



國立交通大學
National Chiao Tung University

Microprocessor system lab.



Outline

- General information
- Background
- Student evaluation
- Schedule

General information

- Instructor: 曹孝櫟, EC426
- TA Team:
 - 李家森 jiasen.cs08g@nctu.edu.tw (TA lead)
 - 賈慶郁, 黃俐欣, 游騰德, 沈康勇
- Course: 5EF-ED117
- Lab: Take home/Demo 3IJK-EC222/EC221/EC220
- Office hour: 5ABCD/EC426
- Course web site
 - <https://e3new.nctu.edu.tw/login/index.php>
- On-line course
 - https://ocw.nctu.edu.tw/course_detail.php?nid=572

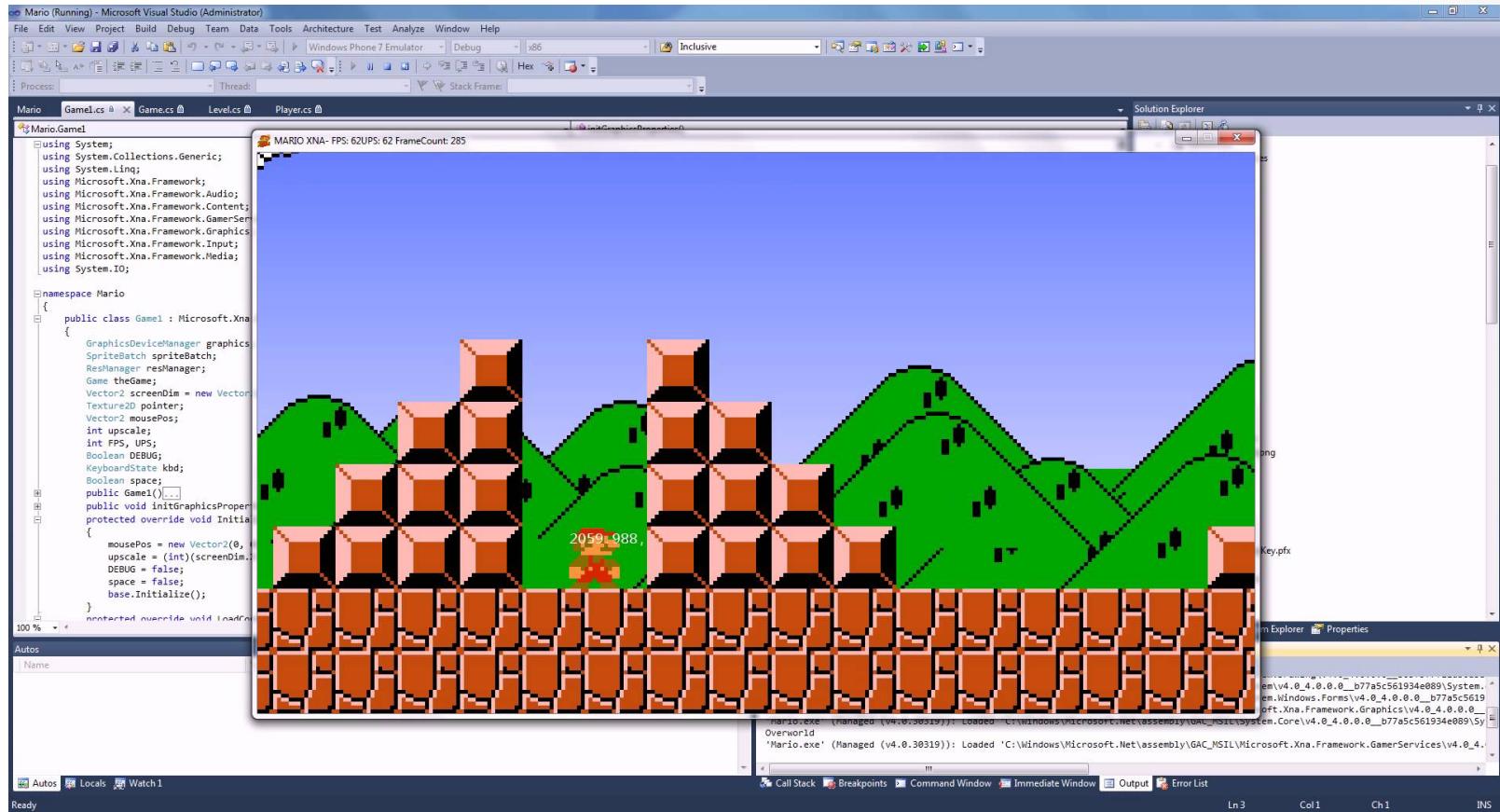
Background

- Course
 - Micro. Computer System Lab.
- Prerequisite
 - Please advise CS rules
 - Knowledge of *computer architecture/organization, assembly language, electronics, electronics lab., digital circuits, intro. to digital systems* will be very helpful
- Objective
 - To understand and **hands-on** micro. computer system about architecture, peripheral, timer, counter, interrupt, I/O control and etc.
 - ARM Cortex M4 microcontroller is used as an example

