

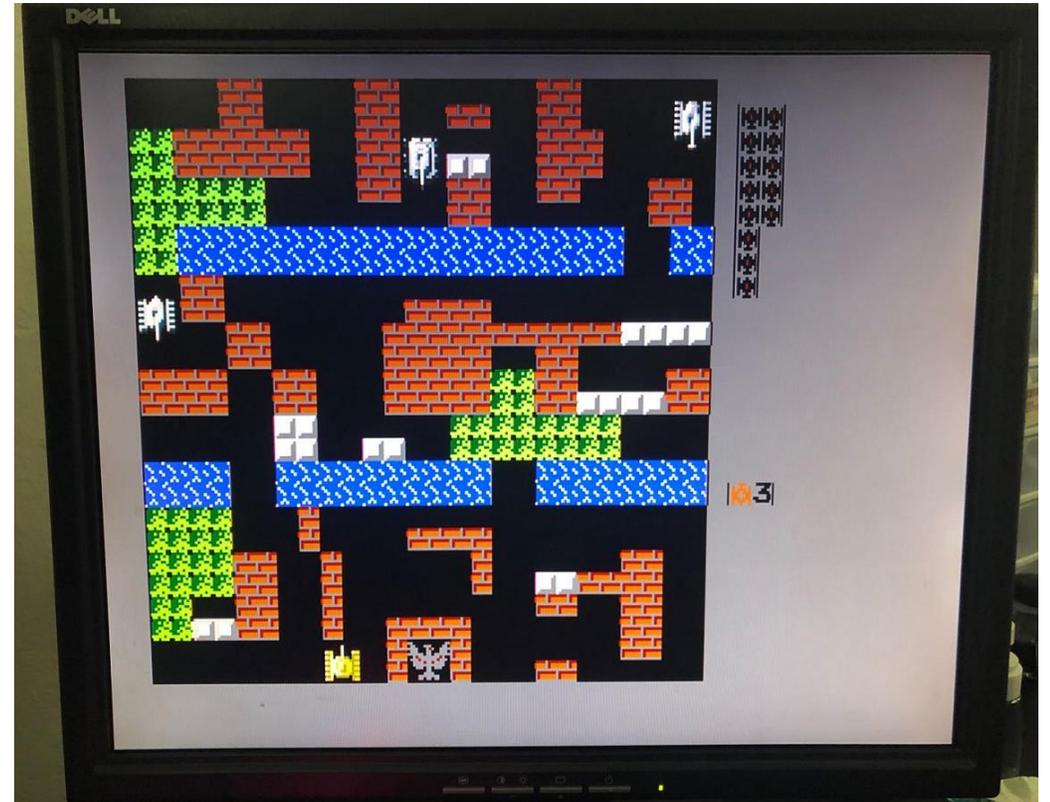
Tank Game

Zixiang Zheng zz2642

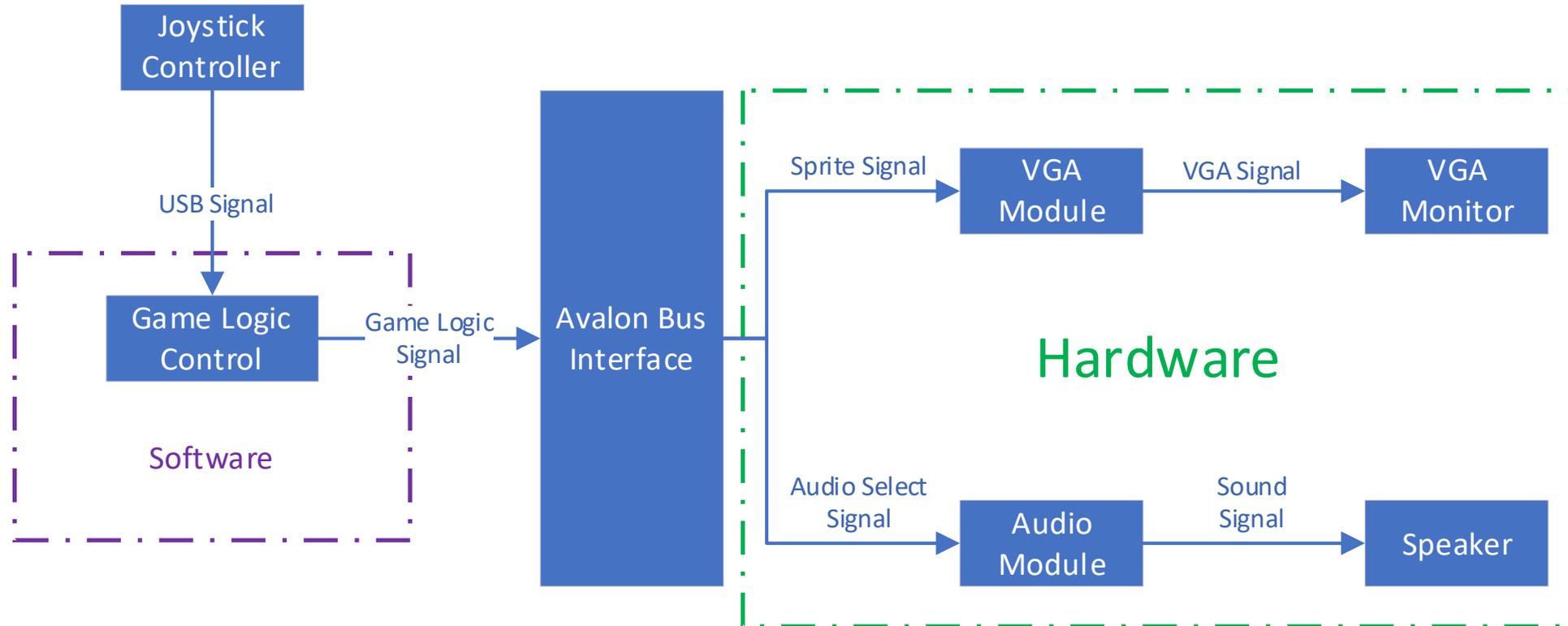
Wenzhe He wh2443

1. Project Overview

- Reimplement 1985 'Battle City' tank game
- Player have 3 life.
- Player need to destroy all enemy tank to win.
- If life are used up or base is attack, game will lose.

