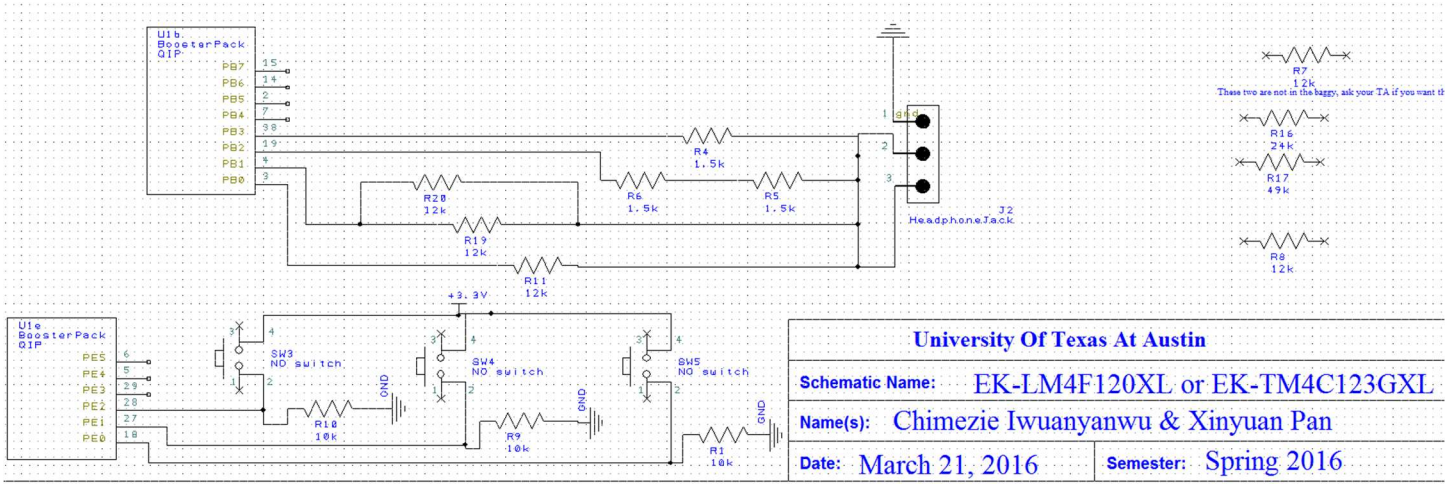
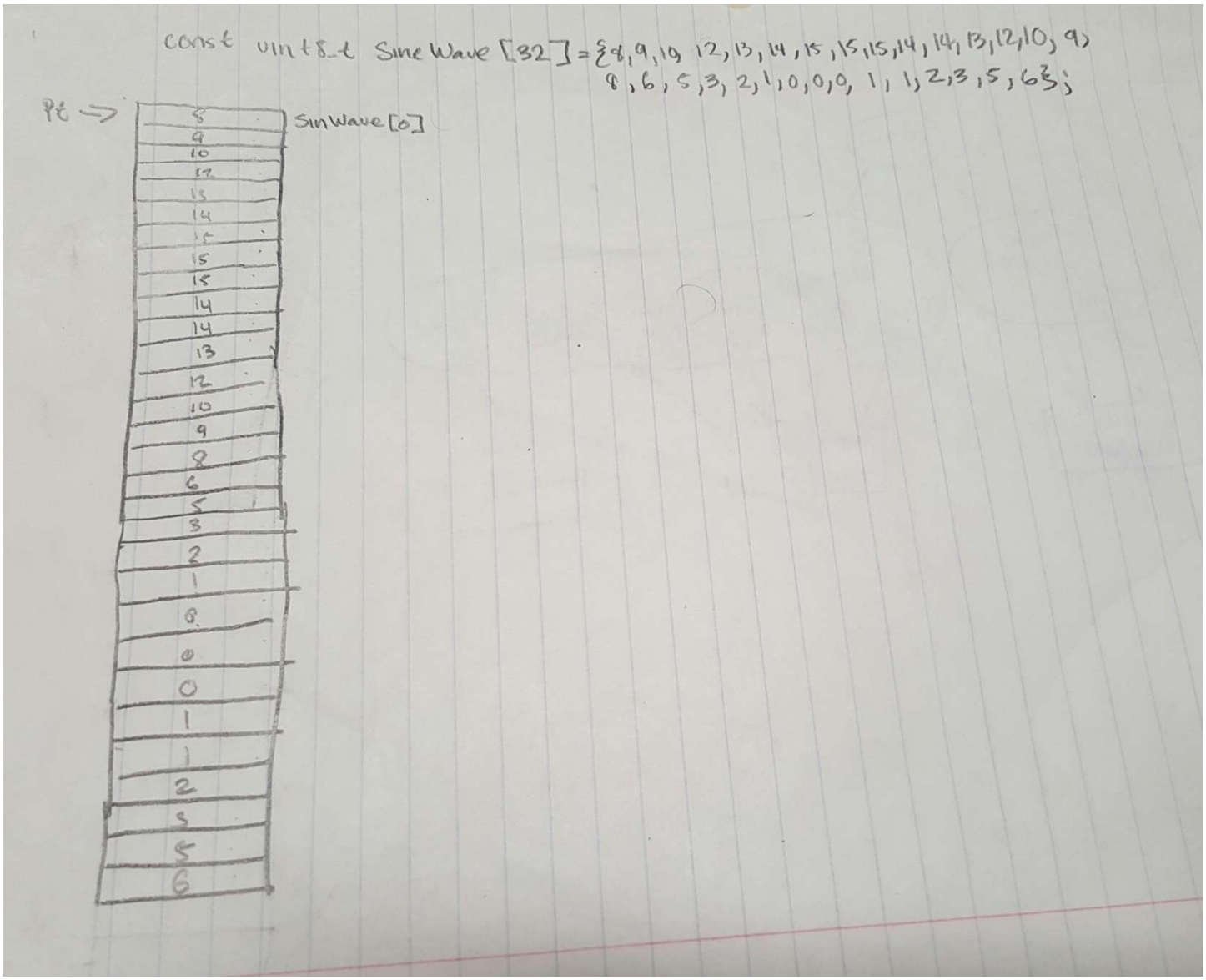