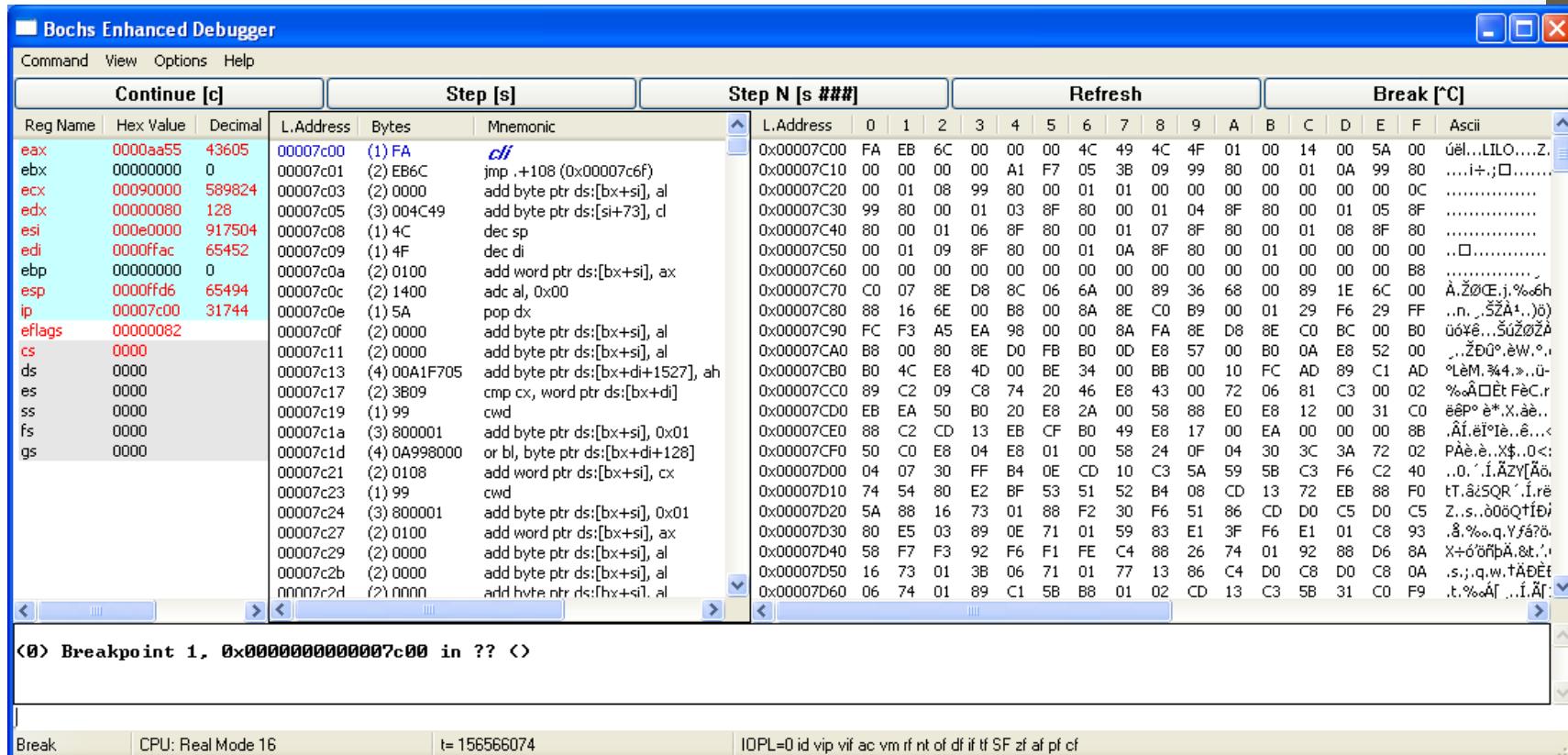
	Embedded Hardware/SoC	Embedded System Software	Embedded Application Software
Basics	數位邏輯設計 (Digital Logic Design)	系統程式 (System Software)	程式語言 (Programming Language)
	電子電路 (E&E)		數位訊號處理 (DSP Introduction)
Intermediate	計算機組織 (Computer Organization)	作業系統概論 (Introduction to OS)	嵌入式系統程式語言 Embedded System Programming
	微處理器實驗 (Microprocessor Lab.)	高等系統程式 (Advanced System Software)	
嵌入式系統設計概論與實作			
Advanced	積體電路設計 (VHDL & FPGA)	內嵌式編譯器 (Embedded Compiler Design)	數位訊號處理實驗 (Project Lab: DSP Apps)
		作業系統進階 (Advanced OS, Linux Systems)	
嵌入式系統 (Embedded System Design Overview)			
Advanced	系統晶片設計概論 (SOC Design)	嵌入式作業系統實作 (Embedded OS Implementation)	連網型系統晶片嵌入式軟體 (Networked SoC ESW)
	軟硬體協同設計 (HW/SW Co-Design)	嵌入式即時作業系統 (Embedded Real Time OS)	行動裝置嵌入式系統與軟體 (Project Lab: Mobile Apps)
	嵌入式處理器 (Embedded Processor)	嵌入式軟體開發工具 (Embedded Toolchain)	微型感測裝置嵌入式系統與軟體 (Project Lab: Sensor Apps)
	系統晶片實習 (SOC Lab)	輸出入裝置與驅動程式設計 (I/O and Device Driver)	多媒體裝置嵌入式系統與軟體 (Project Lab: Multimedia Apps)

