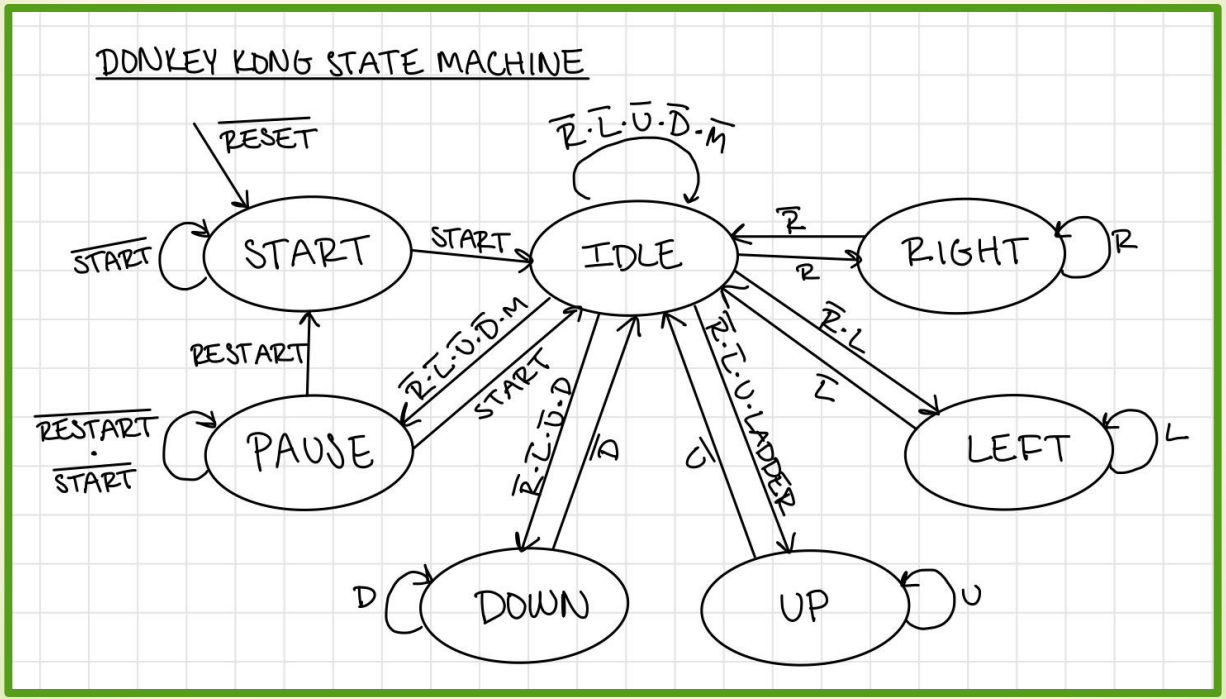
Move Left - Mario moves in the negative x-direction

Pause - Freezes screen and stops play until unpaused

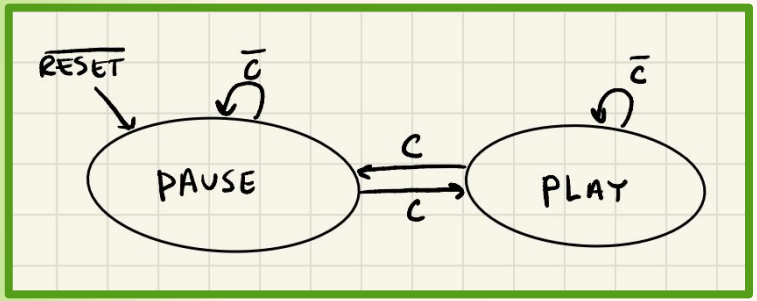
Unpause - Unfreezes screen and progress stays the same

