

Digital Stereoscope

Joshua Monzon

Tony Ng

Hao (Steven) Zhou

Introduction

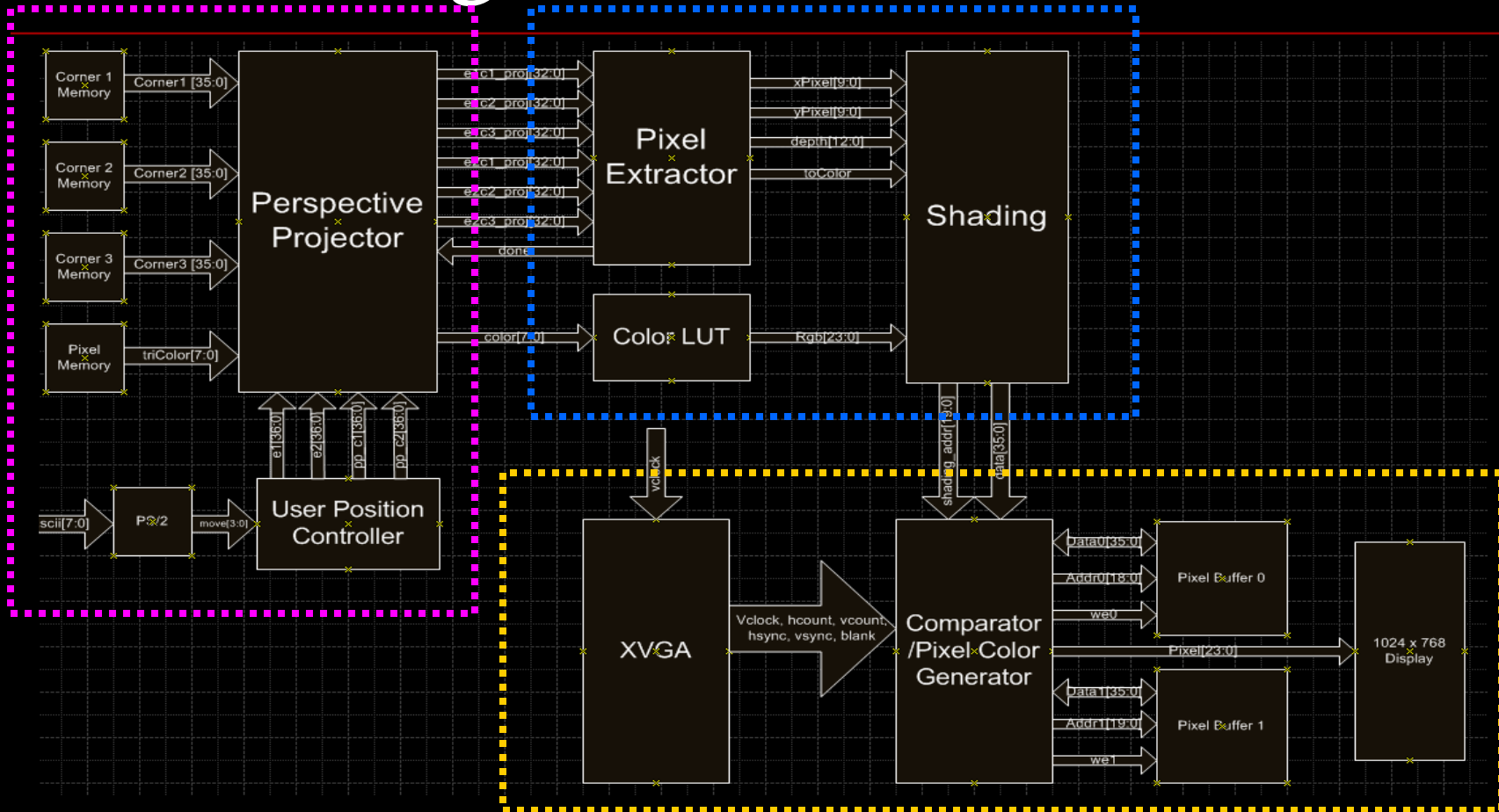
- What is a stereoscope?
- How to implement stereoscope on labkit.
- Example:



Our “World”

