TETRIS

Played in 3D

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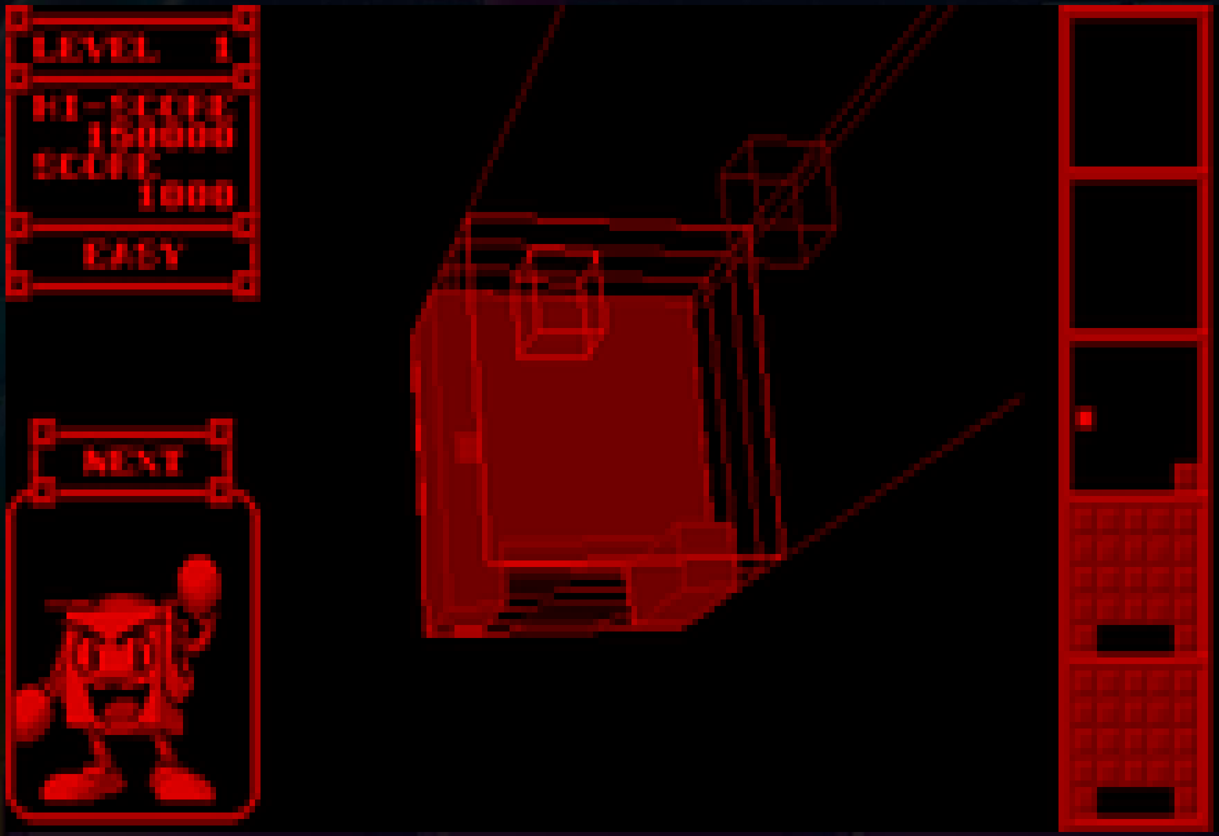
Inspiration

