Interactive Minecraft

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1 Abstract

Minecraft : https://en.wikipedia.org/wiki/Minecraft

For our project we will implement a simplified but interactive version of Minecraft on a FPGA. We aim to build the game in a 3D world, where the player navigates interactively by using controllers like accelerometers and gyros. The player's controls consists of sensors in both the hands and legs. Leg sensors act as a position controller, while hand sensors control the player's mining tools.

The project will be separated into three main parts: the 3D renderer, internal game logic, and player controllers. We list our thoughts on each parts below:

3D Renderer

The 3D renderer will take care of displaying vertices on a external display through the VGA, which mainly includes calculating the 3D positions and transformations to the 2D screen. Dynamic lighting will be excluded from the 3D renderer due to the scope of the project. The render accepts information about n cubes, and viewport info and outputs VGA.

Internal Game Logic

Internal game logic will keep track of the state of the player (ie: position, actions, velocity vector, inventory, etc), the state of other objects (ie position, being hit, stationary, type, or disappeared), player collisions, player boundaries, and memory limits (ie number of objects).

Controls

The player needs to do basic controls like walking around, jumping, rotating their viewport, collecting, destroying and dropping objects, as well as more advanced controls like using tools including axes, sword, arrows etc.(hopefully) In order to do this, we plan to use at least one gyro for direction and one accelerometer for actions, and use Bluetooth for communication if needed. The detailed control will be discussed later.