

Hardware Engineering

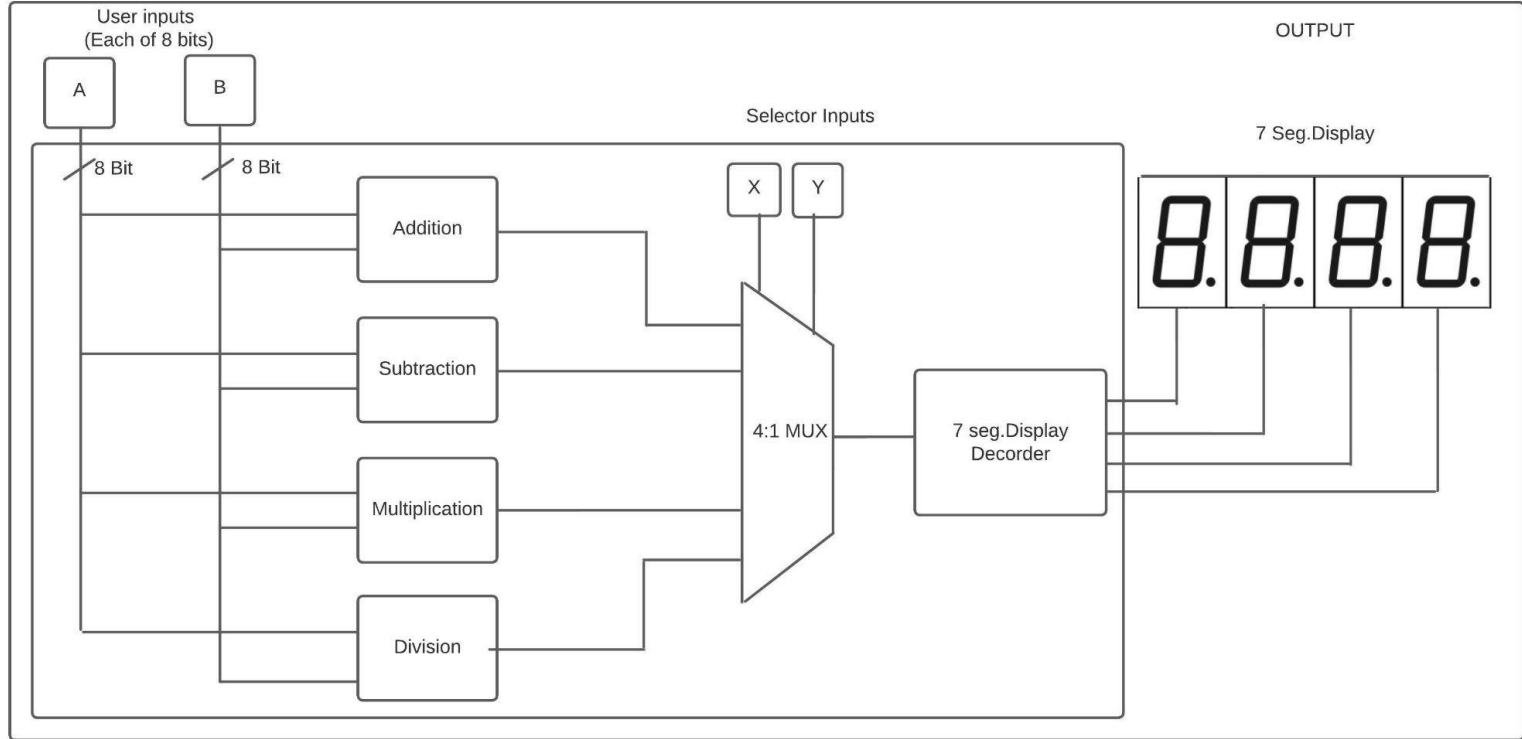
Team : Exemplary



Team members :