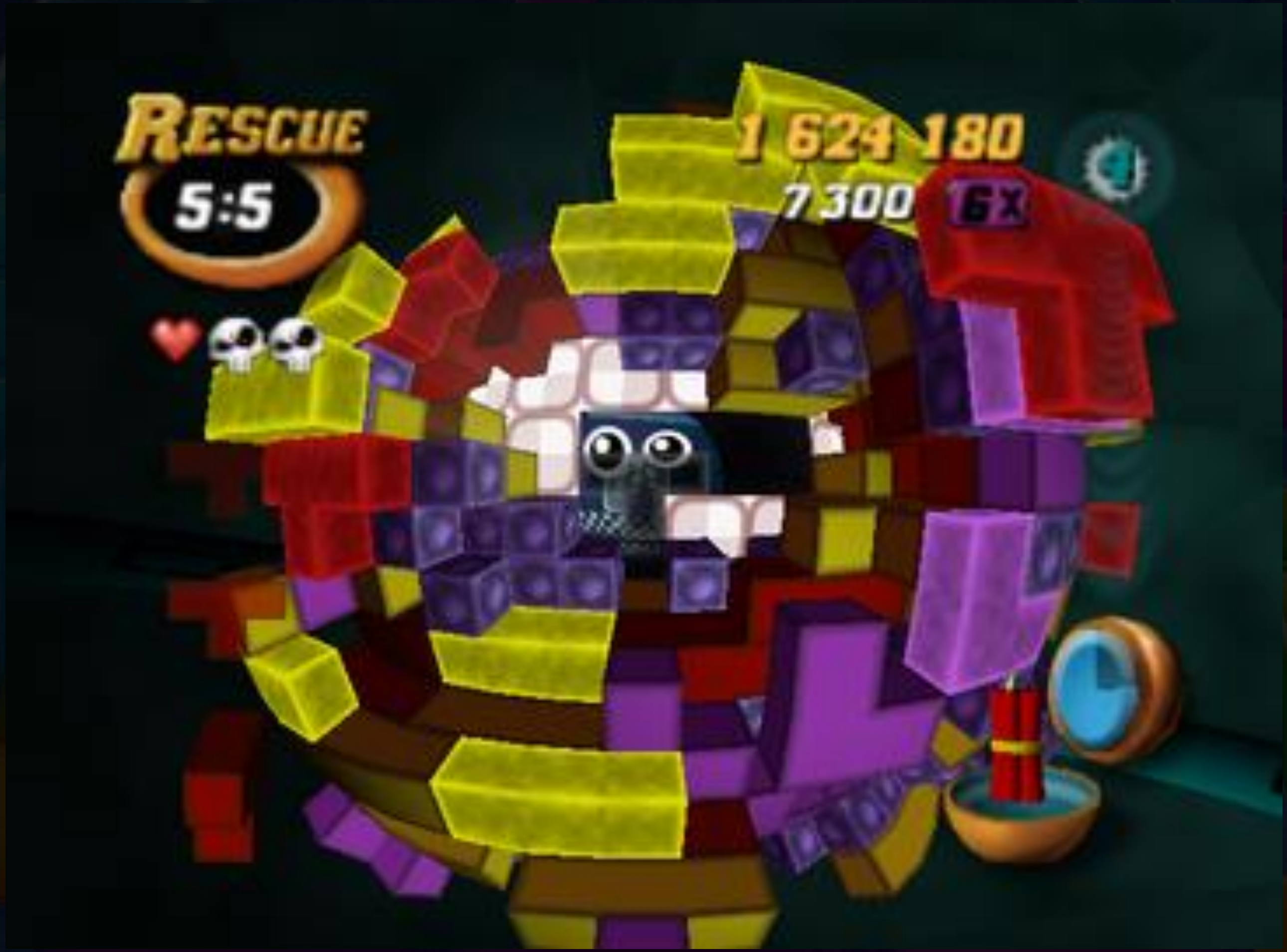


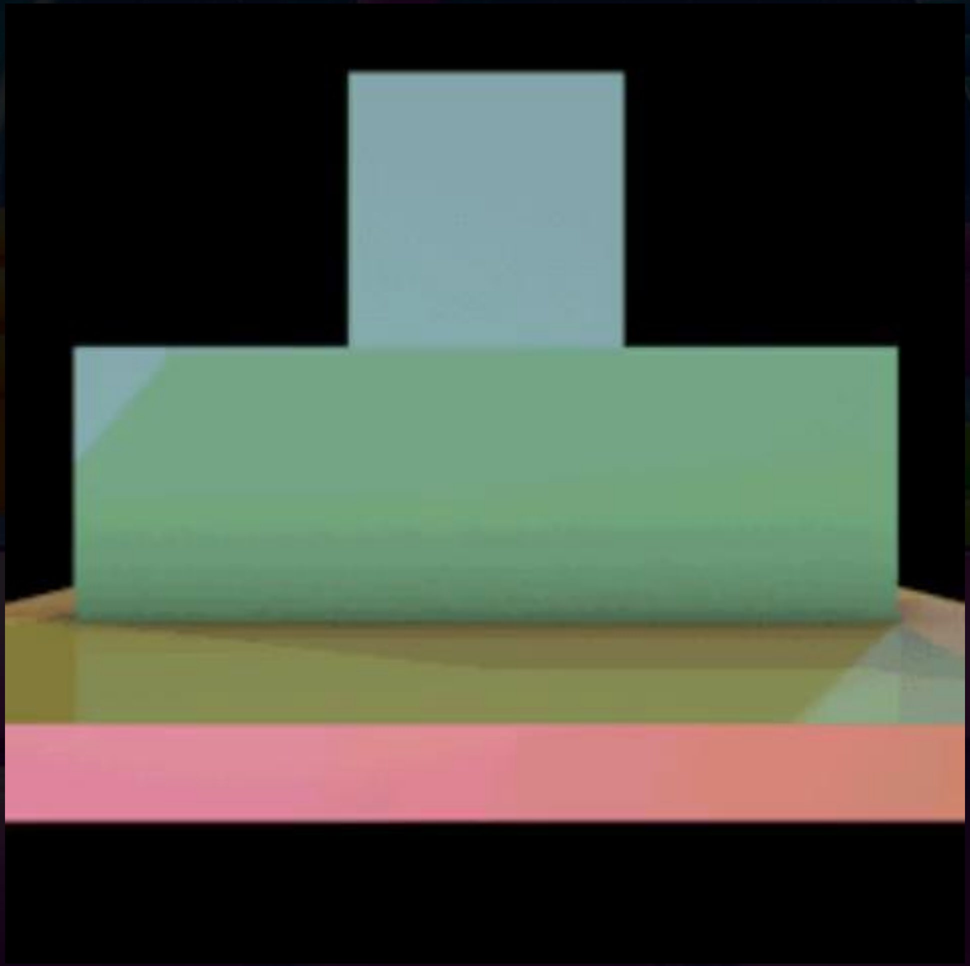
LEVEL 1

HI-SCORE
150000
SCORE
1000

EASY

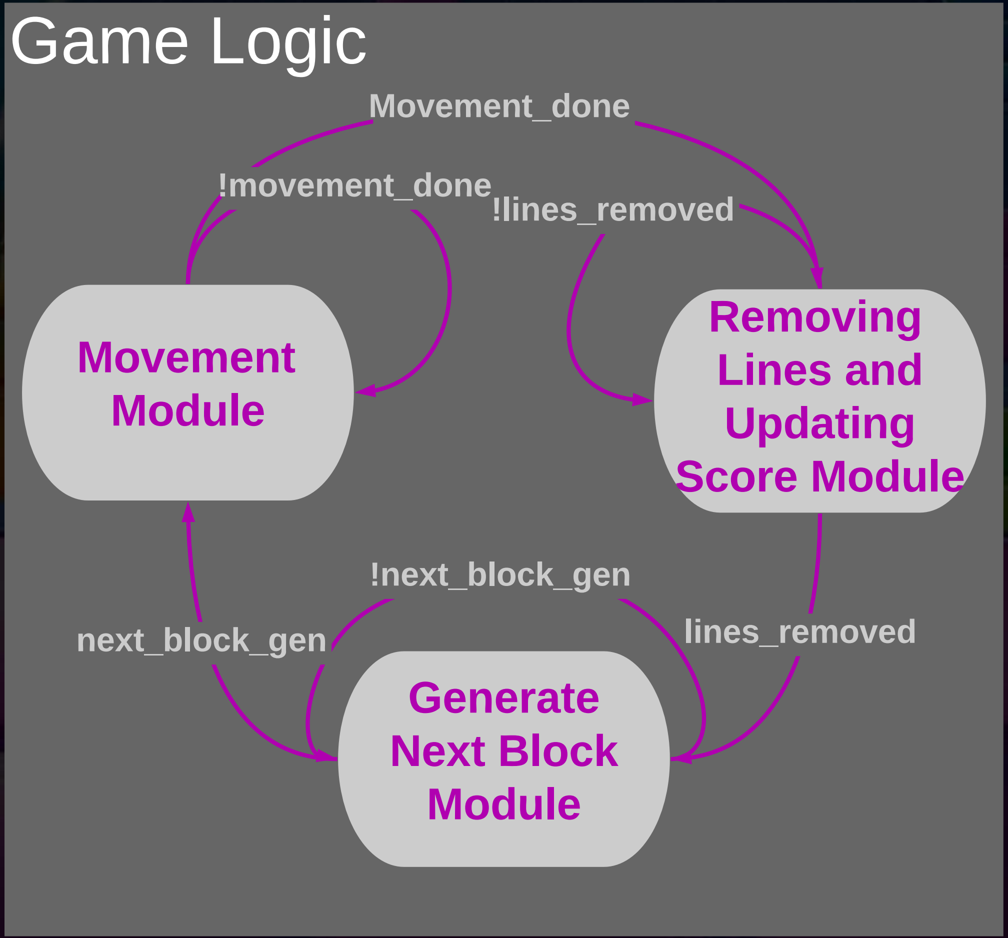
Inspiration





Game Logic

Tetris FSM



Game Logic

Movement_done