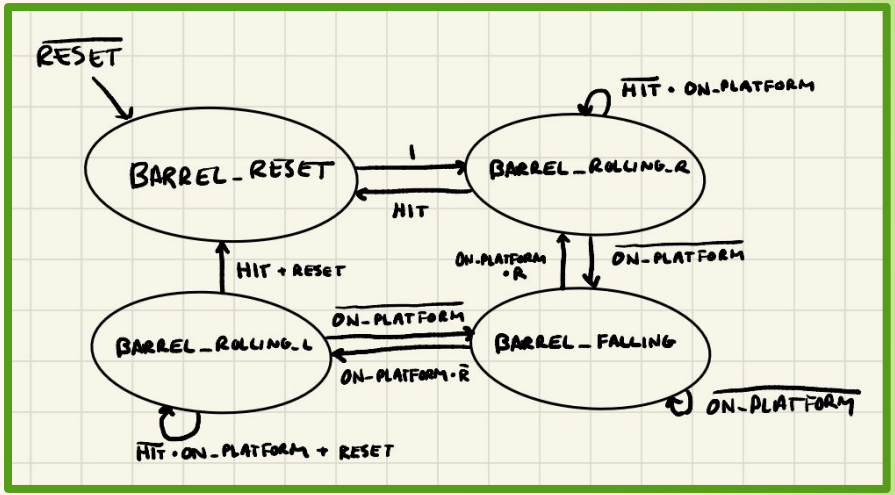
Reset - Resets if Mario is hit by barrel or has successfully finished the level

State Machine Explanation

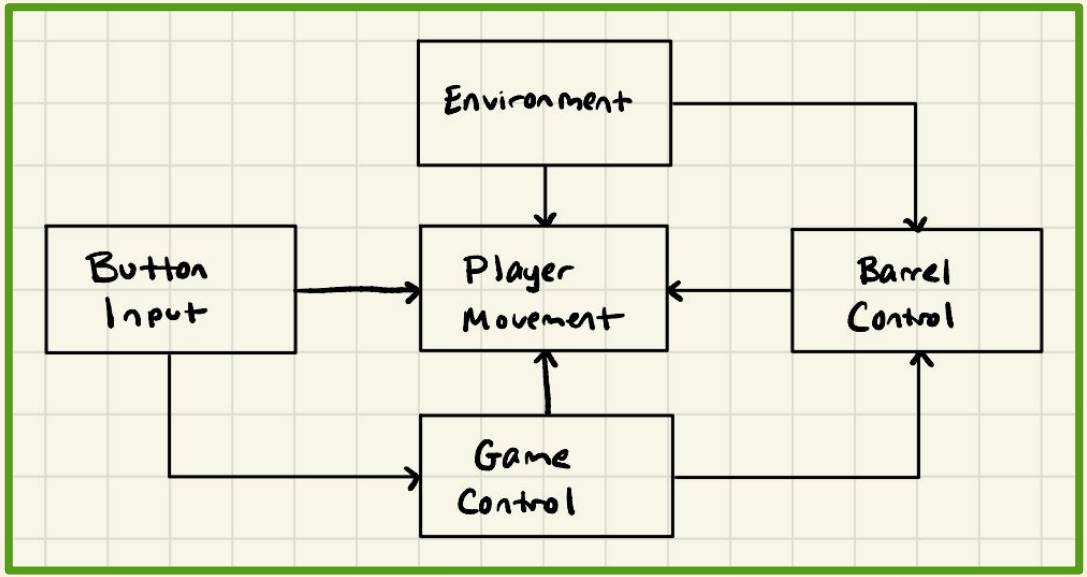


Pause/Unpause & Barrel State Machine





Block-Level Description of Implementation



Conclusion & Future Work

- Aimed to recreate the Donkey Kong game
- Made some changes due to obstacles
- In the original game, Mario jumps over barrels to avoid restarting the level
    - Required us to implement jumping physics logic to our code
    - Instead, in our game, Mario avoids the barrel by climbing up and down the ladder
    - No jumping involved
- This jumping physics logic could be an improvement future students could add to our project
- Also faced the challenge of bounds
    - Mario would get stuck when it hit a bound and surpassed the value
    - To fix this issue, we would reset the value every time it went over the xpos on our screen
- Given more time, we would have liked to add more levels and increase number of barrels
    - Proud of our outcome and learned more about working with VGA and FPGA boards