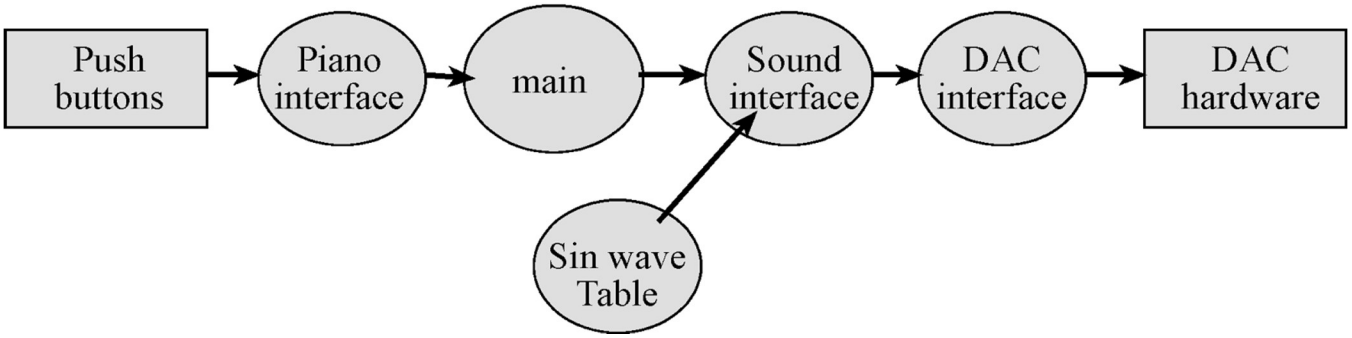
Chimezie Iwuanyanwu cci273
Xinyuan Pan xp572