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ASM Nurussafa

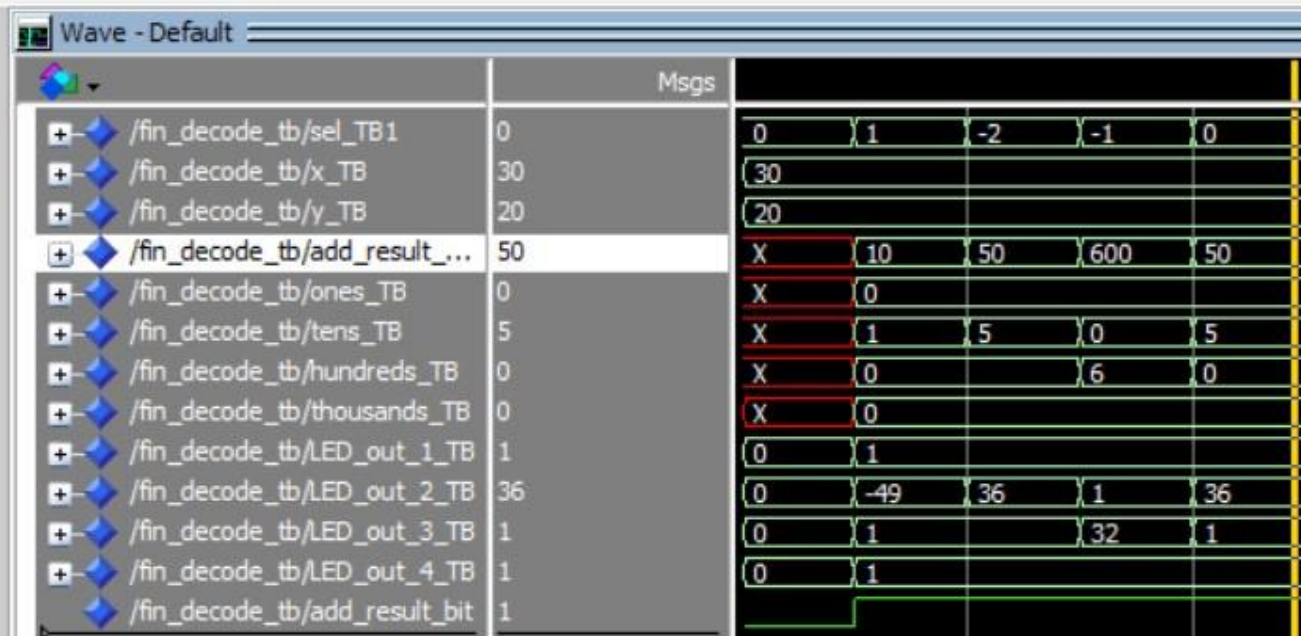
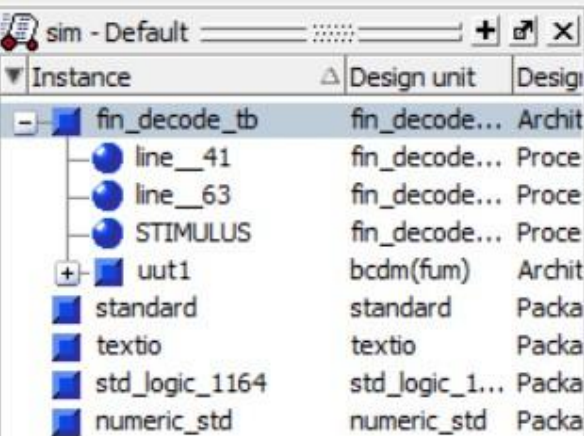
Concept



Block Diagram

components

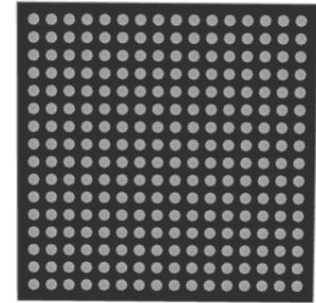
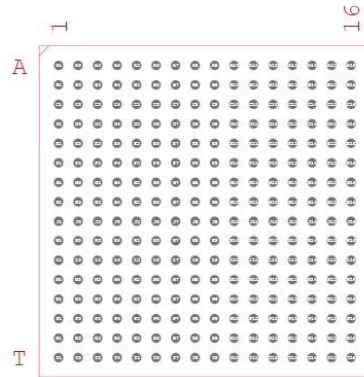
VHDL Implementation