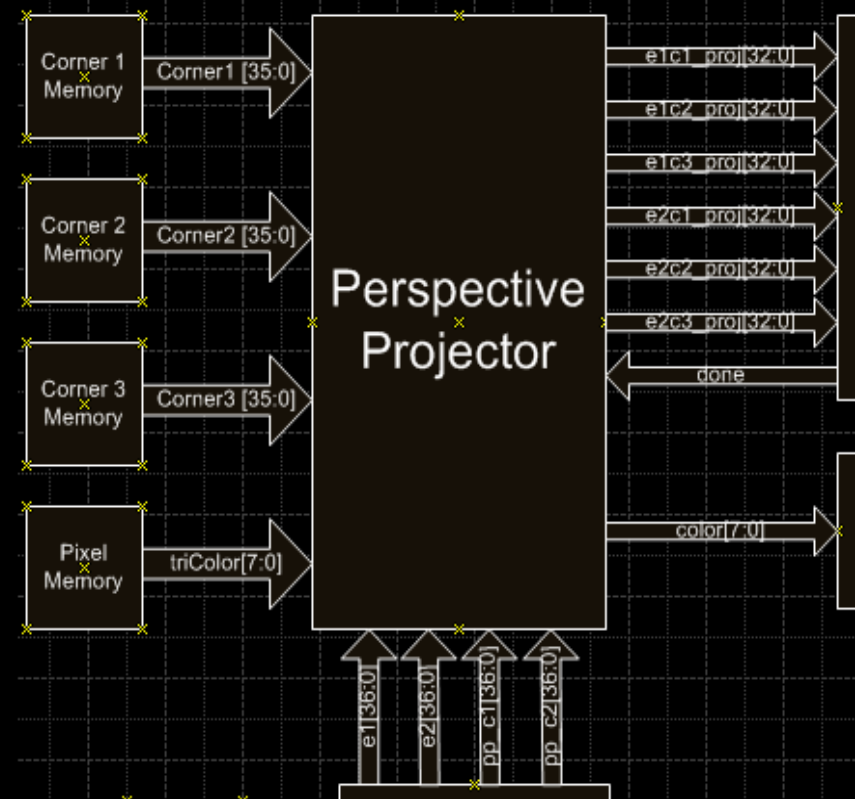
- Our world is square with a dimension of 4096 x 4096 x 4096 pixel units.
- Our Projection plane is a 320 x 320 pixel units square for each eye.
- Will Use 1024 x 768 resolution, and store the left eye projection on the left half of the monitor, and the right eye projection on the right half

Block Diagram



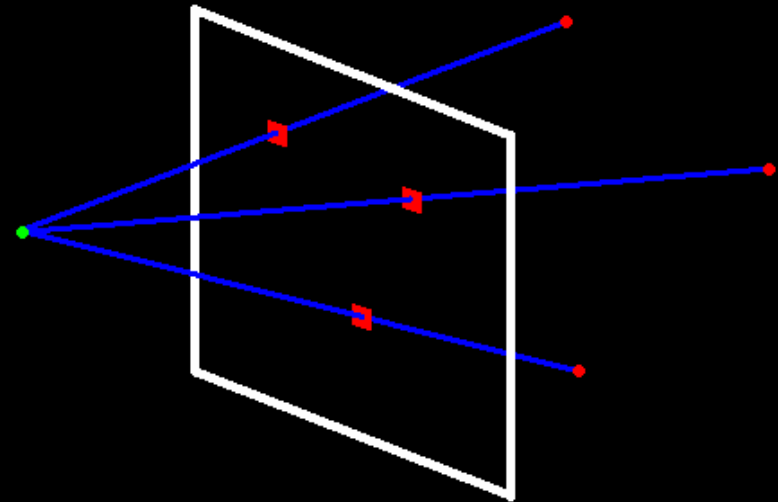
Corner Memory and Perspective Projector

- Corner Memory stores the color and 3D coordinates of triangles.
- Perspective Projector converts triangles in 3D onto a 2D plane.



