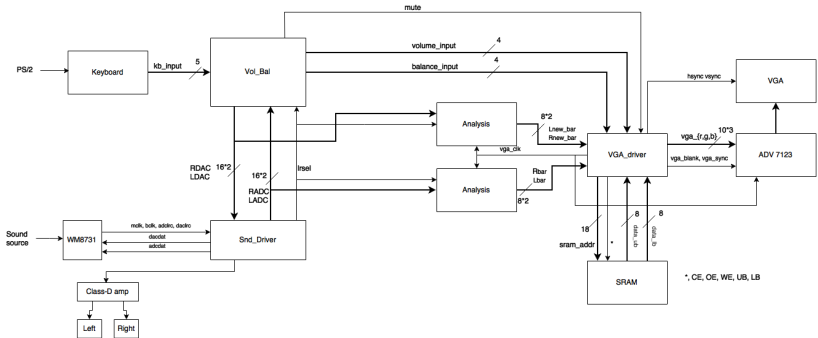# Group 41

TSIU03 - First Presentation

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About the Project

- Audio processing
- Keyboard controlled
- VGA-compliant GUI
  - Settings
  - Signal status – Pre- and Post-processing

First Layer of Modules

# Keyboard

- PS/2 keyboard, *one hot encoded*

- Volume and Balance adjustment, Mute

- Scan codes passed into a '1'-set shift register

  - Once the startbit is shifted out, the 3:rd byte is NAND:ed with FF_{16}

  - Compare with expected values

KEY	MAKE	BREAK	kb_input	Function
U ARROW	E0,75	E0,F0,75	00001	Volume Increase
L ARROW	E0,6B	E0,F0,6B	00010	Balance Bias Left
D ARROW	E0,72	E0,F0,72	00100	Volume Decrease
R ARROW	E0,74	E0,F0,74	01000	Balance Bias Right
END	E0,69	E0,F0,69	10000	Mute Volume

- Identical function as the one in *Lab 4*
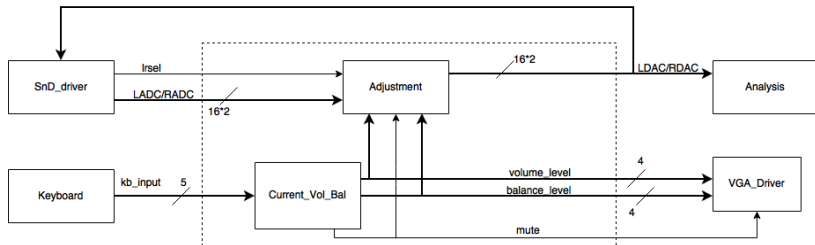 (Vol_Bal replaces Application)
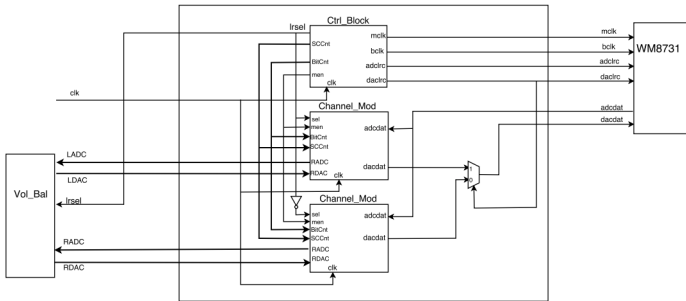
Vol_Bal (1)

- Sub-module `Current_Vol_Bal` holds current values for volume, balance and mute.
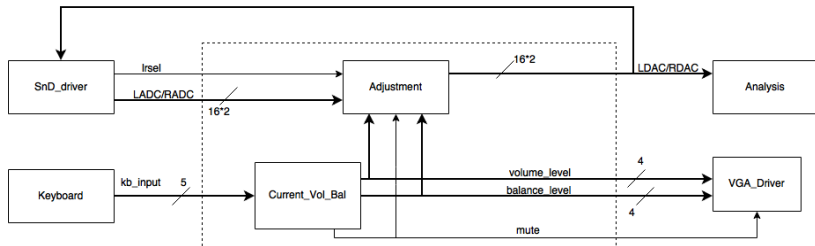
- Sub-module `Adjustment`

$$A_{l\_new} = A_{l\_old} \cdot (1/\sqrt{2})^{n+m} \qquad , \; m = 0 \; \textit{for} \; m < 0$$

$$A_{r\_new} = A_{r\_old} \cdot (1/\sqrt{2})^{n+|m|} \qquad , \; m = 0 \; \textit{for} \; m > 0 \; ,$$

Vol_Bal (2)

- Decremental adjustment of the output (volume: 0 to (-30) dB, balance 0 to (-15) dB per channel)

- "Mute" blanks A_{new} values to $\{L/R\}$DAC

Analysis

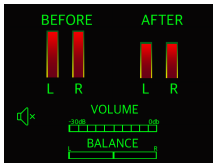- Low pass filtering

- Forward control signals to `VGA_driver`

Name	Type	Description
`lrsel`	input	Channel select
`{L,R}ADC`	input	Left/Right audio input channel
`{L,R}DAC`	input	Left/Right audio output channel
`{L,R}new_bar`	output	Bar amplitude, post-processing
`{L,R}bar`	output	Bar amplitude, pre-processing

VGA-driver

- Similar to *Lab 3*
- New sub-modules: Bar_{Tender,Mixer}
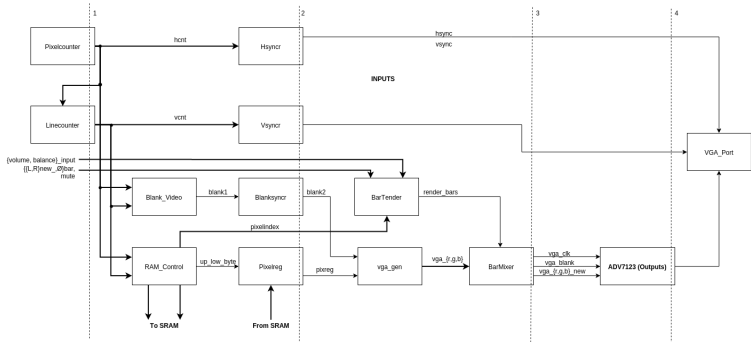
Bar_Tender

- Creates rendering control signal `render_bars` for bar graphs (volume, balance, signal strength pre- and post-processing)

- Background pre-filled bars are blanked out downwards

- Based on the signals:

Name	Type	Description
`volume_input`	Input	A 4-bit input containing vol. info.
`balance_input`	Input	A 4-bit input containing bal. info.
`{L,R}bar`	Input	An 8-bit input containing input signal level
`{L,R}new_bar`	Input	An 8-bit input containing manipulated input signal level
`vga_clk`	Output	Clock signal needed for scanning

Bar_Mixer

- Acts as a multiplexer blanking/enabling bar fill through the control signal `render_bars`.