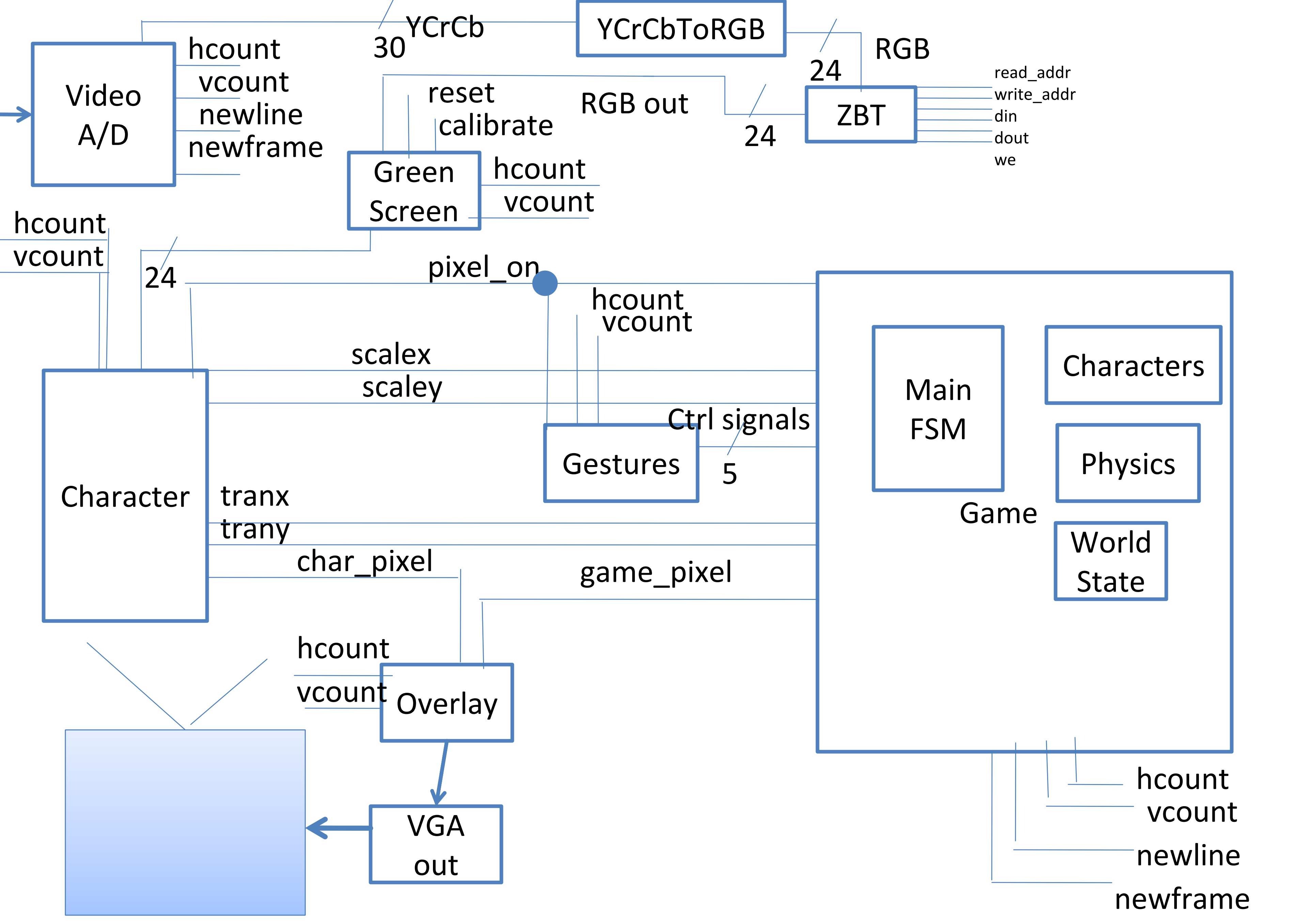
Interactive Adventure Game

Greg Luthman
Akash Shah

Overview

- Inspiration: Super Mario Brothers
- Goal: create a side scroll adventure game that puts the player into the game world.
  - A live action, side scroll adventure game
  - Instead of playing with a controller and seeing a character move on screen, everything is controlled by the player's actions in front of a camera.
  - Use the video of the player to determine the proper commands to send to the game
  - The player will be able to duck objects, jump over objects, move forward or backward in the game world.


Video A/D
hcount
vcount
newline
newframe
30
YCrCb
YCrCbToRGB
24
RGB
ZBT
read_addr
write_addr
din
dout
we
reset
calibrate
RGB out
24
Green Screen
hcount
vcount
hcount
vcount
24
pixel_on
hcount
vcount
scalex
scaley
Gestures
Ctrl signals
5
Character
tranx
trany
char_pixel
game_pixel
Main FSM
Characters
Physics
Game
World State
hcount
vcount
Overlay
VGA out
hcount
vcount
newline
newframe