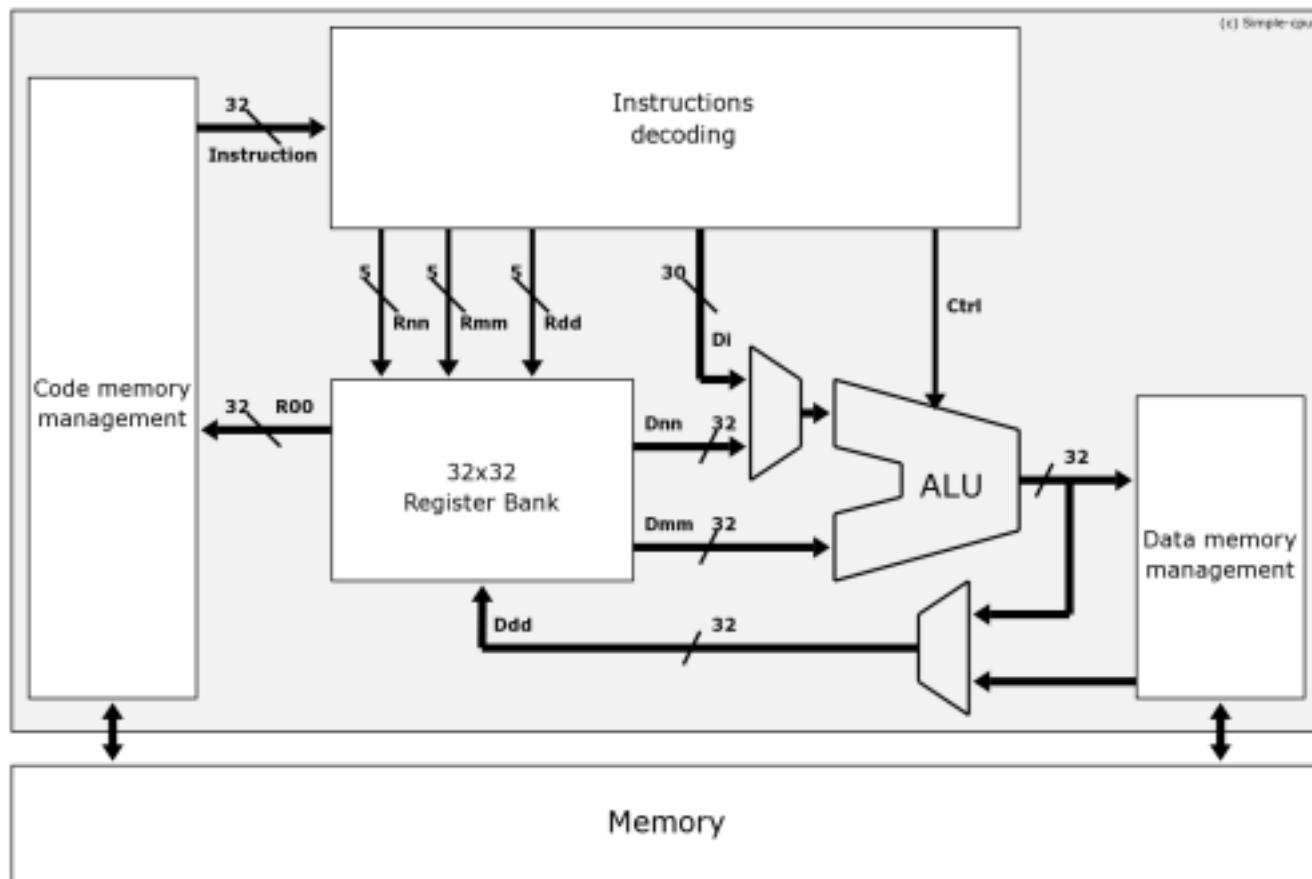


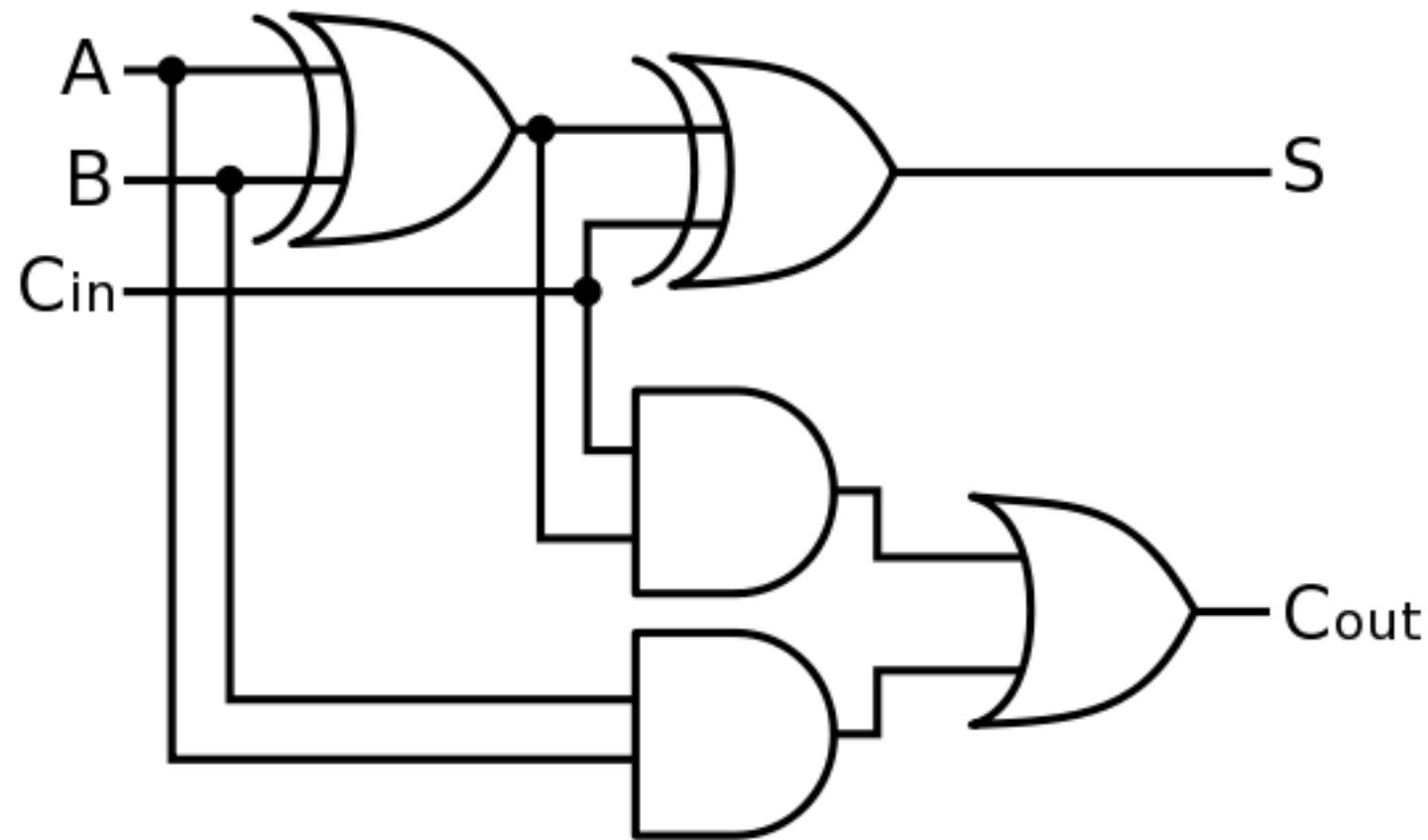
Source: <https://www.youtube.com/watch?v=raI1Y1jR5j8>

