

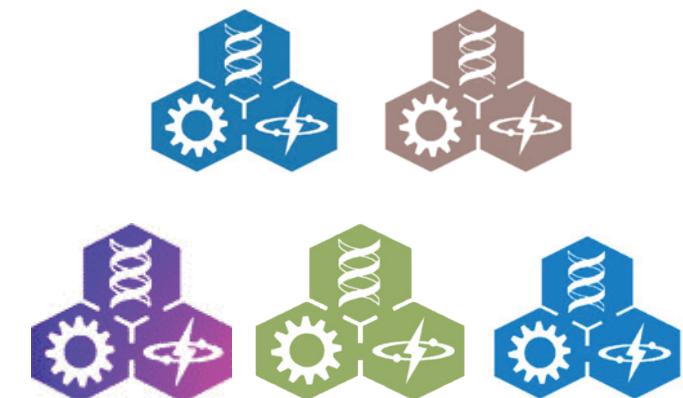
Principles and Applications of Microcontrollers

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Dept. of Bio-industrial Mechatronics Engineering
National Taiwan University

Today:

- Course introduction



Synopsis

- Course introduction
- Your choice – 3 plans for you
- Instrument introduction
- Lab0

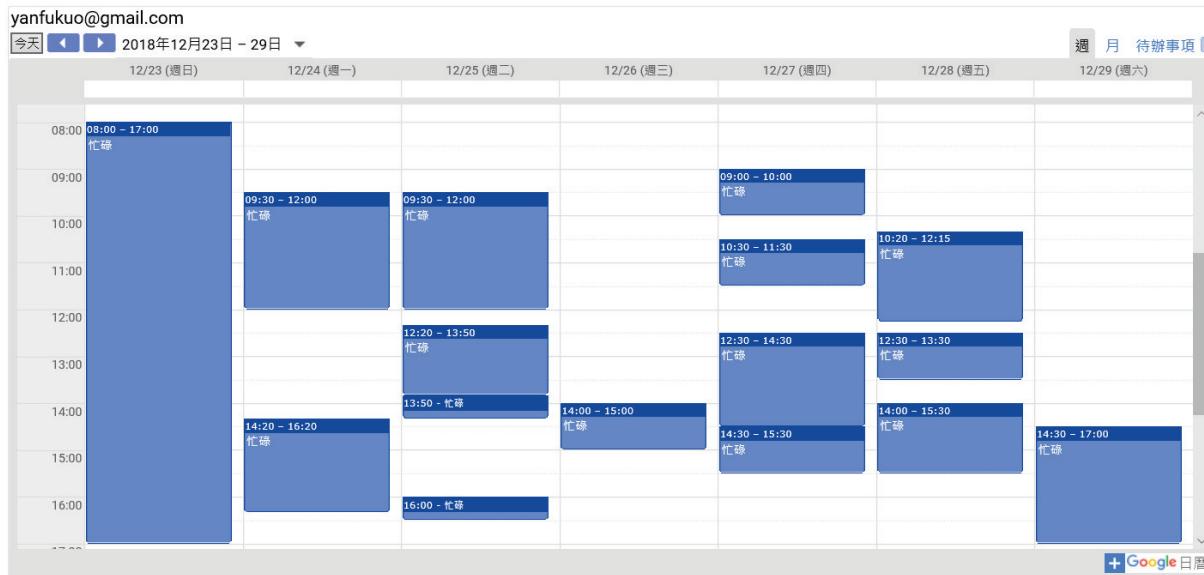
Instructor



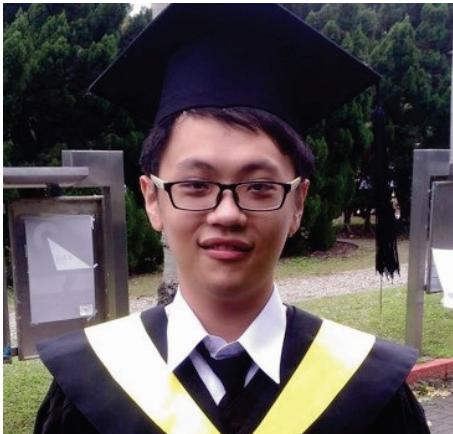
= 大鍋

- Yan-Fu Kuo (ykao@ntu.edu.tw)
- Office: Rm. 206, Main Farm Machinery Hall
- <https://sites.google.com/view/mlmv/my-calendar>

