The design is broken into three physical modules:
• video controller
• audio controller
• main controller

The design itself is broken into more parts, some software, some hardware:
• video controller
  • video processor
  • palette/timer/digital output
  • analog conversion
• audio controller
  • 5 independent signal generators
  • a mixer
  • analog conversion
• main controller
  • Boot loader
  • Input processing system
  • System library
• memory interface
• component interface

The design process up to this point has been:
1. Brainstorm ideas
2. Discuss trade offs for each idea
3. Decide on an idea based on trade offs
4. Get feedback from advisor/sponsor
Complete System

Bootloader
- Display Logo?
- Reads header from ROM (determine memory locations of various parts)
- Copy ROM to video SRAM
- Copy ROM to audio SRAM
- Copy ROM to program/data SRAM
- Disable ROM
- Initialize input control system
- Jump to CPU SRAM

System Library Functions
- Simple interface to all video and audio functions
- Trig functions
- Square root
- Logarithm
- e to the x
- Power
- VideoInit
Operations

PutTile(address,i,j)
  Draws a tile to framebuffer
  address is the address in memory of the 8x8 tile
  i is the x offset for the tile in tile space (0 to 30)
  j is the y offset for the tile in tile space (0 to 25)

ShiftTiles(i,j)
  Increments or decrements i or j value of all tiles in tile space.
  If tile goes out of range tile is deleted.
  Fills with blank tiles

TileOffset(x,y)
  sets the pixel start for the tiled background
  x sets the x direction pixel (0-7)
  y sets the y direction pixel (0-7)

RefillTiles()
Redraws all tiles from previous frame to framebuffer

**PutSprite(address,x,y)**
- Draws a 16x16 sprite to the framebuffer dealing with alpha channel
- address is the address in memory of the 16x16 sprite
- x is the pixel coordinate in horizontal space
- y is the pixel coordinate in vertical space

**SetPalette(paletteEntry, color)**
- sets a palette entry to be of a certain color
- paletteEntry is the entry to modify (1-255)
- color is the color to put in that entry

**Swap()**

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**Audio System**

![Audio System Diagram]

- **Square Generator**
- **Square Generator**
- **Triangle Generator**
- **Sawtooth Generator**
- **Noise Generator**
- **Raw Data**
- **DAC**
- **Line-Level Driver**
- **TV**
- **Microcontroller**
- **Decoder/Control**
- **FIFO**

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**Operations**

**SetSound(shape,frequency,volume)**
- Sets a generator settings and starts output
- shape is: square1, square2, triangle, sawtooth, noise
- noise may or may not take frequency input
- frequency sets the frequency in Hz of the signal (20-8000)
- volume sets the amplitude of the signal (0-255)
SetRaw(address,numSamples,volume)
  address is the beginning of the sound sample to play
  numSamples is how long sound is in samples
  volume sets the amplitude of the signal (0-255)
Swap()
  Initiates all changes since last Swap()