!movement_done

!lines_removed

Movement Module

Removing Lines and Updating Score Module

!next_block_gen

next_block_gen

lines_removed

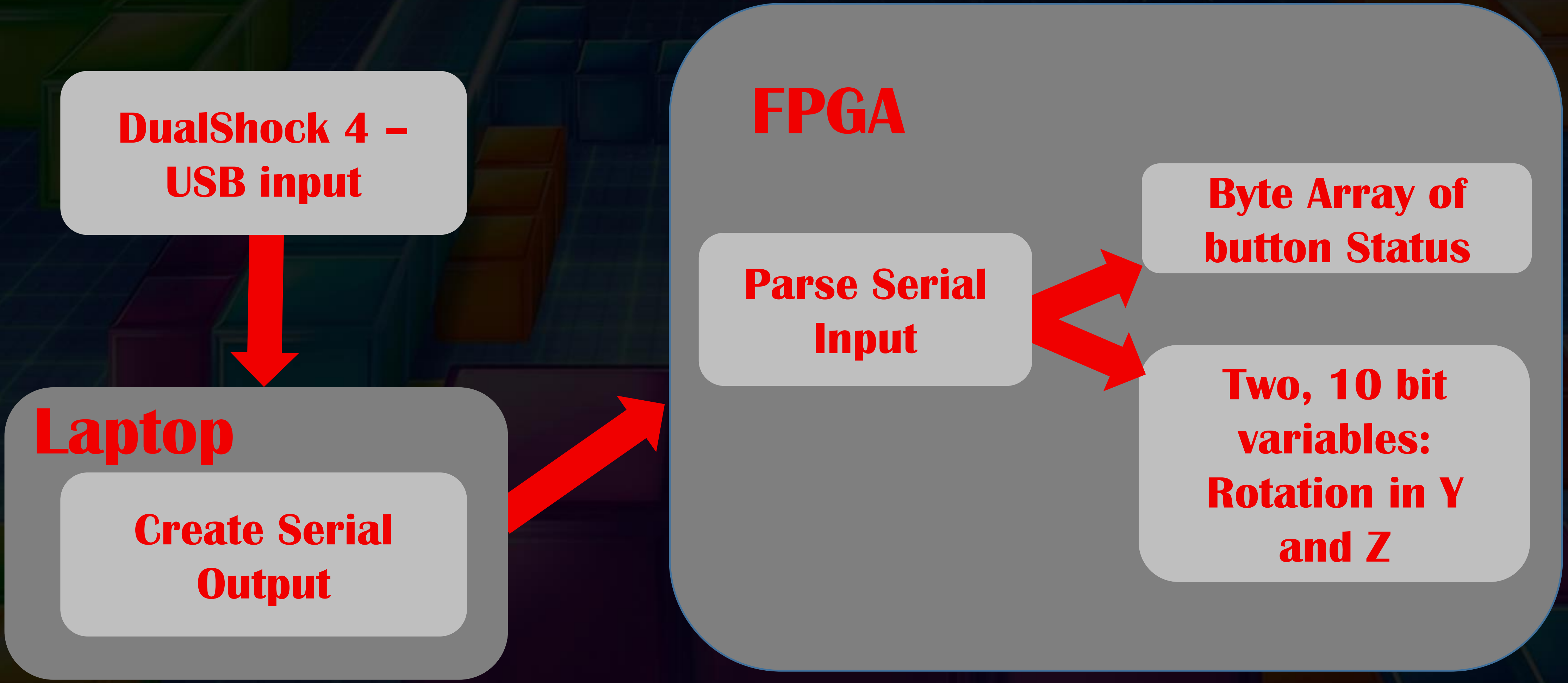
Generate Next Block Module

Controls, Audio, Visual