Video Subsystem Breakdown

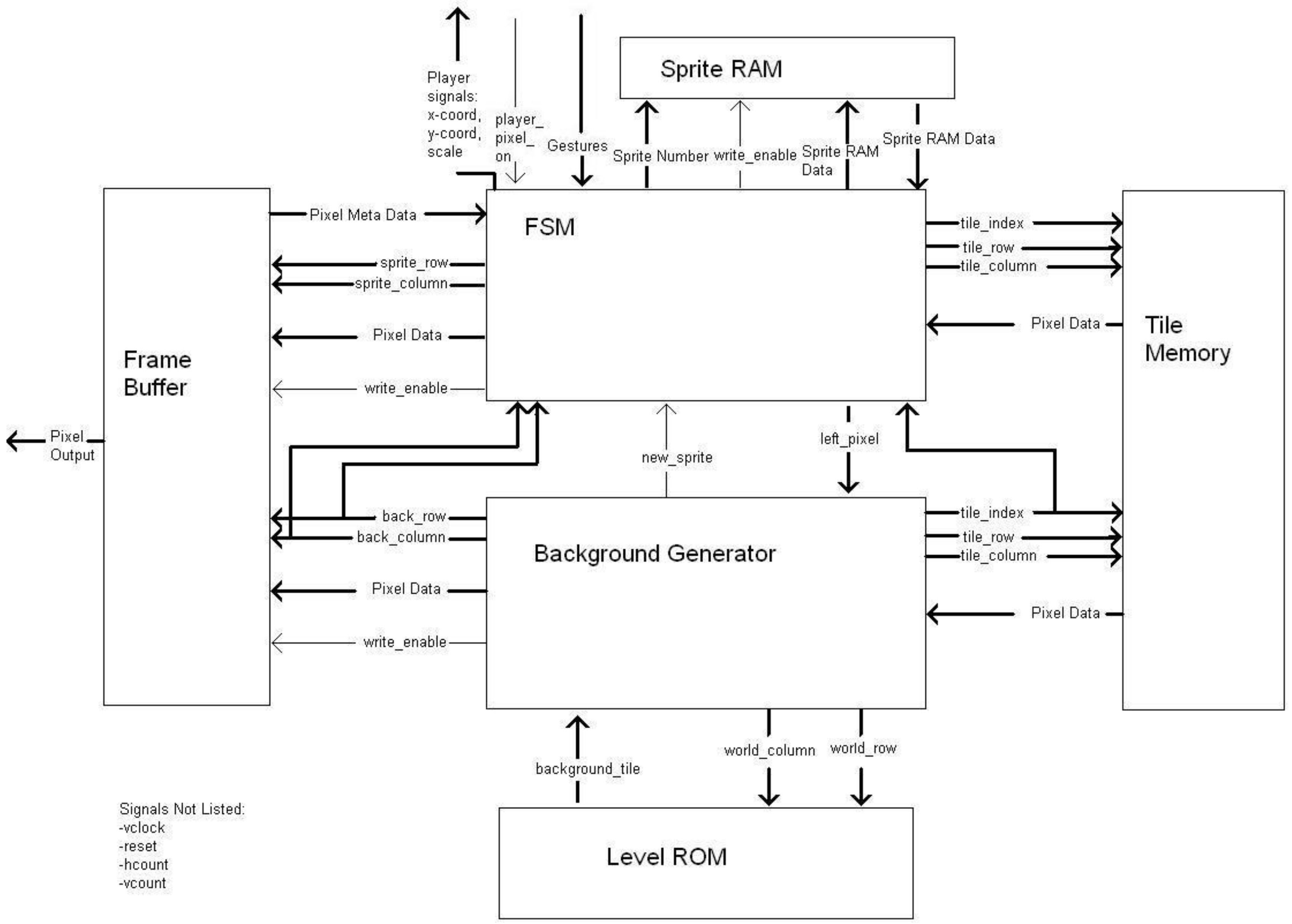
- Video in: Handles the video that is being input from the camera into the labkit.
- Green Screen Module
  - Handles detection of the green screen background
  - Allows for an overlay that replaces the background color with the virtual game world.
  - The module will allow for handling of variations in intensity and color

Video Subsystem Cont’d

- Character Module
  - Utilizes the green screen module
  - Determines the location of the character on the captured image.
- Gesture Recognition
  - Recognizes simple gestures that the player may choose to execute.
  - A group of control signals denote which actions have been made

Video Subsystem Cont'd

- Overlay
  - Overlays incoming filtered video feed with game environment
- VGA Output
  - Outputs the VGA signal to the monitor



Signals Not Listed:
-vclock
-reset
-hcount
-vcount

Game Subsystem

- Frame Buffer
  - 240 x 256 resolution, 9-bit pixel data (fits onto BRAM)
  - Can only write when vcount is off screen to avoid glitchy looking graphics
- Background Generator
  - Updates the frame buffer using data from the level rom and the tile memory
  - Uses “left_pixel” from FSM to determine where the screen is in the game world

Game Subsystem cont'd

- Tile Memory
  - Holds 64 tiles
  - Each tile is 16 x 16
- Level ROM
  - Game world is 15 tiles high by 256 tiles long
  - Given a row and a column, will return which type of tile is in that spot

Game Subsystem cont’d

- Sprite RAM
  - Holds data for 16 different sprites
  - X-coordinate, y-coordinate, and data about the sprite (tile type, sprite state, ect.)
- FSM
  - Updates and draws the sprites into the Frame Buffer after the Background generator
  - Detects collisions between sprites, the player, and the background
  - Does all physics calculations

Timeline

- Last Week
  - Camera Working
  - Chroma Key
  - Frame Buffer 100% finished
  - Background Generator working
- This Week
  - Character Recognition
  - Background Generator 100% finished
  - Level ROM, Tile memory working

Timeline cont’d

- Next Week (before Thanksgiving)
  - Simple Gestures
  - Sprite RAM working
- First Week of December
  - Gestures finished
  - FSM 100% finished
  - Background tiles finished (.coe 50% finished)

Timeline cont'd

- 2nd Week of December
  - Sprite tiles finished (.coe files 100 % finished)
  - Testing integrated system
- Just in Case Weekend
  - Debugging
  - Extras (if time)

Questions?