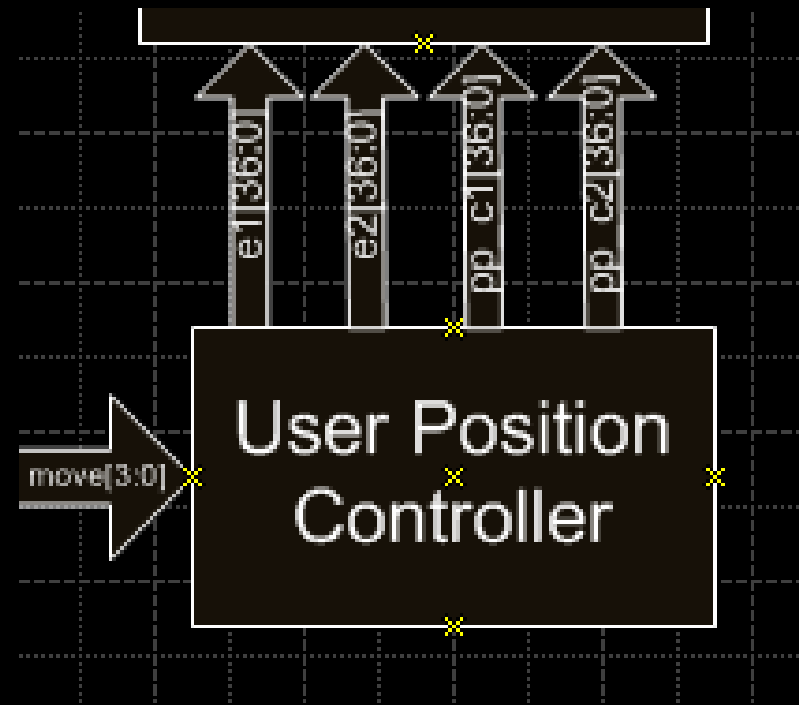
Perspective Projector

- Inputs: 3D coordinates of the eye, coordinates defining the plane, and coordinates of triangle.
- Outputs: Color, Depth, and 2D coordinates associated with each point in triangle.



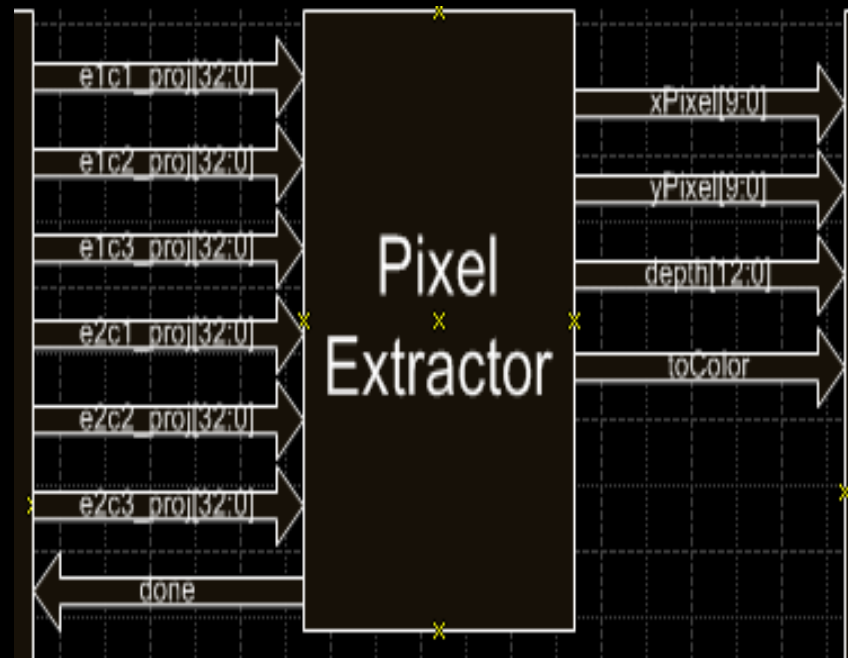
User Position Controller

- Generates location of two eyes and projection plane in front.
- Allows keyboard input to move up, down, left, right, forward, backwards, turn left, and turn right.



