
Team Light Speed

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FPGA Raycasting

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OVERVIEW

Our team intends to build a playable 3d environment employing techniques used in games such as Wolfenstein 3d. We aim to demonstrate the power of hardware implementation of algorithms in the process.

GOALS (“what”)

1. Understand and recreate raycasting algorithm first in software then in hardware
2. Understand how to design levels that utilize the raycasting algorithm.
3. Convert the raycasting algorithm to a hardware design & create a driver to communicate with the circuit
4. Utilize vga output, implemented in FPGA hardware to display the game.
 - a. Initial goal would be to implement a maze and have the user get from start to finish using a set of keys on the DE1-SOC board
 - b. We would also aim to implement an auto-solver for the maze using BFS/DFS graph algorithms, based on the key that is pressed on the board
5. (Stretch goal) Adapt the open source version of wolfenstein to utilize our hardware specific implementations: <https://github.com/11001011101001011/Wolf4SDL>
- 6.

SPECIFICATIONS (“how”)

We expect that initially, the first steps will be to understand the raycasting algorithm and implement all functionality in software. We will be utilizing the tutorial found here: [Raycasting Tutorial](#).

As lectures and labs progress, we will understand more about optimizations and tricks related to displaying the game in a resource efficient manner. We suspect that doing a straight dump of contents from memory frame buffer will not be fast enough and that optimizations will be required that are not known at this time.

MILESTONES

Milestone 1

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Milestone 2

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