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Project Checklist

Commitment:
The following are the minimum commitment goals for our 6.111 Final Project.

1. **Working game with button inputs:** We want to emulate the game's elementary behaviors. Mario can 'move' to the right/up based on button inputs and interactions with other sprites such as a Goomba, pipes, bricks, a hole, and a flagpole at the end of the level. Mario's movement can be constrained by pipes/bricks/flag and will 'die' when he falls into a hole or touches a Goomba or runs out of time.
2. **Game finishes:** The game ends either when you reach the flag at the end of the level, or Mario runs out of lives/time.
3. **Side-scrolling:** As Mario traverses the level, sprites appear and the background moves to the left, making it appear as though Mario is moving to the right.

Baseline Goals:
The following is the completed project goal that we hope to deliver.

1. **Working game with IMU controller:** The initial game will be controlled using the button inputs on the FPGA. We hope to implement an IMU controller where tilting in the x-axis determines if Mario moves left or right and tilting in the y-axis determines if he jumps. This provides an intuitive way for the user to move Mario.
2. **Two-directional movement:** Initially, we will make Mario move only to the right and have the screen scroll with him. However, since the original Super Mario Bros lets Mario move backwards towards the left edge of the screen, we will incorporate logic such that when Mario moves to the right the screen moves with him and he stays at the halfway point; however, when he moves to the left the screen stops and Mario himself moves until he reaches the left edge of the camera range.
3. **Add a Star Coin:** We will add a star coin that Mario can collect for extra points
4. **SD Card Audio:** We will incorporate nostalgic audio stored on an SD card

Stretch Goals:
The following are some of the stretch goals that we have considered to extend the functionality of our project. We hope to complete 1-2 of the following in our implementation and all of them if time permits.

1. **IMU Speed:** In our baseline goal, we will be implementing a player controlling by making use of the accelerometer and gyroscope on the IMU sensor. Initially, we hope to have a binary output determining whether a player is moving right or left at a constant speed. Our stretch goal would be to implement a variable velocity that depends on the angle at which the IMU controller is at.

2. **Player Avatars:** Another stretch goal would be to implement a functionality that allows for character sprites, such as Mario or the Goomba, to be replaced by saved images. For example, instead of Mario completing our level, an image of someone's face could play the game instead.
3. **Two-Player Mode:** Our baseline goal is to implement a single-player version of our game. As a stretch goal, we would want to implement a two-player version. We are thinking that the Two-Player game mode will be competitive, rather than collaborative. The first player to complete a goal will win the game.
4. **Wireless IMU Controller**: Our final stretch goal would be to implement a wireless version of our IMU controller that would likely operate using bluetooth.