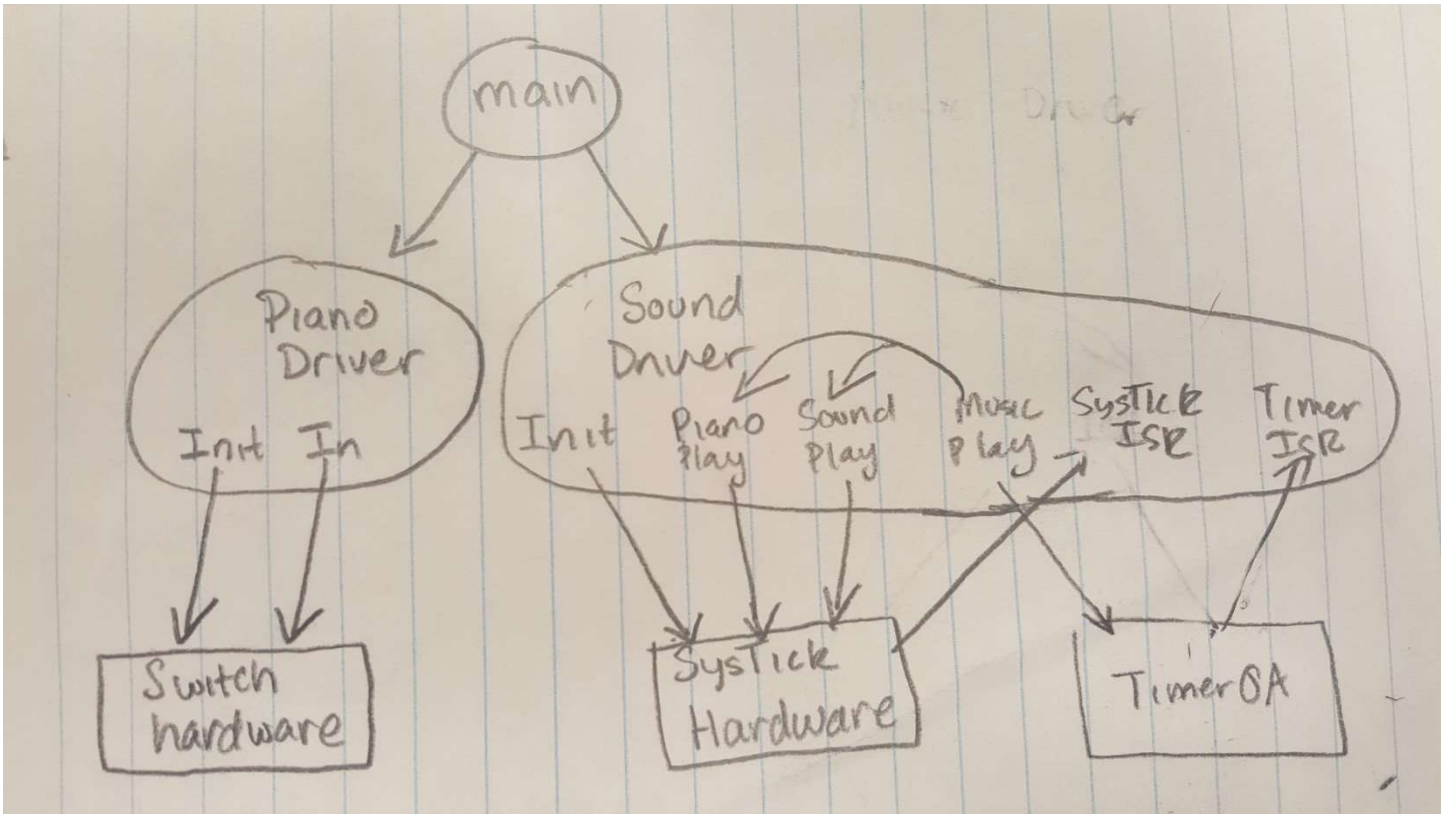
Circuit Diagram



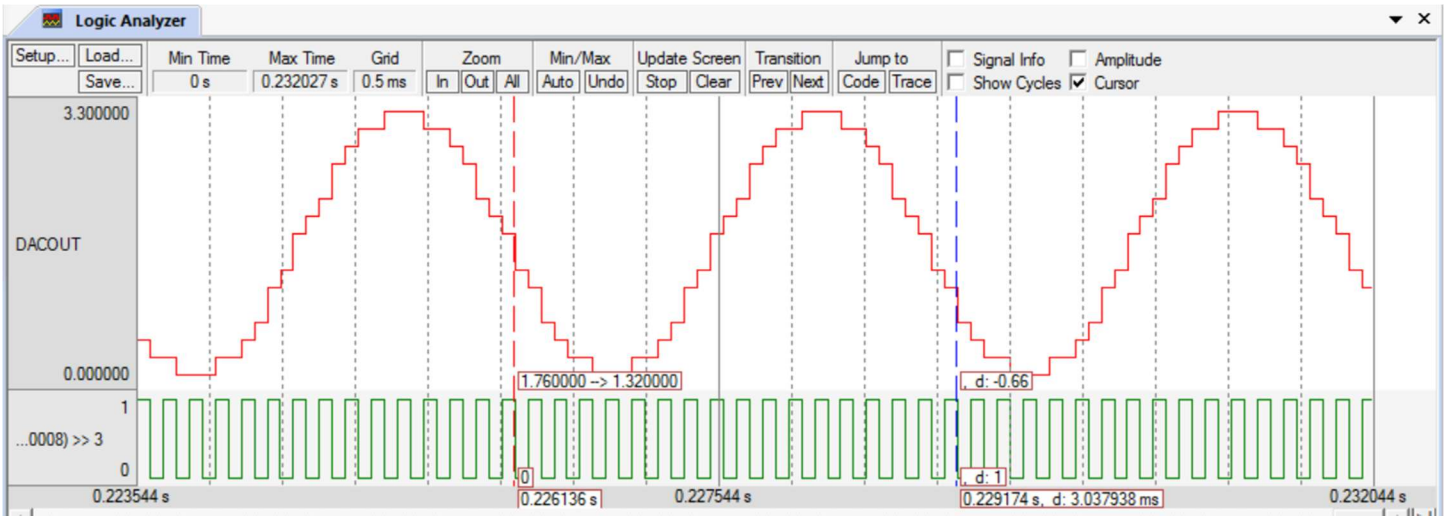
Software Design

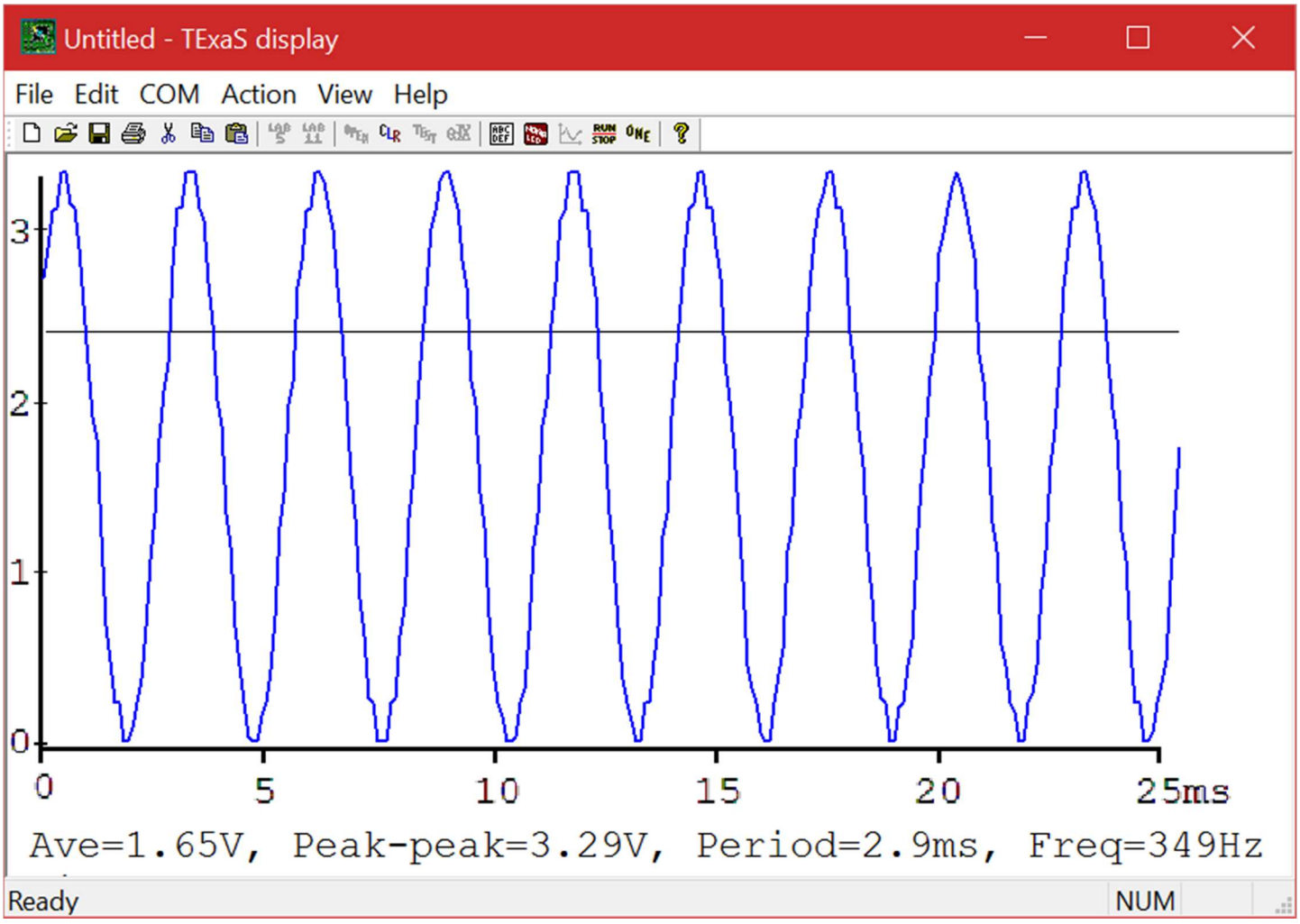





main
Piano Driver
Init
In
Sound Driver
Init
Piano Play
Sound Play
Music Play
SysTick ISR
Timer ISR
Switch hardware
SysTick Hardware
Timer0A

Screenshots





Measurement Data

Bit3 bit2 bit1 bit0	Theoretical DAC voltage	Measured DAC voltage	Accuracy Percentage
0	0	0	100
1	0.22	0.22	100
2	0.44	0.44	100
3	0.66	0.67	98.4
4	0.88	0.87	98.9
5	1.1	1.10	99.1
6	1.32	1.31	99.2
7	1.54	1.53	99.4
8	1.76	1.75	99.4
9	1.98	1.97	99.5
10	2.2	2.19	99.5
11	2.42	2.41	99.6
12	2.64	2.63	99.6
13	2.86	2.85	99.7
14	3.08	3.07	99.7
15	3.3	3.29	99.7

Range = 3.29V – 0V = 3.29V Precision = 4 bits or 16 Resolution = (3.29)/(16) = 0.205625

When does the interrupt trigger occur?
After the SysTick or Timer0A current registers decrement to zero.

In which file is the interrupt vector?
The both timer interrupt vectors are in the Startup.s file.

List the steps that occur after the trigger occurs and before the processor executes the handler.
The control flag bit for the timer control register is set and the system puts the interrupt vector handler address in the PC.

It looks like BX LR instruction simply moves LR into PC, how does this return from interrupt?
The system, in addition, goes to the address 0xFFFFFFF9 to pop the 8 registers it pushed to the stack when the interrupt occurred.