Game Input

- DualShock 4 - PlayStation controller
- USB Protocol
- updates every 4ms

DS4 Input Module



DualShock 4 – USB input

Laptop

Create Serial Output

FPGA

Parse Serial Input

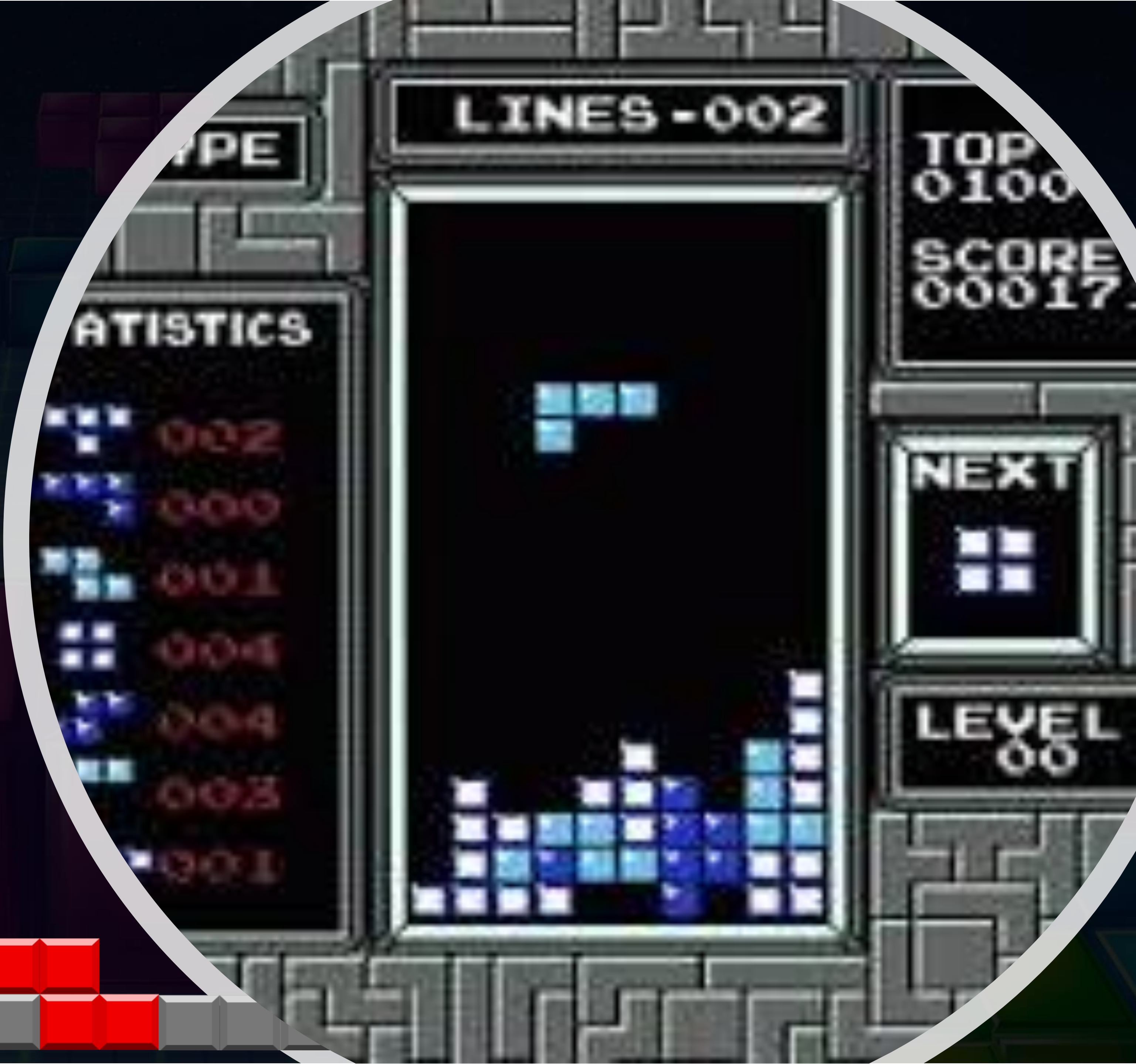
Byte Array of button Status

Two, 10 bit variables: Rotation in Y and Z

Display Output

- Score, Next, Level
- 2D display of the game, for debugging - could be a game mode
- XVGA
- Stretch goal - Create a menu for a better User Experience