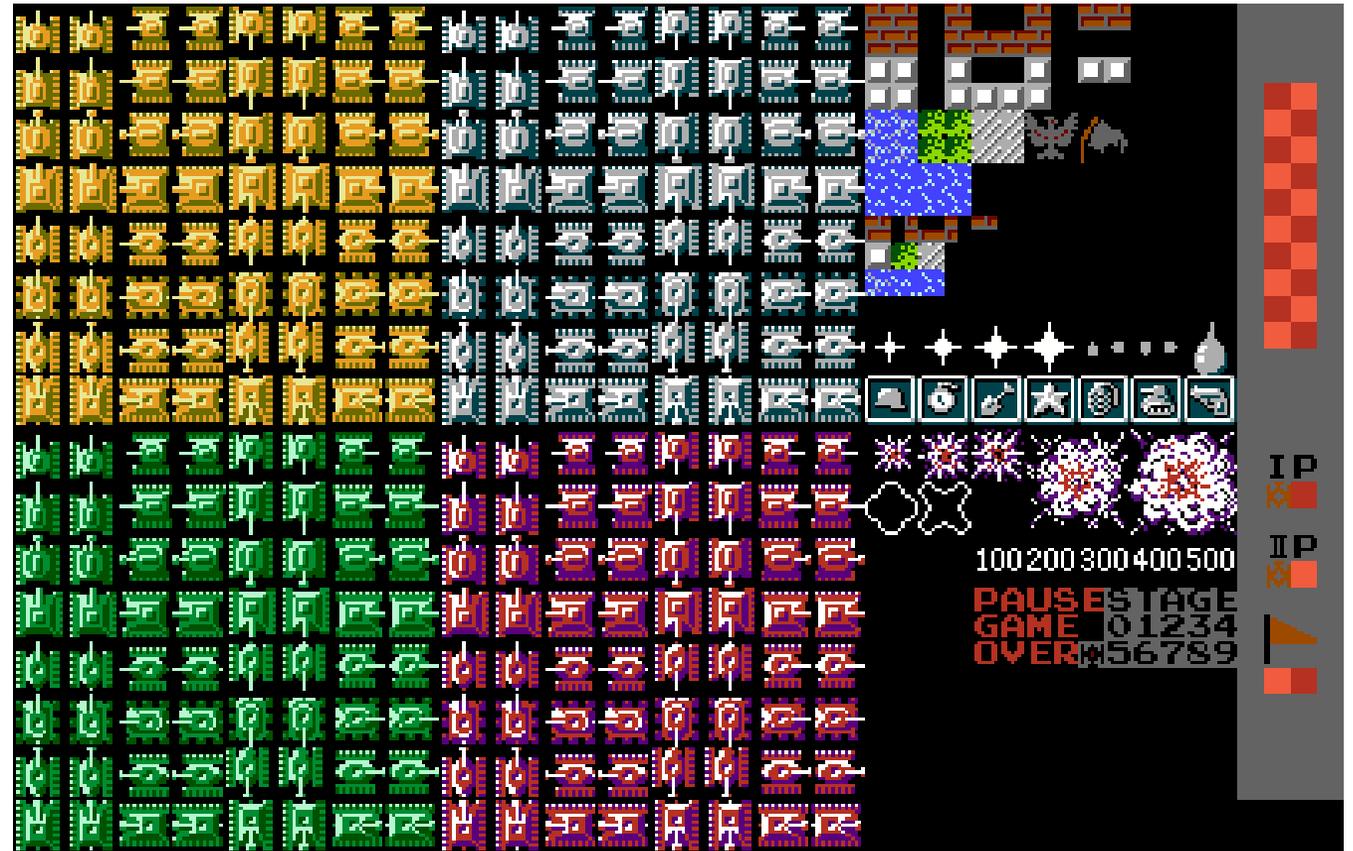
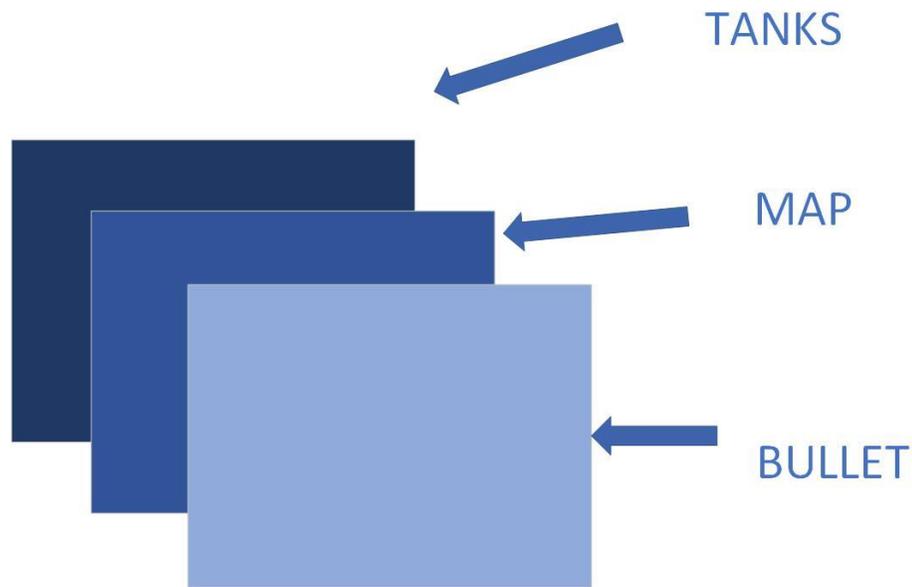