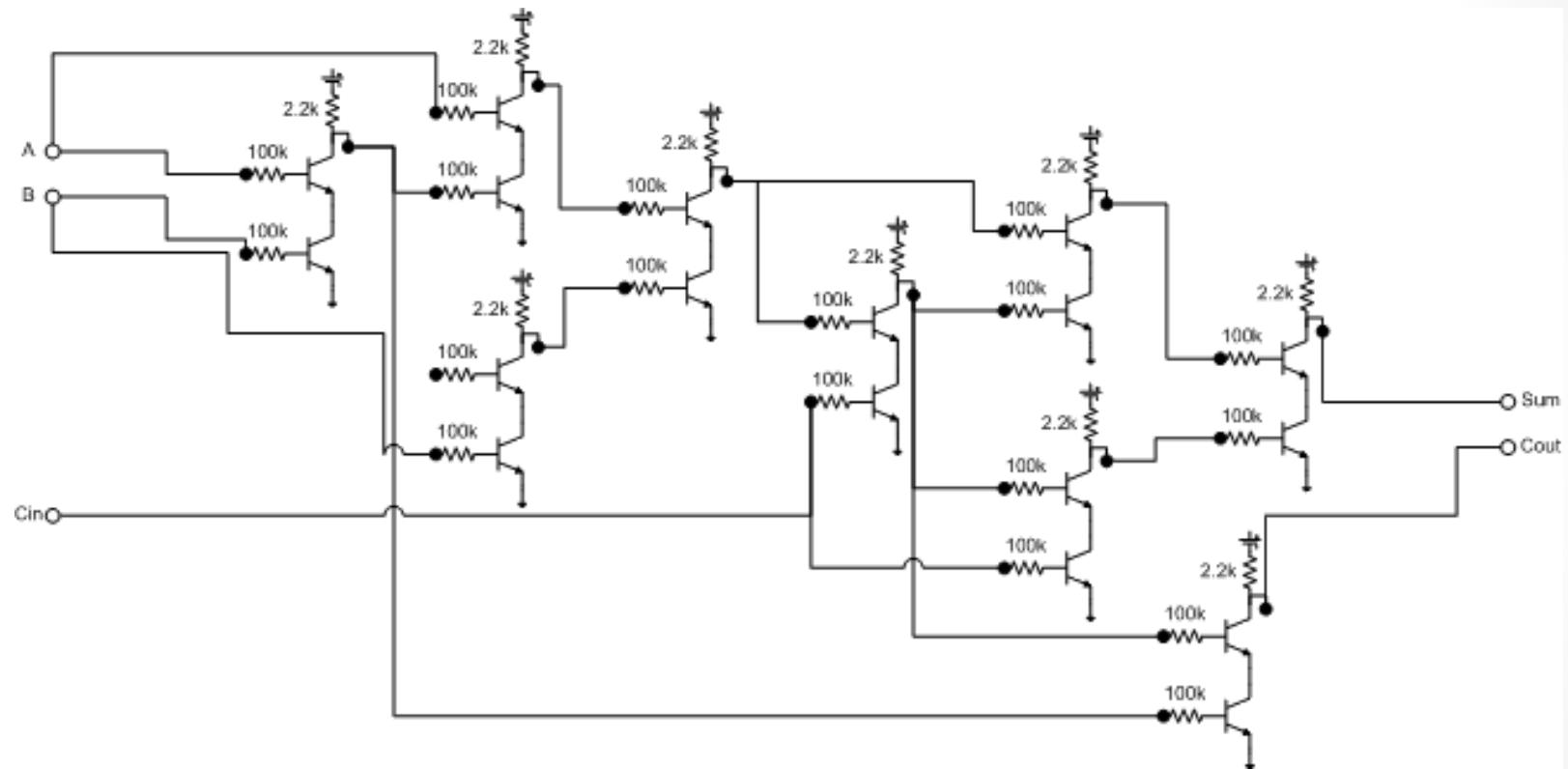


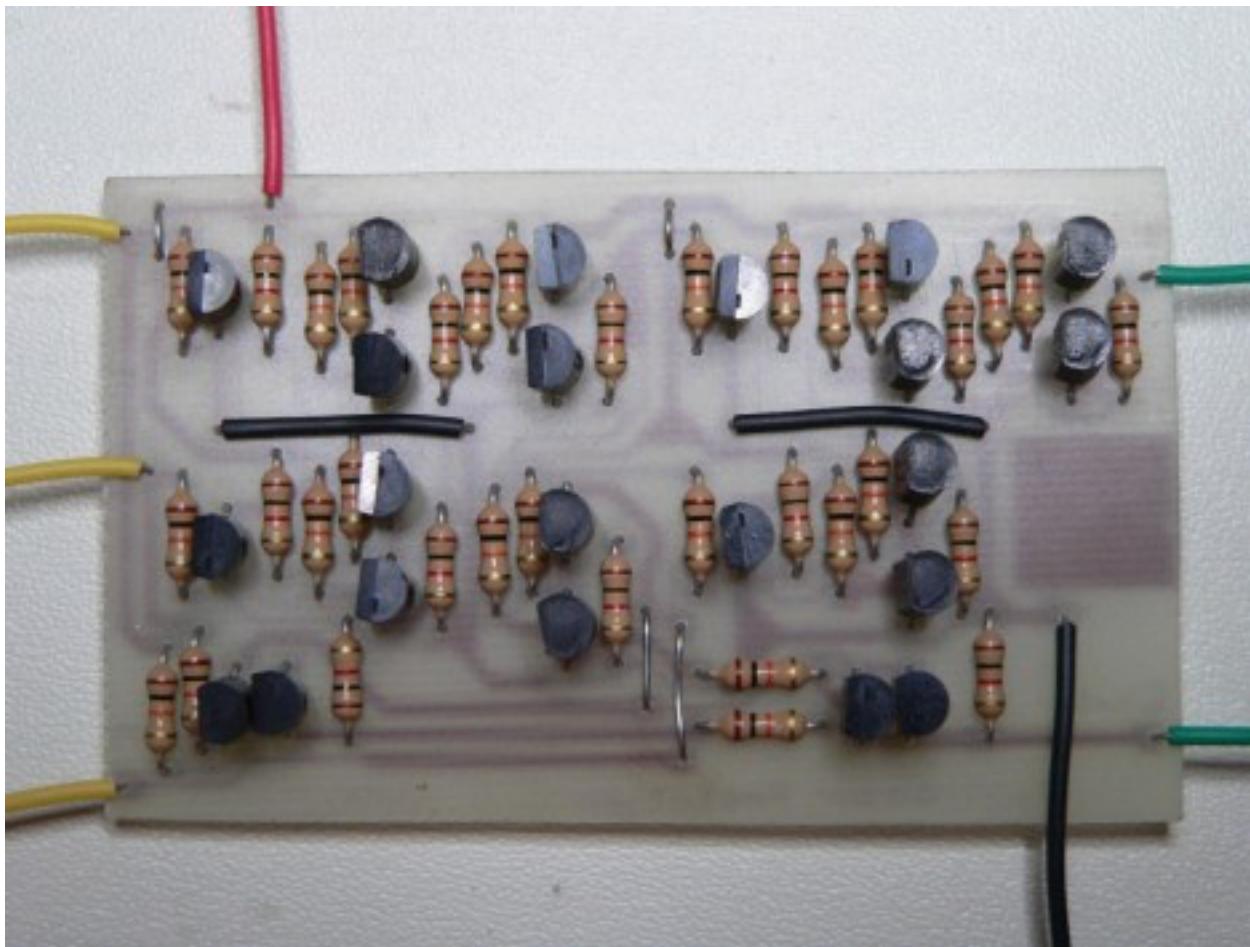
Source: <https://github.com/Matriks404/openSMB2>