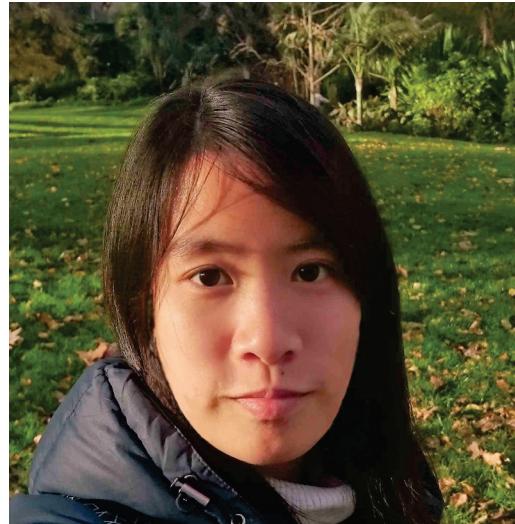
老師行事曆



Teaching Assistants



- 粘書耀 (Andy)
- Rm. 304,
Tomatake Hall
- 3366-5354



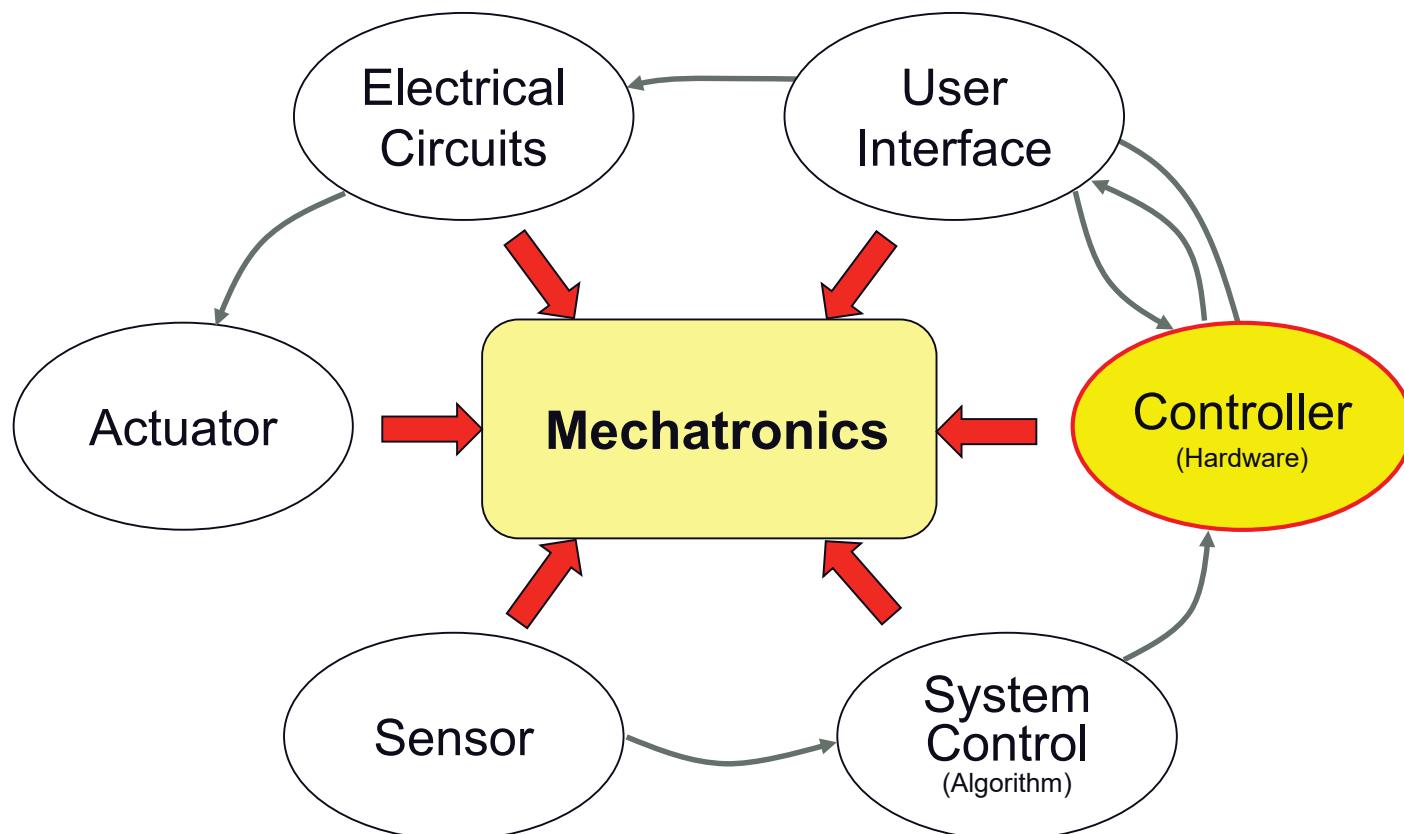
- 吳芳 (Fang)
- Rm. 405,
Tomatake Hall
- 3366-5377