2. System architecture



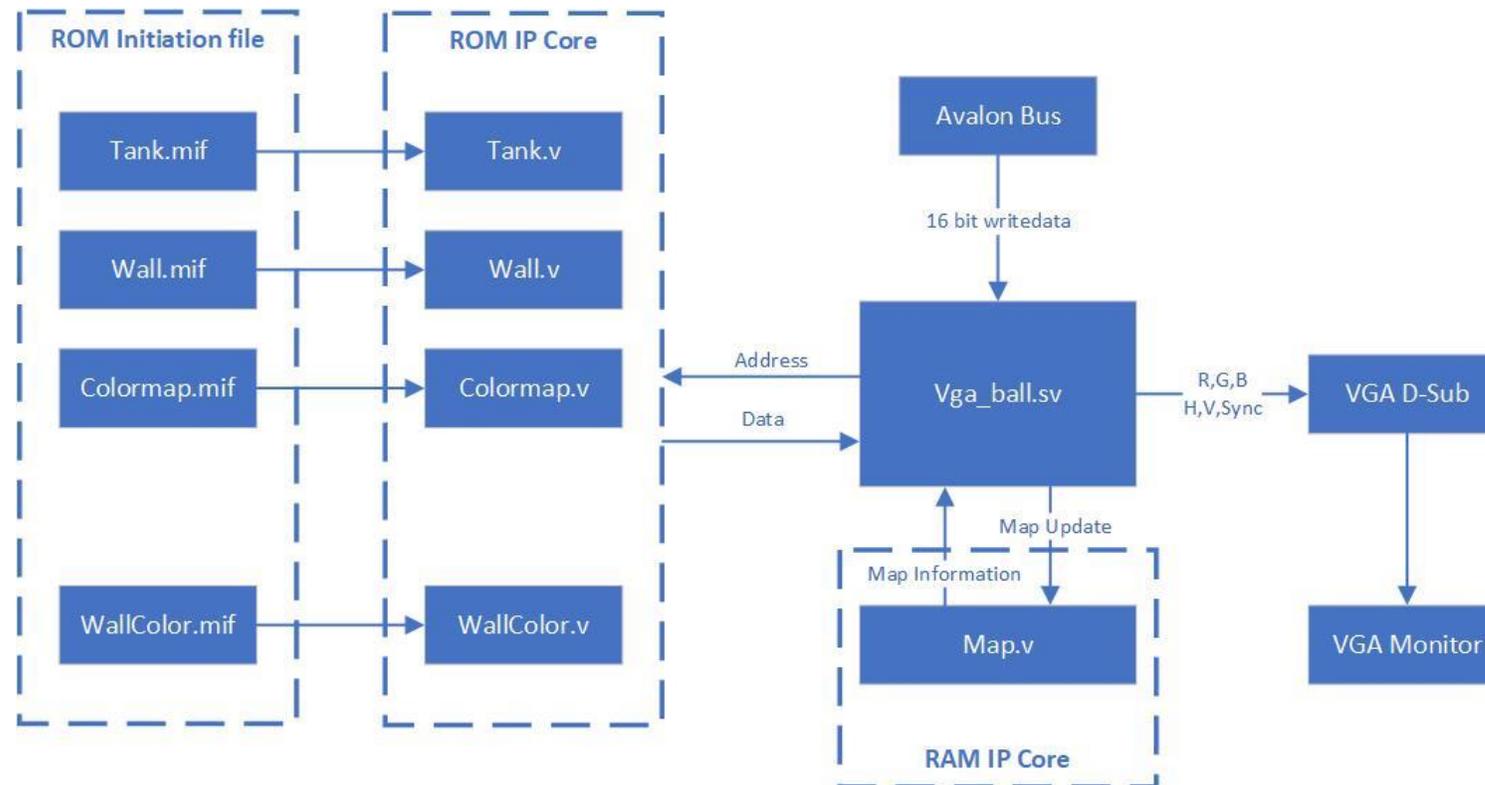
3. Hardware design

- 1. Graphic Design



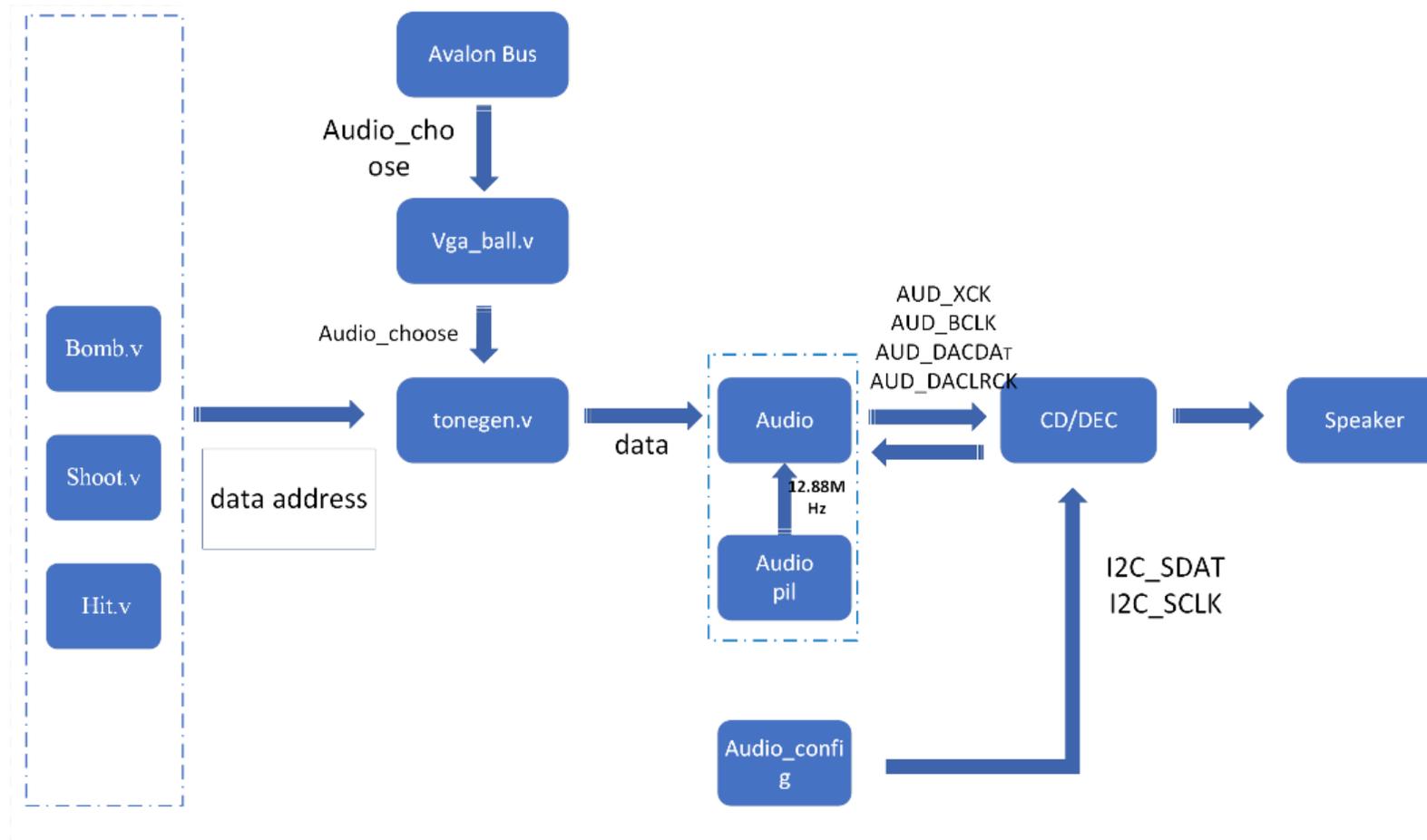
3. Hardware design

- 2. Tile and Sprite Hardware design



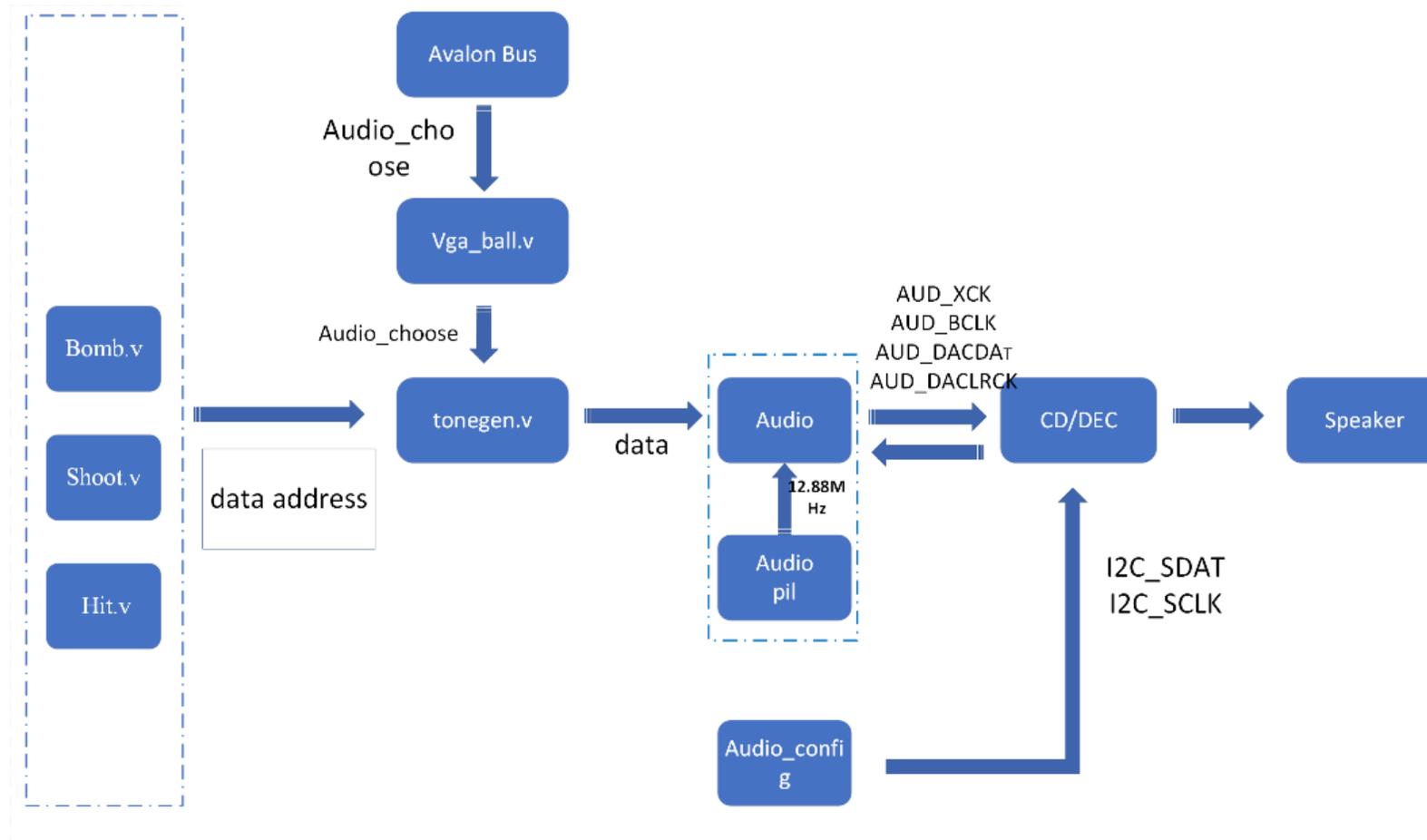
3. Hardware design

- 3. Audio Hardware design



3. Hardware design

- 3. Audio Hardware design



3. Hardware design

- 3. Audio Hardware design

The screenshot displays the Altera Platform Designer (Qsys) interface for a project named 'soc_system.qsys'. The main window shows a 'Connections' diagram on the left and a detailed component table on the right. The table lists various components and their properties, including clock sources, HPS (Hard Processor System) components, audio PLL, and video components.

