Checklist

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Commitments

For our MVP, we aim to make the 3D renderer and the game logic (only navigates throughout the world).
Module structures are listed below:

1. 3D Renderer
   (a) Data Processing Module
      i. Takes in game logic input, loop through all the cubes that needs to be rendered, feed data to Matrix module
   (b) Matrix Module
      i. Generate triangles from 3D cube position and transfer to 2D screen coordinates along with depth information, color etc
      ii. Division look-up table
   (c) Rasterization module
      i. Generate triangles from vertices on screen.
      ii. Generate start and end signals.
   (d) Z-Buffering
      i. Calculate the Barycentric.
      ii. From Barycentric, calculate the depth.
2. Game Logic:
   (a) Simple movement around 3D world.
   (b) Viewport change, rotation

Goals

Beyond our MVP, we aim to refine game logic and and incorporate controllers to send input to the game logic.

1. 3D Renderer

   (a) Parallelize modules

2. Game Logic
   (a) Create interface from FPGA buttons to the game logic inputs.
   (b) Write into BRAM at when player manipulates a block.
   (c) Block Selection.
   (d) Collision detection.
   (e) Block mining and building.

3. Controller Module
   (a) Sending and reading interactive inputs from gyro and accelerometer.
   (b) Basic filtering to process the data into control parameters the game logic needs

Stretch Goals

We want to refine and extend each part as below:

1. 3D Renderer
   (a) Create basic shading

2. Game Logic
   (a) Add selection cursor on screen
   (b) Add user inventory
   (c) Add simple UI like current block holding

Apart from these, we would like to optimize the design by pipelining:

1. Pipeline individual modules, as opposed to between modules to make the project run faster.