- 方品智 (Frank)
- Rm. 405,
Tomatake Hall
- 3366-5376

Mechatronics Concept Map

- What role does the microcontroller play?

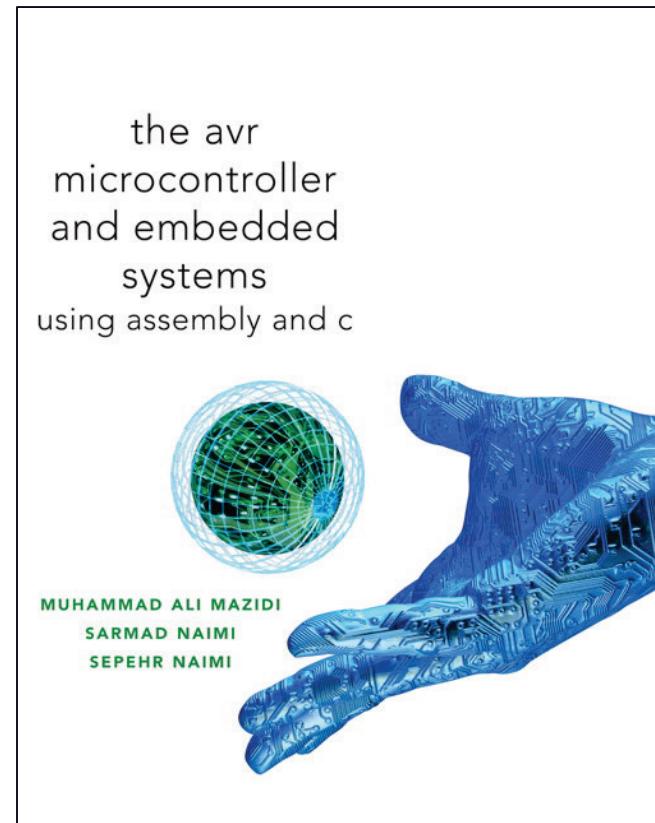
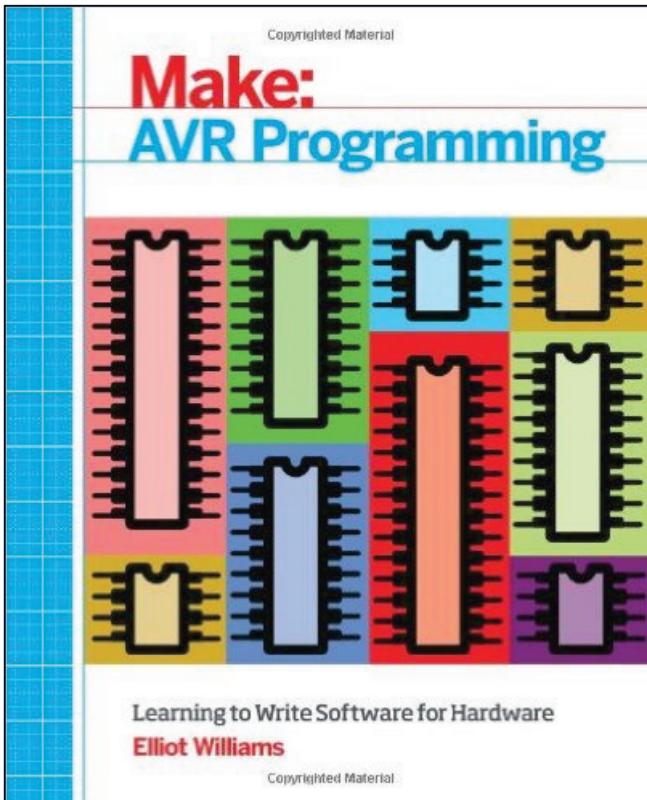


