Title: Mario Bros Classic in Real Life

Team Members:
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Project Description:
For our final project, we will recreate the side-scrolling Mario Bros Classic game for Nintendo with several added functionalities. One of the major challenges we expect will be storing and loading the graphics of the level as Mario moves.

We will program this project on the Nexys4-DDR FPGA using the XVGA display to host the game graphics. We will also make use of some of the internal/external memory to load the map and sprites onto the display. The initial goal of the project is to create a level where Mario can jump over and stomp Goombas to complete the level.

We are also thinking about possible add-ons for our game. Instead of using buttons to move Mario around the screen, the player will make Mario perform actions by performing them in real life with an IMU controller with at least two IMU sensors. For instance, to make Mario jump, the controller should be accelerated upward. To make Mario move in a direction, the IMU controller can be tilted in either direction.

Possible add-ons are:
1. IMU controller
2. Add nostalgic music and sound effects
3. Ground pounding/going into pipes
4. Including a green screen avatar of the player in the game so they can play as themselves instead of as Mario.
5. Two player mode

Project Stages:
1. Mario a la Google dinosaur game (i.e., Mario figure just stays in one place and jumps as Goombas come towards him, FPGA controlled)
2. Mario can now move on the screen through a side-scrolling level with placeholder sprites
3. Making it look more like Mario Bros Classic: i.e., coming up with a plan for moving up and down, more advanced level graphics/sprites
4. Music and sound effects
5. Mario controlled by IMU
6. Adding in the green-screen player avatar; i.e., the player's body on a green screen replaces the Mario avatar

Modules:
1. Graphics module to display game platforms, Mario, square and Goombas.
   a. Sprite generation modules (Izzy)
   b. Side-scrolling and memory loading module (Jose)
      i. Level Generation
      ii. Camera perspective / Mario centered
2. Game Mechanics top_level (Nancy)
   a. Collision Detection (wall, ground, holes)
   b. Movement for Mario and Goombas
      i. Mario Jumping
      ii. Ground Stomp?
   c. Stomping Goombas
   d. Ending Game
   e. Keeping Score / Time (hex display)
3. IMU module (Izzy)