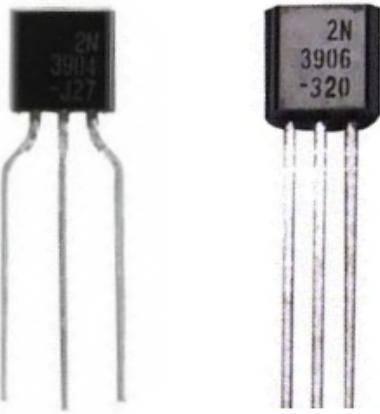






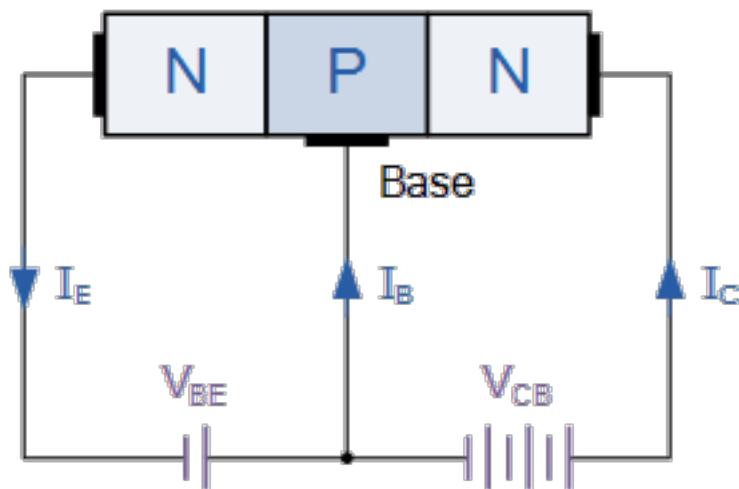




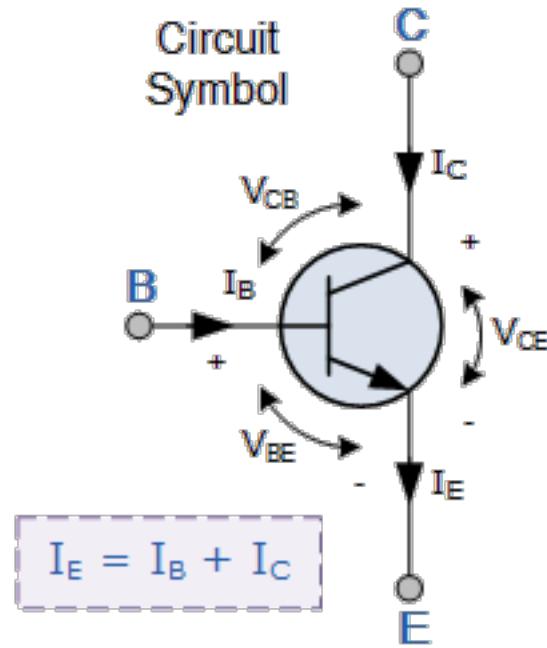


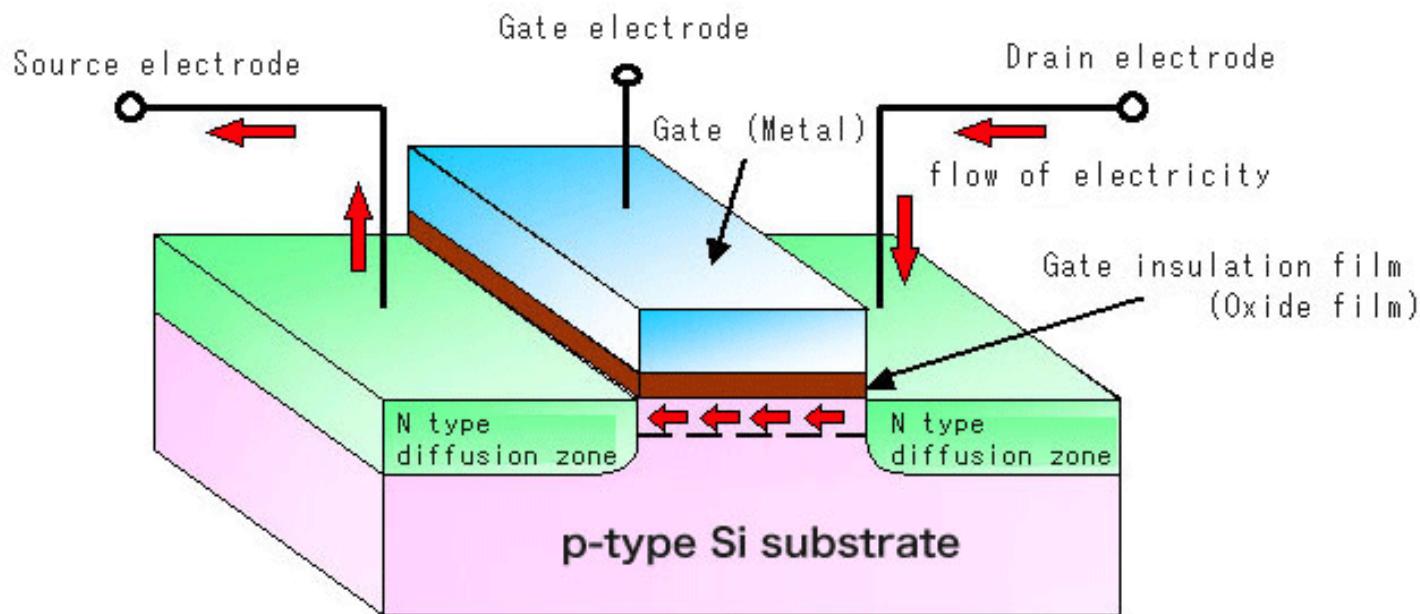
Emitter

Collector



Circuit
Symbol



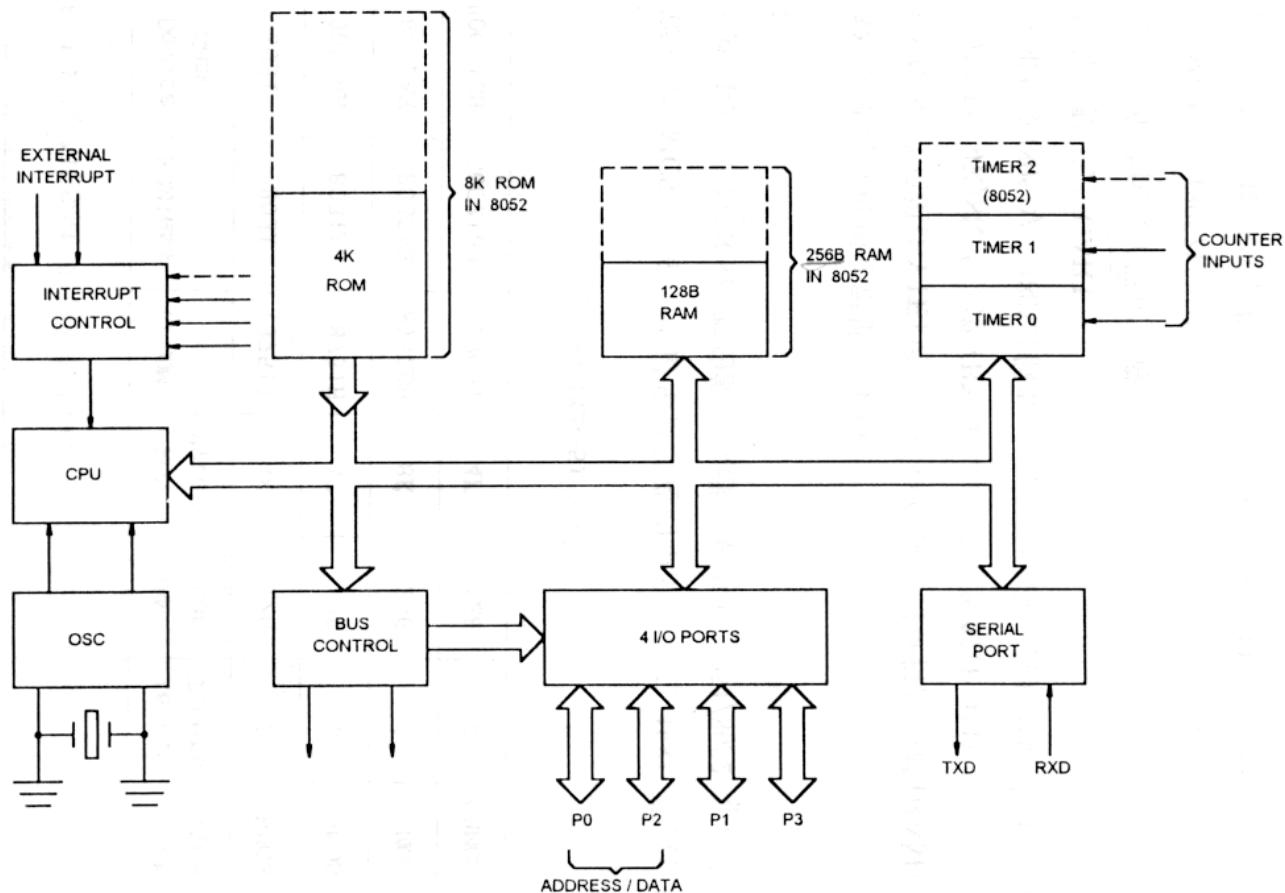


Construction of MOSFET

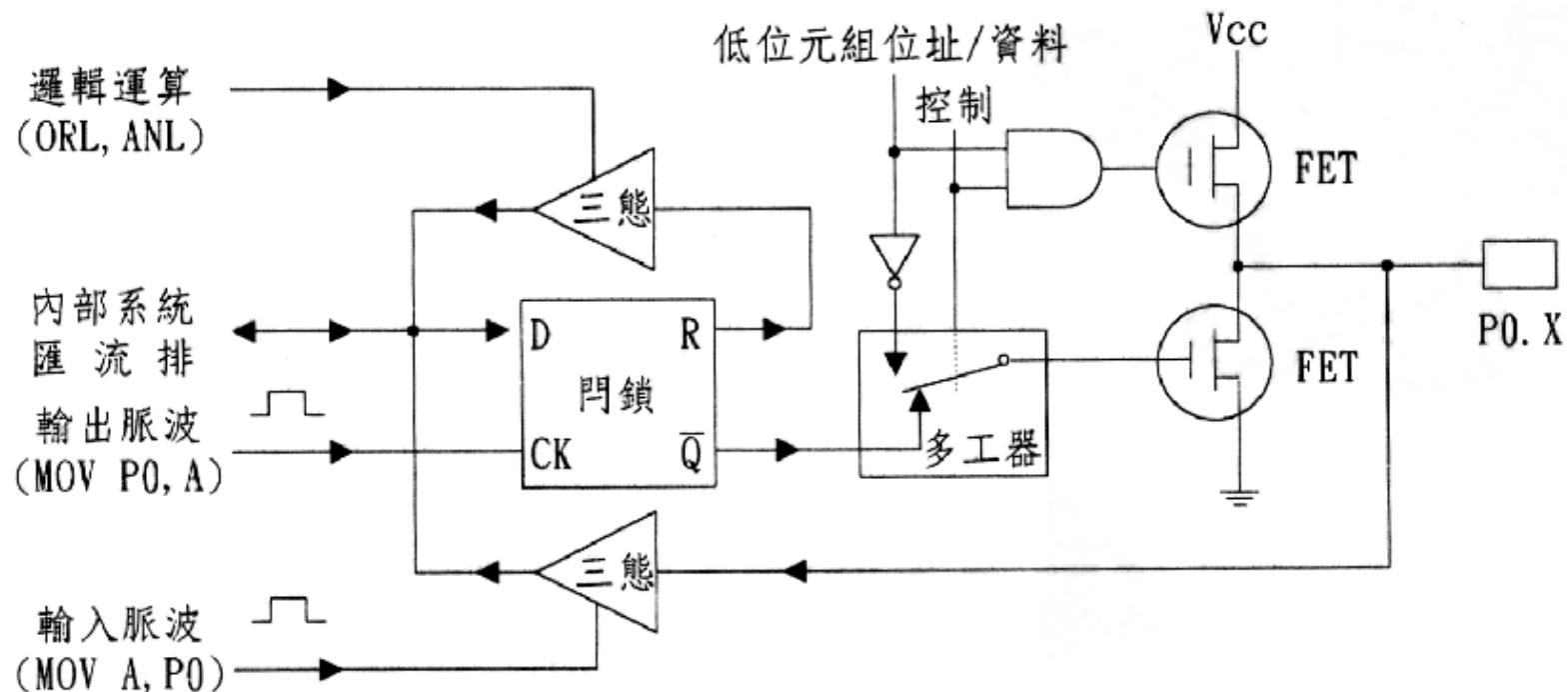
Prerequisite

- Computer architecture/organization
- Assembly language
- Electric Circuits
- Electronics
- Electronics lab.
- Digital circuits
- Digital circuits lab
- Intro. to digital systems

Architecture



Electric Circuits & Electronics



Experimental Platform

- ARM Cortex M4 (32 bits RISC)