Use	Connections	Name	Description	Export	Clock	Base	End	IRQ	Tags	Opcode Name	
<input checked="" type="checkbox"/>		clk_0	Clock Source	clk	exported						
<input checked="" type="checkbox"/>		clk_in	Clock Input	clk	Double-click to	clk_0					
<input checked="" type="checkbox"/>		clk_in_reset	Reset Input	reset	Double-click to						
<input checked="" type="checkbox"/>		clk	Clock Output	clk	Double-click to						
<input checked="" type="checkbox"/>		clk_reset	Reset Output	reset	Double-click to						
<input checked="" type="checkbox"/>		hps_0	Arria V/Cyclone V Hard Proce...								
<input checked="" type="checkbox"/>		h2f_user1_clock	Clock Output	hps_0_h2...	Double-click to	hps_0_h2...					
<input checked="" type="checkbox"/>		memory	Conduit	hps_0	Double-click to						
<input checked="" type="checkbox"/>		hps_io	Conduit	hps_0	Double-click to						
<input checked="" type="checkbox"/>		h2f_reset	Reset Output	reset	Double-click to						
<input checked="" type="checkbox"/>		h2f_axi_clock	Clock Input	clk_0	Double-click to	clk_0					
<input checked="" type="checkbox"/>		h2f_axi_master	AXI Master	[h2f_axi...	Double-click to	[h2f_axi...					
<input checked="" type="checkbox"/>		f2h_axi_master	Clock Input	clk_0	Double-click to	clk_0					
<input checked="" type="checkbox"/>		f2h_axi_slave	AXI Slave	[f2h_axi...	Double-click to	[f2h_axi...					
<input checked="" type="checkbox"/>		h2f_lw_axi_clock	Clock Input	clk_0	Double-click to	clk_0					
<input checked="" type="checkbox"/>	h2f_lw_axi_master	AXI Master	[h2f_lw_a...	Double-click to	[h2f_lw_a...						
<input checked="" type="checkbox"/>	f2h_irq0	Interrupt Receiver	IRQ 0	Double-click to		IRQ 0		IRQ 31			
<input checked="" type="checkbox"/>	f2h_irq1	Interrupt Receiver	IRQ 0	Double-click to		IRQ 0		IRQ 31			
<input checked="" type="checkbox"/>	audio_pll_0	Audio Clock for DE-series Boa...									
<input checked="" type="checkbox"/>	ref_clk	Clock Input	clk_0	Double-click to	clk_0						
<input checked="" type="checkbox"/>	ref_reset	Reset Input	reset	Double-click to							
<input checked="" type="checkbox"/>	audio_clk	Clock Output	audio_pll...	Double-click to	audio_pll...						
<input checked="" type="checkbox"/>	reset_source	Reset Output	reset	Double-click to							
<input checked="" type="checkbox"/>	audio_and_video...	Audio and Video Config									
<input checked="" type="checkbox"/>	clk	Clock Input	clk_0	Double-click to	clk_0						
<input checked="" type="checkbox"/>	reset	Reset Input	reset	Double-click to	[clk]						
<input checked="" type="checkbox"/>	avalon_av_config...	Avalon Memory Mapped Slave	external_interface	Double-click to	external_interface						
<input checked="" type="checkbox"/>	external_interface	Conduit	audio_and_video_c...	Double-click to							
<input checked="" type="checkbox"/>	audio_0	Audio									
<input checked="" type="checkbox"/>	clk	Clock Input	clk_0	Double-click to	clk_0						
<input checked="" type="checkbox"/>	reset	Reset Input	reset	Double-click to	[clk]						
<input checked="" type="checkbox"/>	avalon_left_chan...	Avalon Streaming Source	avalon_left_chan...	Double-click to	[clk]						
<input checked="" type="checkbox"/>	avalon_right_chan...	Avalon Streaming Source	avalon_right_chan...	Double-click to	[clk]						
<input checked="" type="checkbox"/>	avalon_left_chan...	Avalon Streaming Sink	avalon_left_chan...	Double-click to	[clk]						
<input checked="" type="checkbox"/>	avalon_right_chan...	Avalon Streaming Sink	avalon_right_chan...	Double-click to	[clk]						
<input checked="" type="checkbox"/>	external_interface	Conduit	audio_0_external_i...	Double-click to							
<input checked="" type="checkbox"/>	vga_ball_0	VGA Ball									
<input checked="" type="checkbox"/>	clock	Clock Input	clk_0	Double-click to	clk_0						
<input checked="" type="checkbox"/>	reset	Reset Input	reset	Double-click to	[clock]						
<input checked="" type="checkbox"/>	avalon_slave_0	Avalon Memory Mapped Slave	# 0x0000_0000	Double-click to	[clock]	0x0000_0000		0x0000_003f			
<input checked="" type="checkbox"/>	vga	Conduit	vga	Double-click to	[clock]						
<input checked="" type="checkbox"/>	avalon_streamin...	Avalon Streaming Source	avalon_streamin...	Double-click to	[clock]						
<input checked="" type="checkbox"/>	avalon_streamin...	Avalon Streaming Source	avalon_streamin...	Double-click to	[clock]						