Tentative Schedule

Week	Date	Lecture Topic	Assignment
1	02/18	Introduction	Lab0
2	02/25	Arduino 1	Arduino Lab1
3	03/04	Arduino 2	Arduino Lab2
4	03/11	Arduino 3	Arduino Lab3
5	03/18	Arduino 4	Arduino Lab4
6	03/25	AVR C 1 (I/O)	AVR C Lab5
7	04/01	No course – spring break	
8	04/08	AVR C 2 (Timer)	AVR C Lab6
9	04/15	AVR C 3 (ADC & Serial)	AVR C Lab7
10	04/22	AVR C 4 (PWM & Interrupt)	AVR C Lab8
11	04/29	No course – term project announcement	
12	05/06	AVR Assembly 1 (Introduction & I/O)	AVR Assembly Lab9
13	05/13	AVR Assembly 2 (Assembly)	AVR Assembly Lab10
14	05/20	No course – working on the term project	
15	05/27	Term project demo	Report
16	06/03	AVR Assembly 3 (Structured programming)	AVR Assembly Lab11
17	06/10	AVR Assembly 4 (Bit manipulating)	
18	06/17	Final exam	

Reference Books

- "Make: AVR Programming - Learning to Write Software for Hardware" by E. Williams
- "AVR Microcontroller and Embedded Systems: Using Assembly and C" by M. A. Mazidi, S. Naimi, and S. Naimi



Evaluation (Plan A)

- Laboratory assignments: 42%
- Term project: 28%
- Final exam: 30%
- **NOTE: Your attendance is NOT considered!**

Lab Scores (42%)

Lab Number/Name	Difficulty	After		
		Basic	Advanced	Bonus
Lab 0 Instrument	* *		100	
Lab 1 Electronic Piano	*	80	20	
Lab 2 Digital Watch	* * *		100	20
Lab 3 Wheel Robot	*	85	15	
Lab 4 Line Following Robot	* * *		100	10
Lab 5 Button Display	* * *		100	20
Lab 6 E-Piano with 7-segment	*	80	20	
Lab 7 DMS Distance Meter	* *	80	20	20
Lab 8 Wheel Robot	*	90	10	
Lab 9 Number Digits Display	* * *		100	20
Lab 10 Assembly Programming	*		100	
Lab 11 E-Piano with 7-segment	* *		100	
TOTAL			1290	

Term Project (28%)

- Regular competition:
 - Performance: 26%
 - Report: 2%
- Based on the microcontrollers that the students use:
 1. Arduino: 0-18% (from 26% performance)
 2. ATmega328P: 6-26% (from 26% performance)

Past Term Project – Line Tracker



TA Office Hours and Lab Due

- TA office hours:
 - Monday: 7-9pm
 - TBA: 7-9pm



大學教學助理全納勞健保全台5.3萬名學生受惠

udn 联合新聞網 - May 9, 2018

五一勞動節當天，勞團及學生團體為此到教育部抗議，指出教育部放任各 ... 增加身障及原住民勞工員額，預計將增1500人，教育部也將補助5成經費。

- Lab due:
 - **Friday 10pm** of the same week when a lab is released
 - A 20%-per-day penalty will be applied to LATE assignment

Grade Policies

- Individual contributions to the labs and project is considered
- A penalty will be applied to your grade if working area is in a mess
- No makeup exams shall be made except for those who have valid reasons of absences, and can present official documents that prove the reasons of absences
- Academic dishonesty:
 - First time a student is found guilty of academic dishonesty, the penalty is a zero on the assignment, exam, or report
 - All other academic dishonesty cases will be reported to the university

Past Course Comments

• 2016

對於學習MCU要在每周短短三小時內講完實在有點難lol 但是我們是大一又不能教太深的內容XD 有點尷尬 不過希望這門課以後移到大二上，然後再多教一些內容，在上深入一點
課程設計上就有很大的問題.....