Input A - 30 (00011110)
 Input B - 20 (00010100)
 Selector - "01"- (subtraction),
 "10" - (addition),
 "11"- (multiplication),
 "00" - (Division)

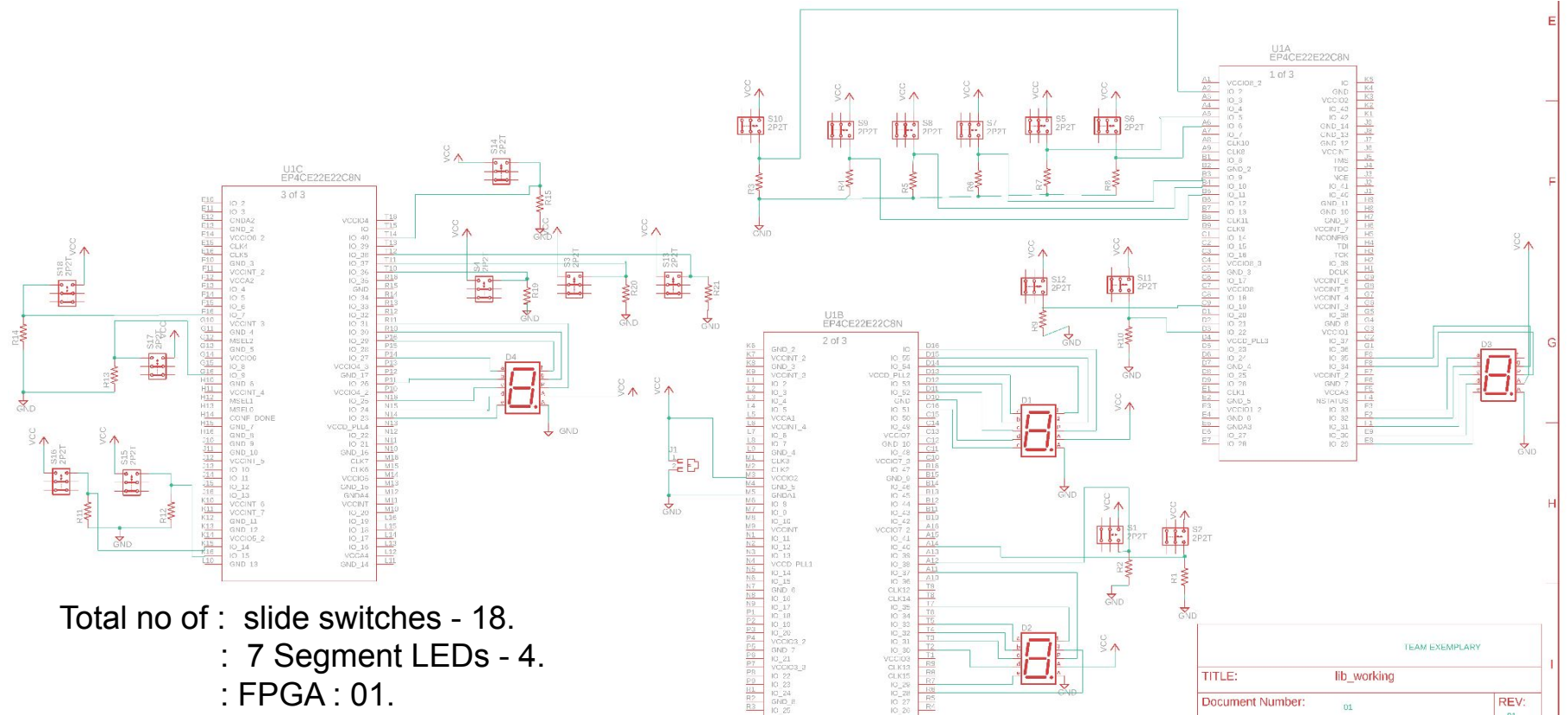
- EP4CE22E22C8N from Intel.