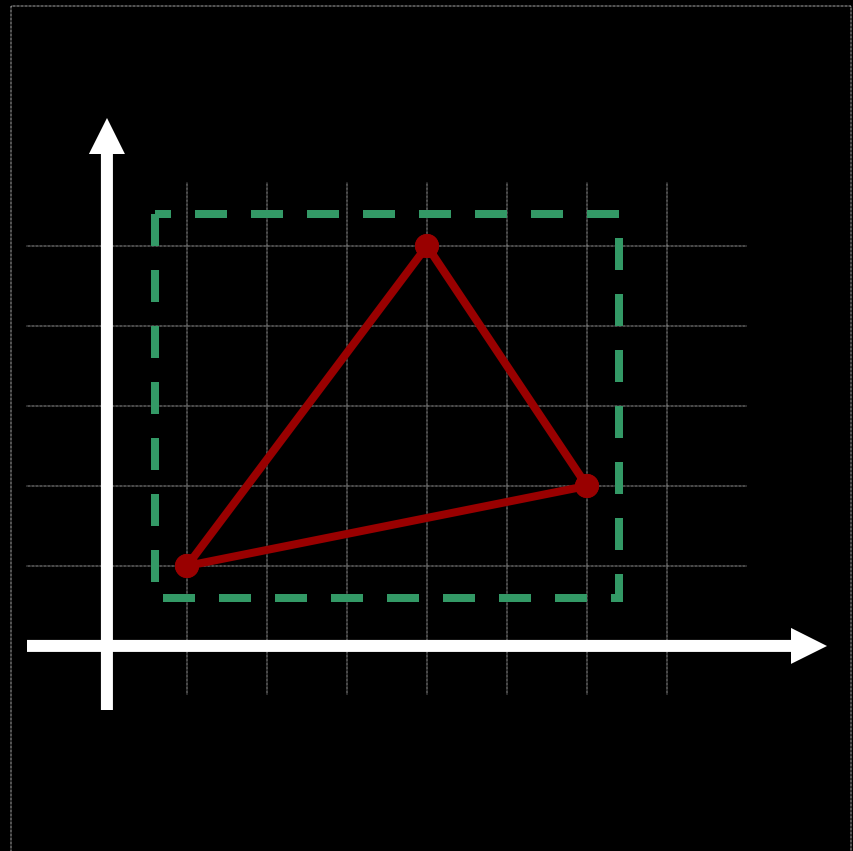
Pixel Extractor

- Input: the pixel coordinates of the three corners of the triangles
- Output: A sequence of pixel locations, their actual depth.



Pixel Extractor (Continued...)

- Action controlled by FSM
- Reset -> Wait -> eye 1 pixel extract -> eye 2 pixel extract.
- Loops through pixels inside green rectangle, and determines if each one is in triangle.



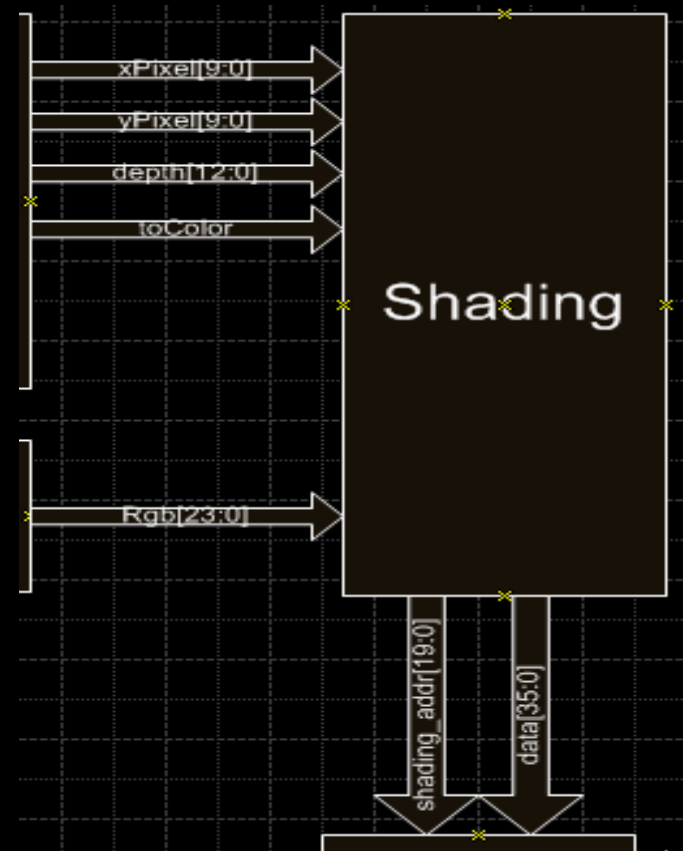
Color LUT

- Input: 8 bit value for Color.
- Output: 24 bit RGB



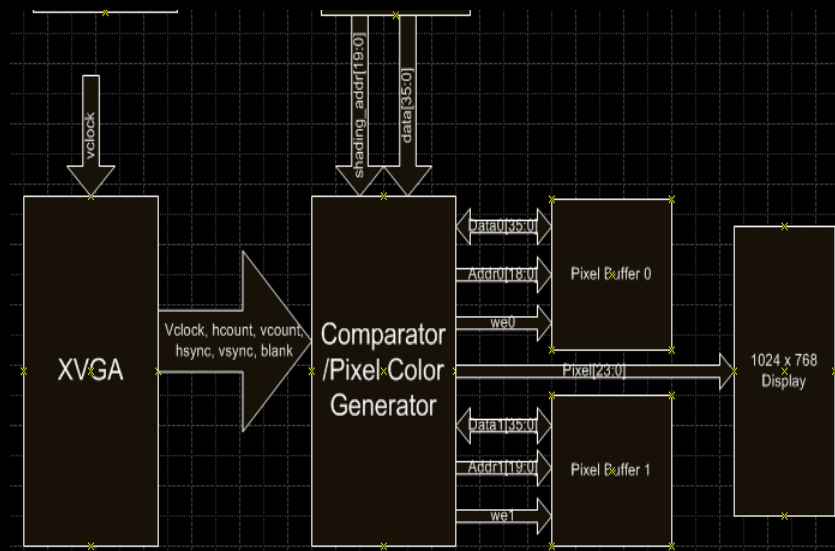
Shading Module

- Input: Pixel location, its depth, and its color.
- Output: Pixel location as a 19 bit address, and 36 bit data, which includes the pixel's 24 bit shaded color, and its 12 bit depth.