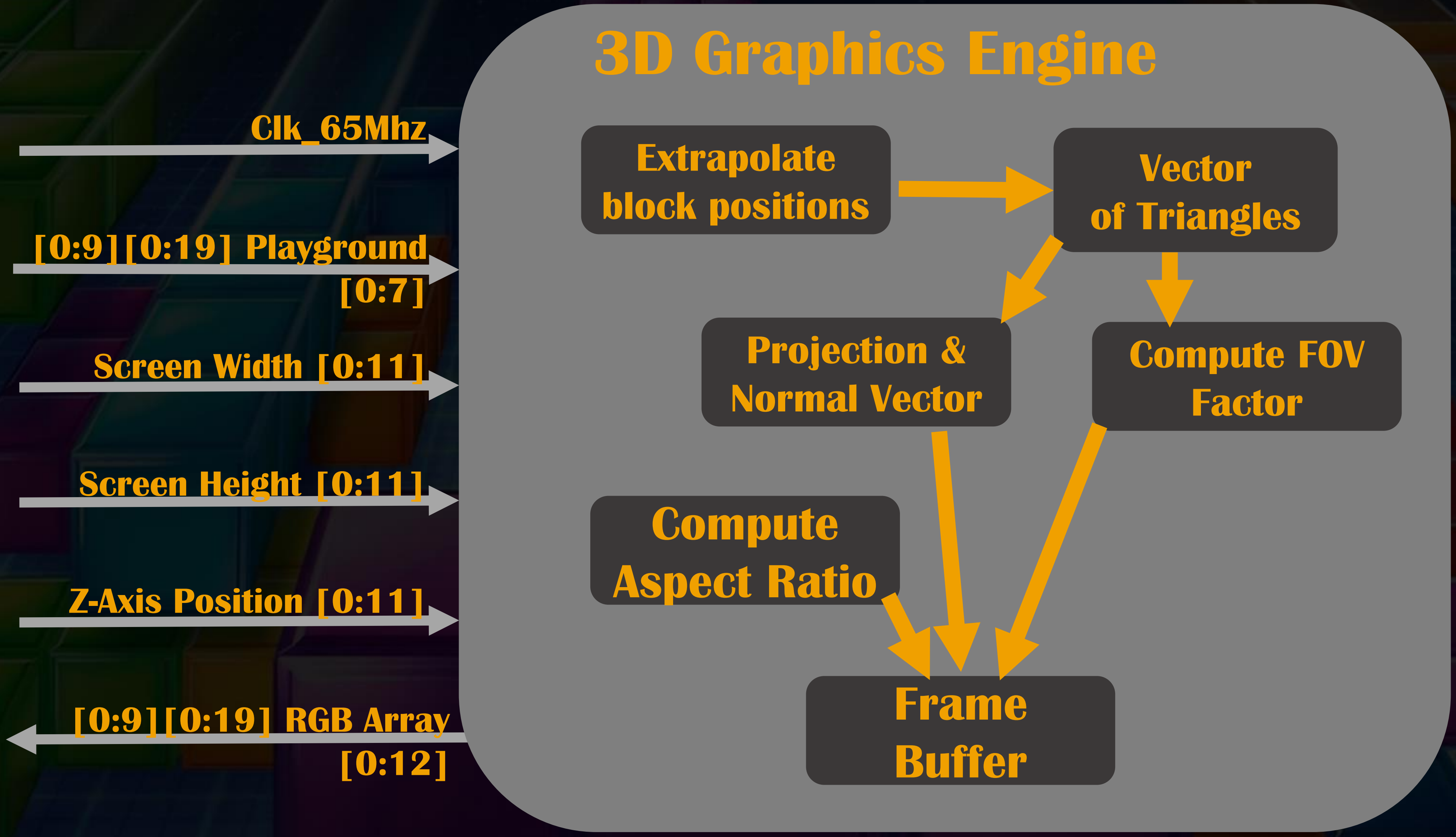
Early Release Teaser



Sound Output

- Store Tetris theme on DRAM
- Play it on a Loop while the game is in session
- Stretch Goal - Adding sound Effects for dropped blocks

3D Engine



3D Graphics Engine

Clk_65Mhz

[0:9][0:19] Playground [0:7]

Screen Width [0:11]

Screen Height [0:11]

Z-Axis Position [0:11]

[0:9][0:19] RGB Array [0:12]

Extrapolate block positions

Vector of Triangles

Projection & Normal Vector

Compute FOV Factor

Compute Aspect Ratio

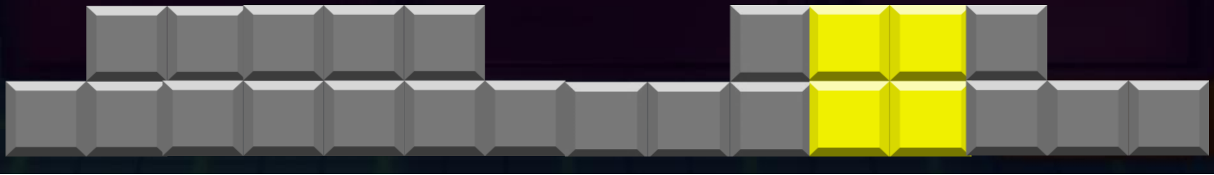
Frame Buffer

Complications

- Timing
- Data Buffers
- Frame Rates

Timeline

- 11/17 - Full 2D Tetris game working and 3D matrix math modules done