- Make sure students can finish each lab within 2-6 hours
- Learn by examples (explain lab exercises)
- Problem-based learning (term project)

Student Evaluation

- Lab Report
 - $6\% \times 8 = 48\%$
- Exams
 - $20\% \times 1 = 20\%$
 - Mid-term programming exam (open book)
- Initial/term projects (two people in a group)
 - 32%
 - Demo (peer review)

Student Evaluation

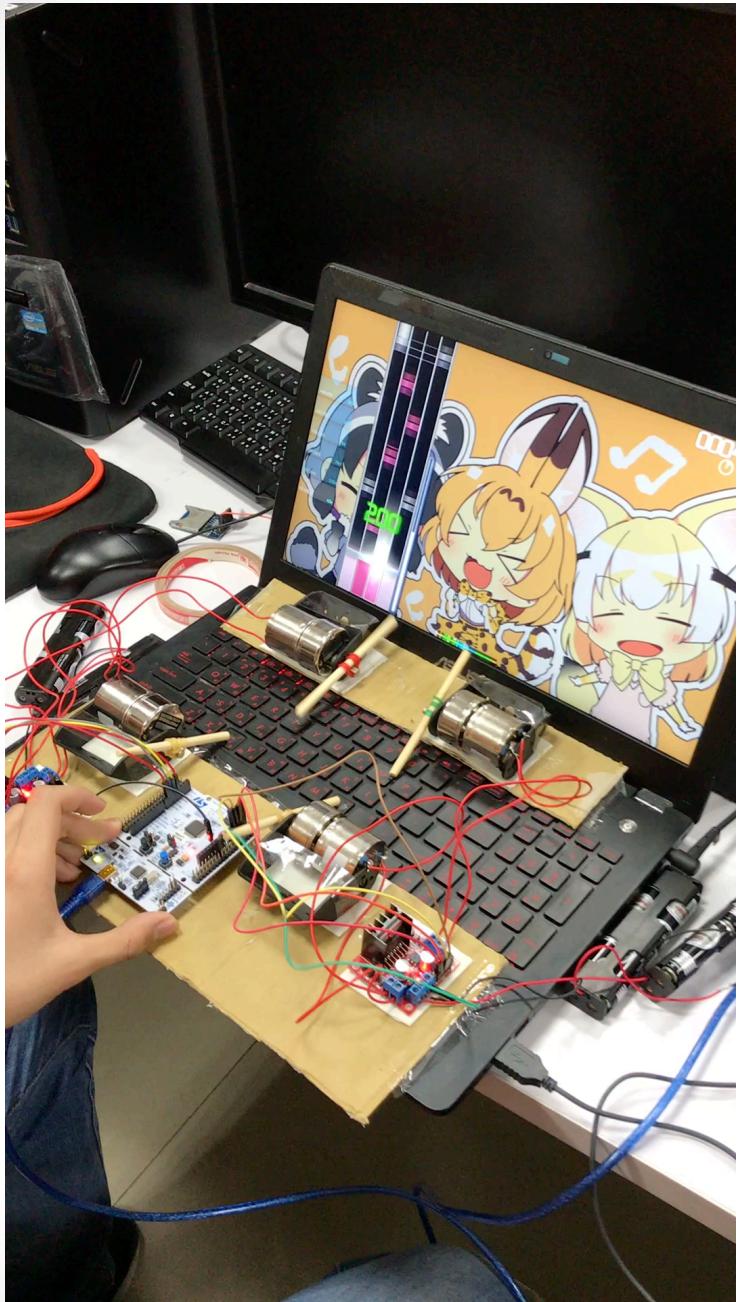
- Announce lab exercises at least 2 weeks before demo
- 8 labs
 - Two people in a group
 - Everyone should attend the lab demo and answer questions (randomly pickup)
- Demo and QA
 - 6:30 p.m.~9:30 p.m. (book slots)