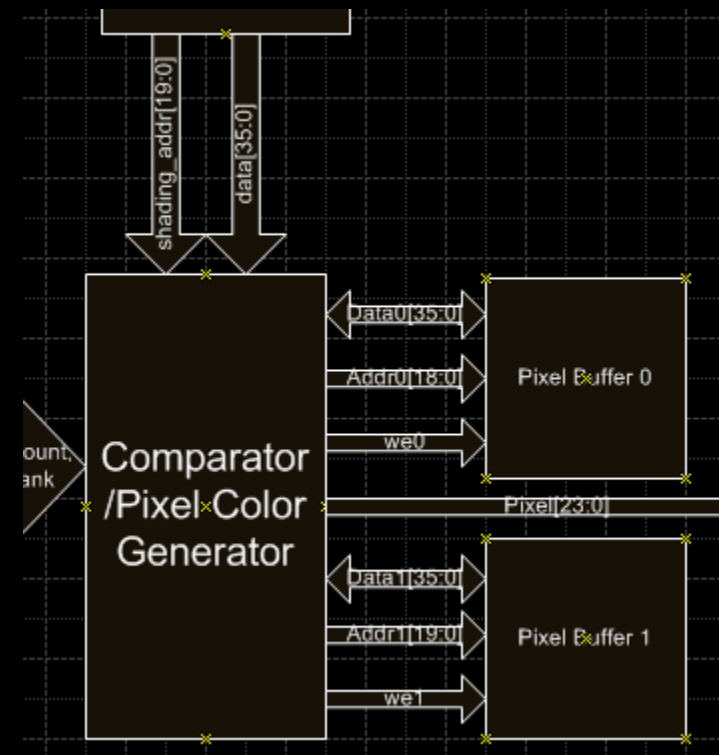
Comparator/Pixel Color Generator

- Interfaces with the Shading Module - gets a 19 bit address and a 36 bit pixel data value
- 2 buffer Memories: one buffer displays pixels to the screen, other stores updated pixels. Once one buffer is finished updating, we then display it to the screen and start updating the other buffer.



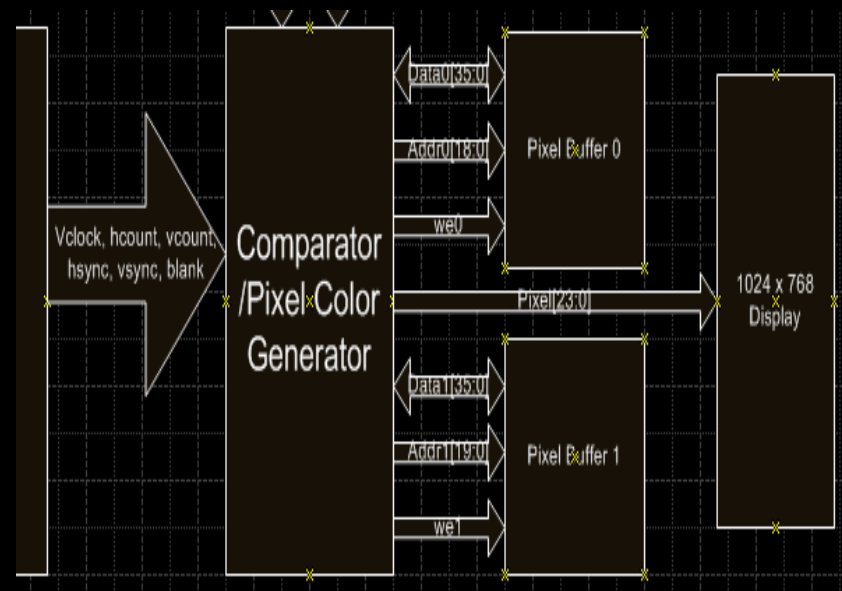
Comparator

- Compares the depths of previously stored pixel values with incoming values from the shading module. The pixel which has smaller depth (therefore closer to the eye) is then stored into the appropriate memory location.



Pixel Color Generator

- Takes in control signals from the XVGA module and accesses the appropriate memory address to display a 24 bit color pixel value corresponding to the x and y coordinate which is being refreshed.
- Controls which buffer is being used to display the pixel values and which one is being used to store updated values
- Switching rate of buffer defined by how fast we can store values in buffer



Questions?