- 11/24 - Controller and audio integration, 3D display works
- 11/24 - 11/26 - Debugging 3D Tetris
- 11/27 - Full 3D Tetris game working
- 12/06 - Stretch goals (user interface, sound effects, challenge modes)



Questions

Tetris

Sub Title

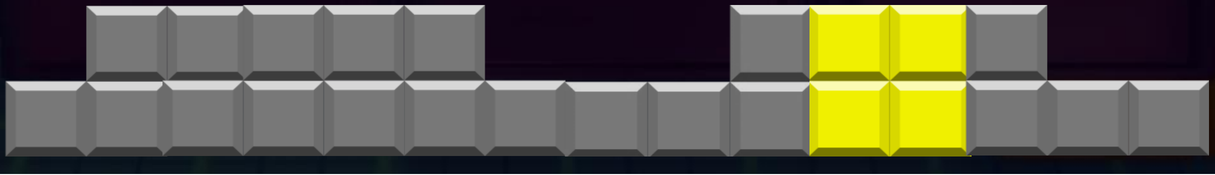
Regular Font

Footer

- Coding going left and right (using tetriminos, not accelerations)
- Drop speed increases (also with tetriminios) when down is pressed on the controller.
- Rotation, Several Possible Solutions
  - Or maybe just have a state machine that contains all rotations and switch between the two
  - Maybe have another list for block type to deal with color later on and with rotation stuff
  - Matrix rotation based on tetromino shape.