Student Evaluation

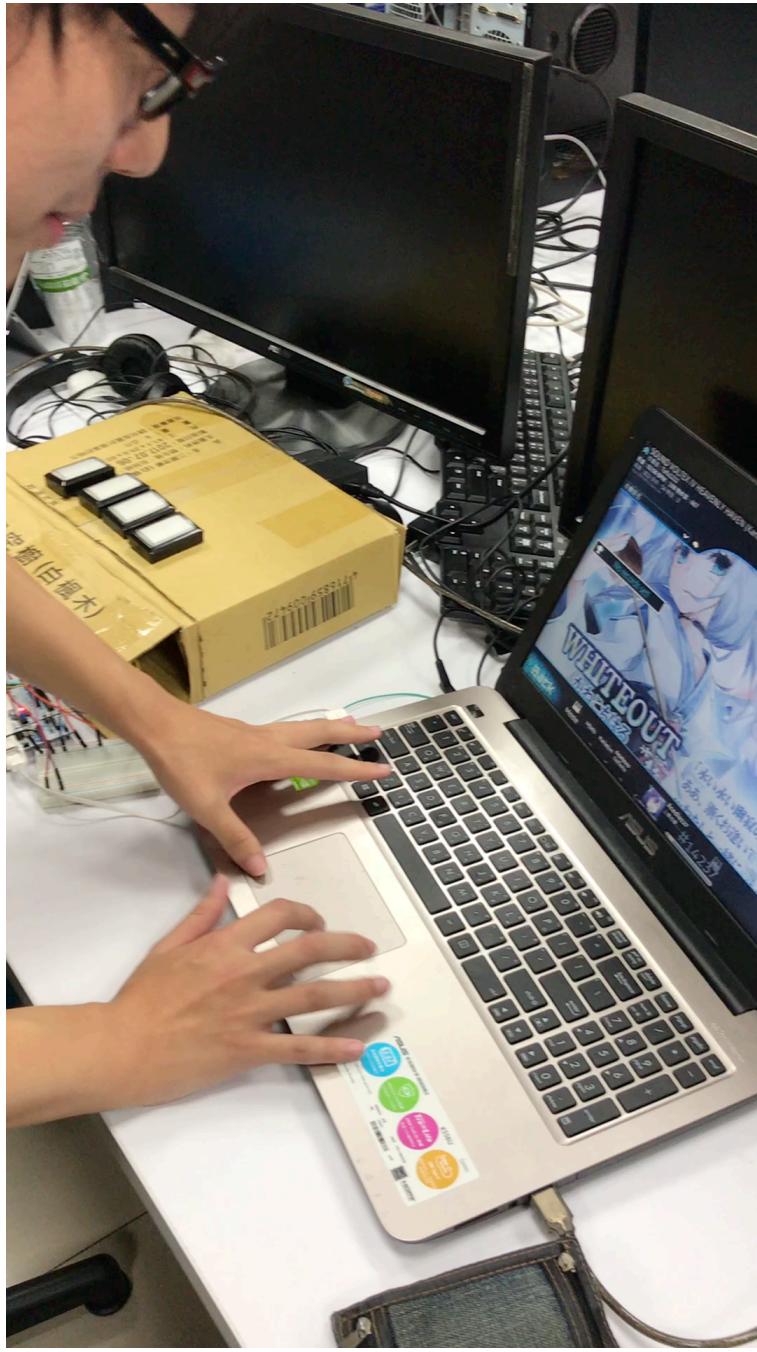
- Term project (32%)
 - System Spec.
 - Design Spec.
 - Demo
 - Report
 - Hackathon