把大家都當天才，進度節奏忽快忽慢，設備品質參差不齊，作業評分標準更是最大的問題所在(程式互抄微調、實驗影片一組做完多組一起拍100分，程度不好但認真做的同學分數卻超低?這評分我問號?那個助教是在想甚麼?)其實不少人都覺得啦，經費不夠、設計不完善、投入時間和回報完全不成比例，這種課程的目的到底是?(笑)
結論就是投機取巧、甜言蜜語的拿高分，認真做的吃大虧跟傻子一樣，真心覺得生機系的排課跟老師很病態，丟一堆莫名課程來壓學生，哪來的自由學習?(笑死呵呵)

• 2017

做PROJECT做到想自殺

老師回家做的lab給的資料可以給多一點，寫程式很累、弄電路很累，所以希望資料多一點可以減少一點負擔。
這堂課讓我獲益良多，下次記得先用原有材料成功完成每次的任務再出給學生做。

比賽制度有待加強，建議不要在比賽前一天改地圖，更不要在比賽當天改變地板的條件，器材很爛
希望老師並不是因為去年A+人很多，就改變final project的程度，很明顯比去年難很多，如果老師想降低，其實可以從一些配分改起，並非讓每年的難度一直上下變動，且希望老師可以提供不同器材的方法，而不是要我們要一直自主學習，因為我們沒課本，也不是有很多的時間，畢竟還有其他科目要顧，老師很有教學熱忱，但是有些課程的制度希望不要因為某些奇怪的原因而變動，而且這堂課其實花學生蠻多時間的，A+也可以是努力多寡的代表

期末專題的部份難度有點太高了，應該是學習微控軟體如何coding的課以及微控制器電路如何接的目的，卻都因為硬體的關係(電池、sensors...)浪費很多時間在調整數據上，覺得很沒意義，好幾個晚上幾乎都在調整車速，而且能用的sensor不多，想用其他辦法(e.g.視覺處理)卻又不知道如何coding相關的程式。

課程內容上，覺得有些程式觀念跟教學後能用的東西有點空泛，感覺並不足以完整的運用課堂中所接觸到的微控制器的所有功能。

Now... Your Choice

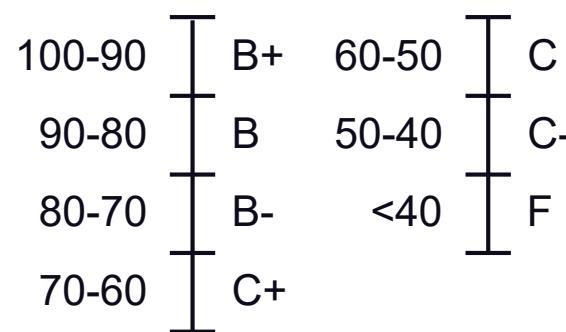
- Considerations:
 - The course materials are challenging
 - I give more labs (a total of 12), compared with another P.
 - We have limited capacity and resource

Plan A:

- Labs: 42%
- Term project: 28%
- Final exam: 30%

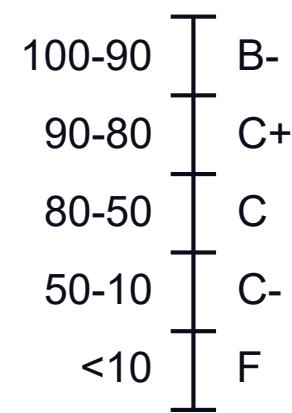
Plan B:

- Labs: 50%
- Final exam: 50%



Plan C:

- Final exam: 100%



Reminder

- Bring your own laptop if you have one
- Download and install “Arduino” to your laptop
(<http://www.arduino.cc>)



Getting Started