A1	WCCIO8	IO	E5
A2	IO	GMI	E4
A3	IO	WCCIO2	E3
A4	IO	IO	E2
A5	IO	IO	E1
A6	IO	GMI	J5
A7	IO	GMI	J4
A8	CLK10	GMI	J3
A9	CLK8	WCCINT	J6
B1	IO	TMS	J5
B2	GND	TDC	J4
B3	IO	nCE	J3
B4	IO	IO	J2
B5	IO	IO	J1
B6	IO	GMI	H5
B7	IO	GMI	H4
B8	CLK11	GMI	H3
B9	CLK9	WCCINT	H6
C1	IO	nCONFIG	H5
C2	IO	TD1	H4
C3	IO	TCR	H3
C4	WCCIO8	IO	H2
C5	GND	DCLR	H1
C6	IO	WCCINT	G5
C7	WCCIO8	WCCINT	G4
C8	IO	WCCINT	G3
C9	IO	WCCINT	G6
D1	IO	IO	G5
D2	IO	GMI	G4
D3	IO	WCCIO1	G3
D4	WCCD_FLL2	IO	G2
D5	IO	IO	G1
D6	IO	IO	F5
D7	GND	IO	F4
D8	IO	WCCINT	F3
D9	IO	GMI	F6
E1	CLK1	WCCAS	F5
E2	GND	nSTATUS	F4
E3	WCCIO1	IO	F3
E4	GND	IO	F2
E5	GNDAS	IO	F1
F6	IO	IO	F5
F7	IO	IO	F4



- ❖ FPGA CycloneR IV E Family
- ❖ 22320 Cells 60 nm Technology
- ❖ 1.2V
- ❖ **144-Pin** EQFP EP

Schematic diagram for the PCB

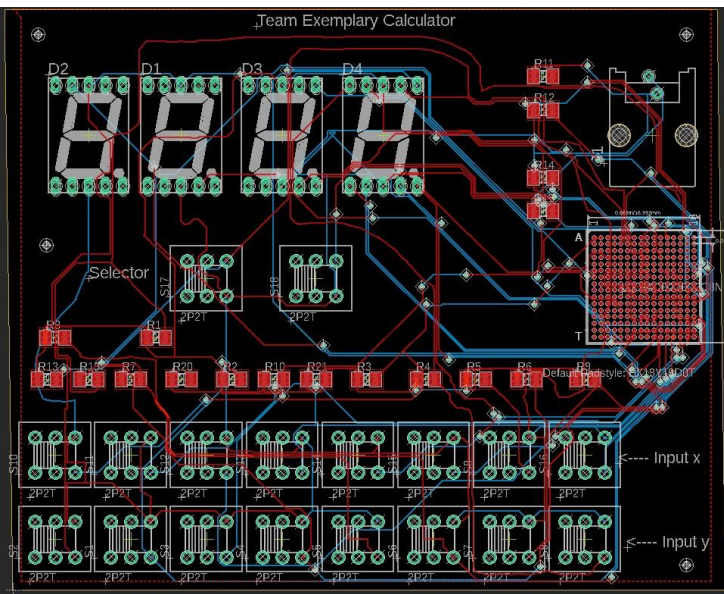


Further requirements

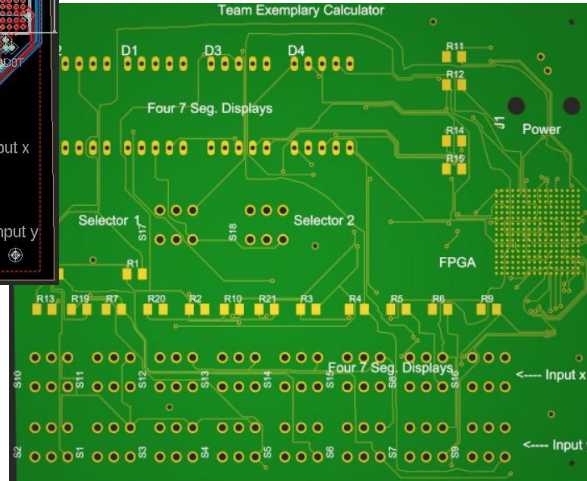
- Inclusion of Power supply for the PCB.
- Implementation of JTAG programmer.
- Use of Oscillator/Clock module .

