

- Video In
  - Takes incoming NTSC video feed and converts to be suitable for VGA out
    - Converts YCrCb to RGB
    - Stores in ZBT frame buffer
  - Demonstrated in conjunction with video out
- YCrCbToRGB
  - Converts YCrCb data to RGB data
  - Demonstrated through video output
- Blue Screen Module
  - Allows calibration of keyed color
  - Removes the keyed shade of blue from the image
  - Allows for tolerance in terms of variation in lighting and color
  - Outputs a high signal when a pixel corresponds to a blue background color
  - Demonstrated by keying the module to a solid blue color and observing the change in output
- Character Module
  - Uses video information to properly identify regions that correspond to the user/character
    - Dependent on Blue Screen Module
  - Outputs a high signal as well as the pixel data for a given pixel if the pixel represents the character
  - Allows repositioning of the character within the game environment
  - Demonstrated through the use of the gesture recognition system
- Gestures Module
  - Calculates center of mass of the character
    - Dependent on character module

- Uses center of mass information to determine where the character is in the video feed
  - Uses location information as well as a grid that is set up, dividing the image to determine actions the character is performing. Center of mass within different areas in this grid represent different actions
  - Functionality of control signals demonstrated through use of LEDs and manual testing
- Overlay Module
  - Allows for overlaying of video input with the game world
  - Character information takes priority over game world
  - Demonstrated through the video output
- Video out
  - Outputs VGA signal and displays the image
- Frame Buffer
  - Sends a glitch free output signal to the video out
  - Converts the low resolution game world frame data to the high resolution output data
  - Stores both pixel color and pixel meta data for every pixel on the screen
- Background Generator
  - Working with the Level ROM and the Tile memory, displays a smooth scrolling background
  - Tells information about new sprites
- Level ROM
  - Holds at least one 256 tile long level
  - Extra - Implement extra levels
- Tile Memory
  - Holds information for enough tiles to create an interesting background
  - Holds information for enough tiles to create interesting sprites

- Sprite Memory
  - Holds information for every sprite on the screen
- FSM
  - Calculates all physics calculations
  - Reads out of the Frame Buffer before writing in sprites to determine collisions
  - Monitors the output of the Frame Buffer to determine collisions with the player
  - Determines the movement of the game world and the player based on the gesture signals generated by the player
- Extra
  - Extra levels
  - Sound
  - Extra gestures (ie. Fireballs)