Goals

- 11/15 - working 2d game displaying the game board, score, level and next block - integrate with game module
- 11/22 - Controller input is functioning, Adding Sound
- 11/26 - integrate controller and sound with the game,
- 12/06 - Improving display UI (More Retro) integrating stuff and Stretch goals

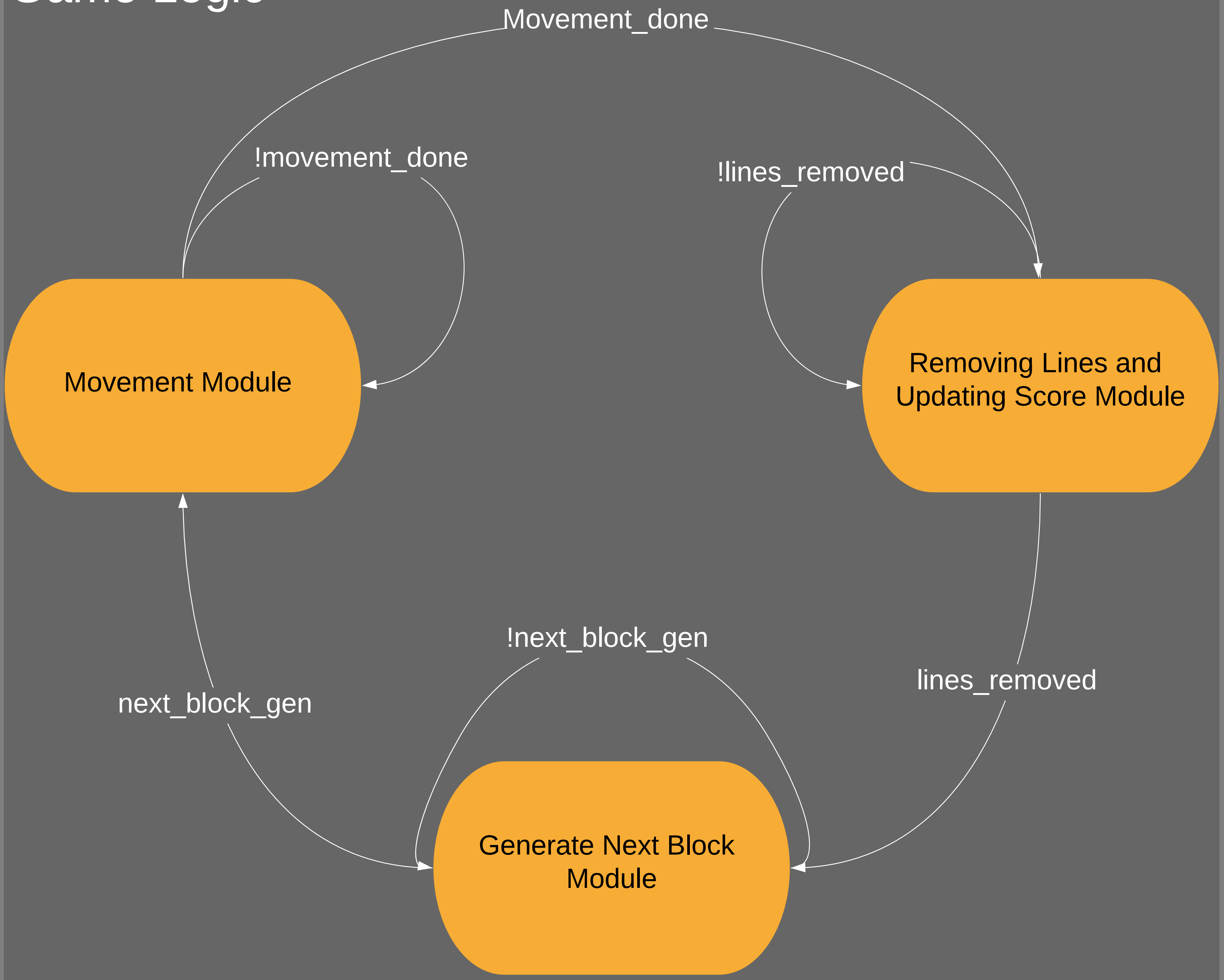


Edge Detection

- Left/Right
  - Check against solid line on right and left
- Bottom
  - Complex due to unknown shape of placed tetrominos
- Top

- Next block generation
    - Rng module
    - Waiting for the sign to drop the next value
    - Send it to charity

Game Logic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next_block_gen
lines_removed
Generate Next Block Module

Parsing USB Input

- USB protocol is very complex and the FPGA
- New plan – Connect controller to my laptop, use ds4drv
- Generate a Serial UART and send to the FPGA
- Process that input