Testing/refining

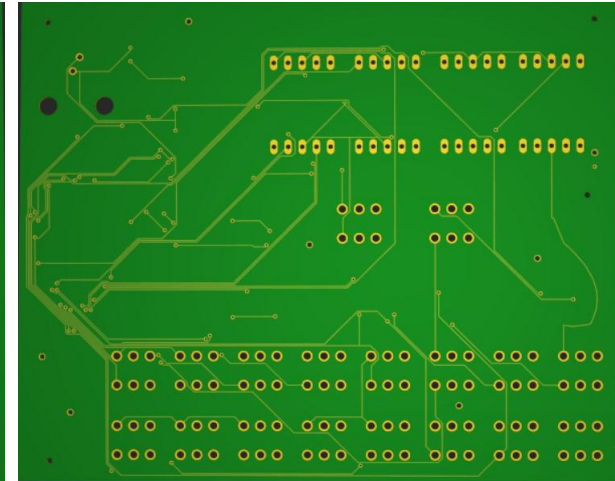
- Should meet the EMC Regulations
- EMI requirments/tests.
- Output/Input ports accessibility. (e.g ;power jack)
- Refine the distance between traces.



(Printed Circuit Board)
No. of layers -2



Front View (Top layer)

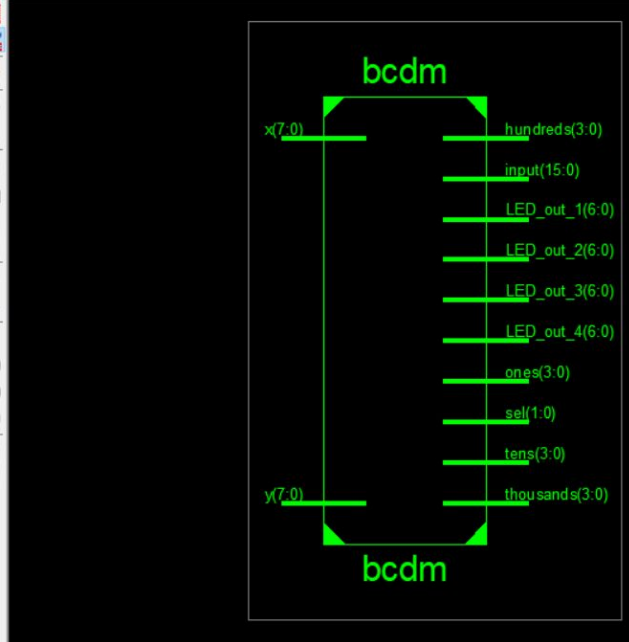
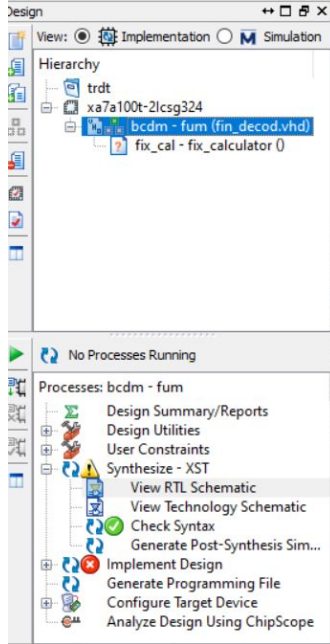


Rear View (bottom layer)