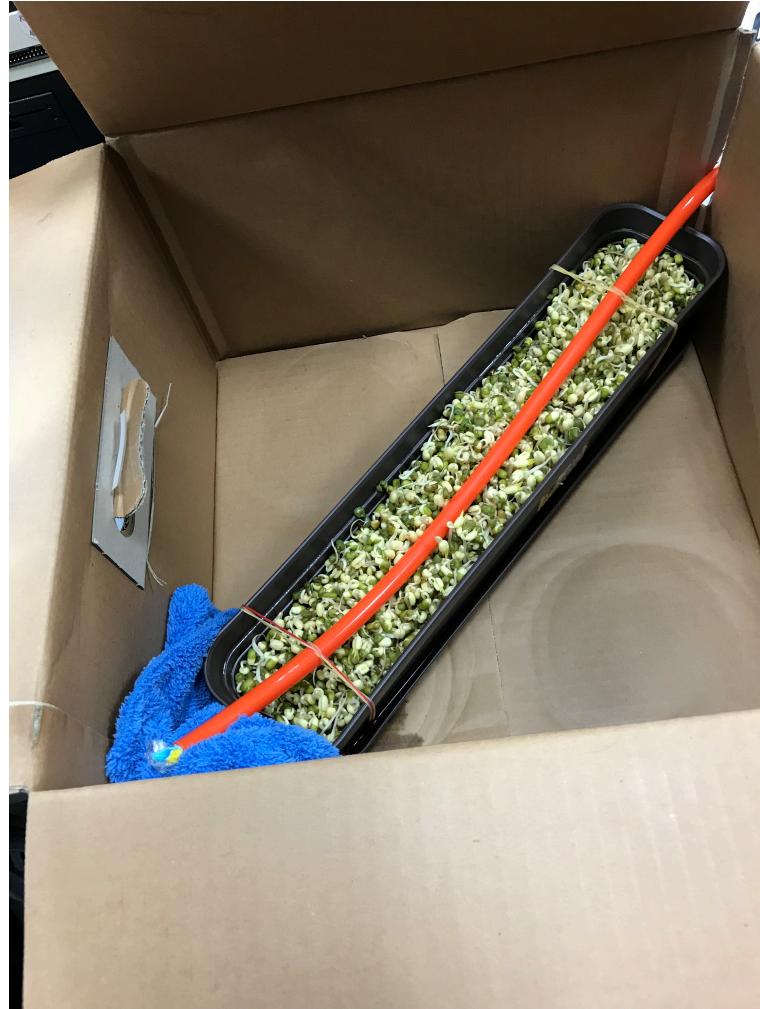


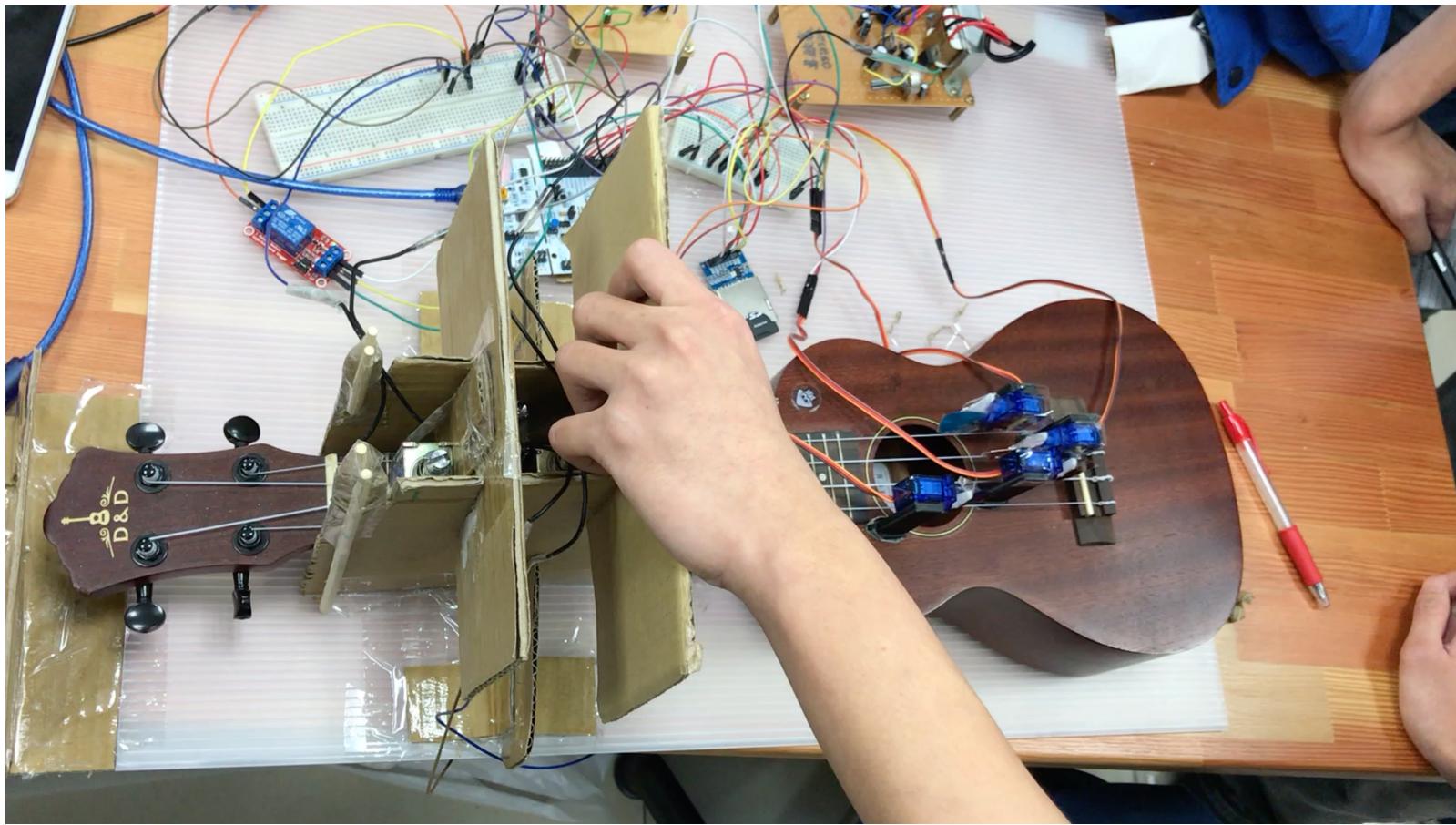














2020 交大微處理機 MPSL

2020年9月 (台北標準時間)

週日	週一	週二	週三	週四	週五	週六
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3

下午1:20 -MPSL課

下午6:30 -MPSL發

下午1:20 -MPSL理

MPSL 分組截止

下午1:20 -MPSL理

下午6:30 -MPSL

中秋節調整放假

2020 交大微處理機 MPSL

2020年10月 (台北標準時間)

週日	週一	週二	週三	週四	週五	週六
	27	28	29	30	1	2
			下午6:30 -MPSL		中秋節調整放假	
4	5	6	7	8	9	10
			下午6:30 -MPSL		國慶日調整放假	
11	12	13	14	15	16	17
			下午6:30 -MPSL		下午1:20 -MPSL理	
18	19	20	21	22	23	24
			下午6:30 -MPSL		下午1:20 -MPSL理	
25	26	27	28	29	30	31
			下午6:30 -MPSL		下午1:20 -MPSL理	

2020 交大微處理機 MPSL

2020年11月 (台北標準時間)

週日	週一	週二	週三	週四	週五	週六
	1	2	3	4	5	6
			下午6:30 -MPSL		下午1:20 -MPSL理	
	8	9	10	11	12	13
			下午6:30 -MPSL		下午1:20 -MPSL理	
	15	16	17	18	19	20
			下午6:30 -MPSL		下午1:20 -MPSL理	
	22	23	24	25	26	27
			下午6:30 -MPSL		下午1:20 -MPSL理	
	29	30	1	2	3	4
			MPSL 提案檔案繳 校運會白天停課 下午6:30 -MPSL		下午12點 -MPSL	
						5

2020 交大微處理機 MPSL

2020年12月 (台北標準時間)

週日	週一	週二	週三	週四	週五	週六
	29	30	1	2	3	4
			MPSL 提案檔案繳 校運會白天停課 下午6:30 -MPSL		下午12點 -MPSL	
	6	7	8	9	10	11
			MPSL 淘寶大採購 下午6:30 -MPSL		下午1:20 -MPSL理	
	13	14	15	16	17	18
					下午1:20 -MPSL理	
	20	21	22	23	24	25
			進度追蹤		期末考週 下午1:20 -MPSL理	
	27	28	29	30	31	1
期末考週					開國紀念日	2

2020 交大微處理機 MPSL

2021年1月 (台北標準時間)

週日	週一	週二	週三	週四	週五	週六
27	28	29	30	31	1	2
期末考週					開國紀念日	
3	4	5	6	7	8	9
專題展						
10	11	12	13	14	15	16
					學期十八週結束	
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Working Items

- Turn on group list next Fri (9/25)
- Issue the kit today (9/23)
- Lab notes/Slides
 - Download from new E3 system

Other rules

- You have to let me know first for any absence of this class
- Encourage to ask questions and discussion
- Buy back if you did not maintain your kit well
- You are encouraged to have your own kit