4. Software design

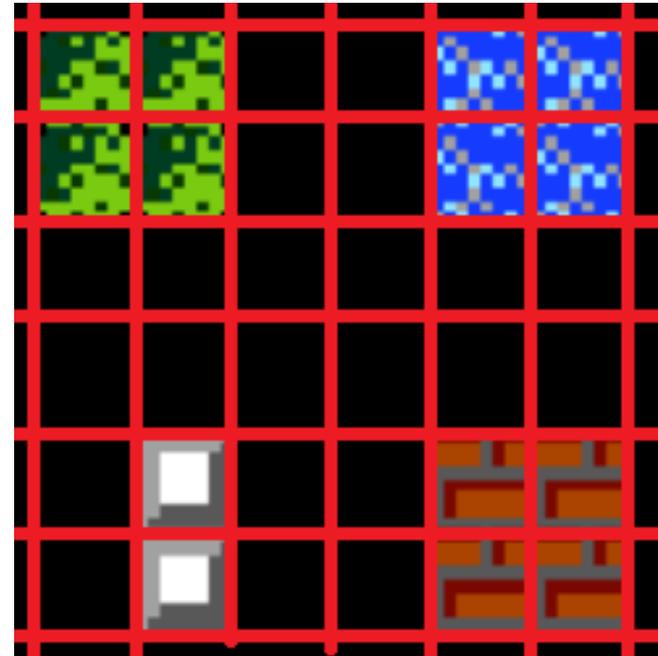
- 1. User Input: iNNEXT joystick gamepad



Button	Function	Button	Function
Up	Tank move up	Start	end game
Down	Tank move down	A	Shoot
Left	Tank move left	B	Summon Player tank
Right	Tank move right		

4. Software design

- 2. Game logic
 - Movement logic
 - Bullet logic
 - Player tank logic
 - Enemy Tank logic
 - Win Lose Logic



4. Software design

- 3. Avalon Bus data

19 16bits data per cycle

Address	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Remark
00	X Position					Y Position					Brick					En.	Wall update, each will update 8*8
01	X Position					Y Position					Brick					En.	Score, Explosive, Gadget Tile
02	X Position							Y Position									Player tank Sprite
03	Tank Class			Color number				Direction						En.			
04	X Position							Y Position									Emeny tank 1 Sprite
05	Tank Class			Color number				Direction						En.			
06	X Position							Y Position									Emeny tank 2 Sprite
07	Tank Class			Color number				Direction						En.			
08	X Position							Y Position									Emeny tank 3 Sprite
09	Tank Class			Color number				Direction						En.			
10	X Position							Y Position									Emeny tank 4 Sprite
11	Tank Class			Color number				Direction						En.			
12	X Position							Y Position									Bullet 1 Position
13	X Position							Y Position									Bullet 2 Position
14	X Position							Y Position									Bullet 3 Position
15	X Position							Y Position									Bullet 4 Position
16	X Position							Y Position									Bullet 5 Position
17	Direction5	Direction4	Direction3	Direction2	Direction1			En. 5	En. 4	En. 3	En. 2	En. 1	Bullet direction and visiable				
18														Sound	Game Information		

5. Challenge

- 1. Enlarge the whole game.
- 2. Display image correctly using ROM and RAM
- 3. Achieve the movement logic correctly.
- 4. Design the AI of the enemy tank.