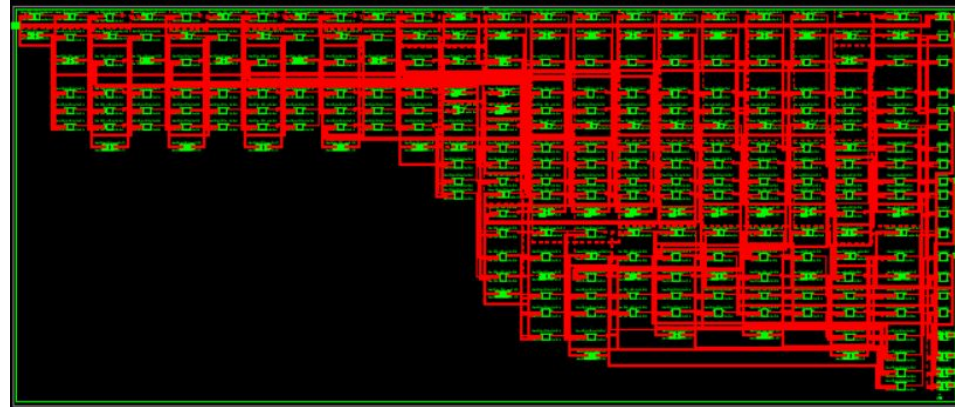
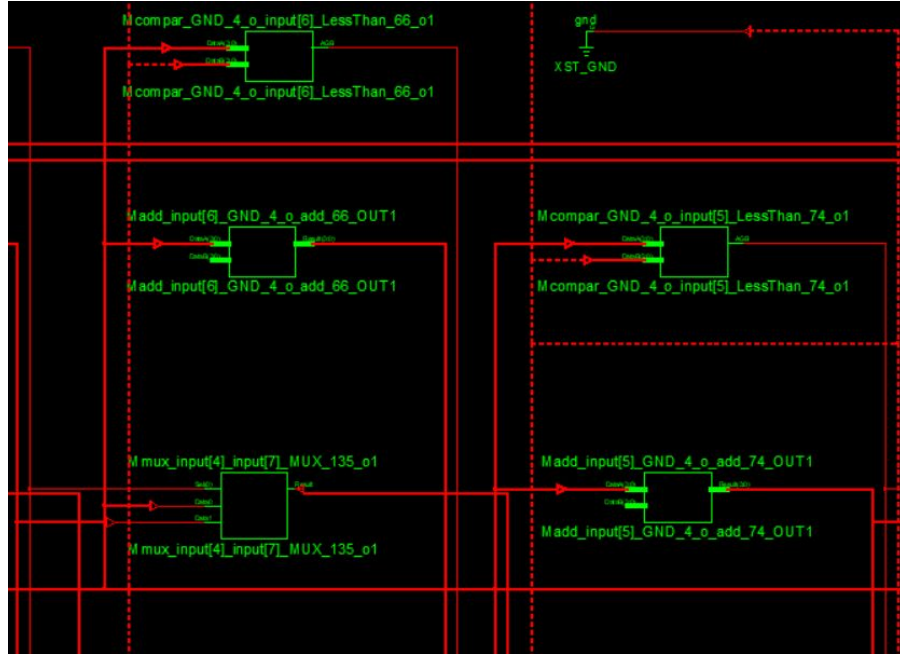
PCB Layout - Size : 4610 x 3453 mil

- Track width 6 mil.

RTL ??



RTL



BOM List and estimated price of PCB components

Qty Value	Device	Package	Parts	Description	Unit price	price sum
1	215876-7	215876-7	J1	AMP connector	~ 2\$	2
4	7SEG-CA	7SEG-13	D1, D2, D3, D4	7-segment DISPLAY	\$0.84	\$3.36
18	R-US_M1206	M1206	R1- R21	RESISTOR, American symbol	\$0.11	\$1.98
18	2P2T	2P2T	S1-S18	SLIDE SWITCH 2P2T Part No. SS-22F05-G(A)4	\$1.48	\$26.64
1	EP4CE22E22C8N	EP4CE22E22C8N	FBGA256	_THIN_WIRE-BOND-A:1.55_	\$71.04	\$71.04
Total cost						\$105.02

Resources

1. <https://www.facebook.com/cyhardwareengineer/>

Thank you for your attention !