NUS
National University
of Singapore

CG2271
Course Overview

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The Architecture for the Digital World®
ARM

About Me

- Ravi Suppiah
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- Email: ravi.suppiah@nus.edu.sg
- Consultation:
  - By appointment through email (Zoom Sessions)
  - By WhatsApp 90688413
- My research interests: Embedded Systems Design & Development / Robotics & Mechatronics
- Industrial experiences: HP Singapore, R&D Embedded Software Engineer

Teaching Assistants

SEAN TAN (GT)

RAMANATHAN VAISHNAVI (Lab)

DANIEL TAN (Lab)

ELANGO PRAVEEN (Lab)

GUNIT MITTAL (Lab)

VO QUANG HUNG (Tut)

DUAN YU HANG (Tut)

LOOI KAI WEN (Tut)

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Course Components

- Lectures: 11/12 weeks, 2 hours/week
- Tutorials: 9 tutorials
- Labs: 8 labs+ 1 Project
- Assessment*: *- subject to changes
  - Final Exam (40%)
  - Midterm (15%)
  - Lab Attendance & Demo (5%)
  - Project (40%)

When is your final exam?

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Detailed Schedule

CG2271 Full Schedule AY2122 SEM1				
Week	Dates	Lecture	Tutorial	Lab
1	9th Aug - 13th Aug	Lect0: Course Overview Lect1: Introduction		
2	16th Aug - 20th Aug	Lect2: SW Design Basics Lect3: CPU		Lab1. System Setup + Blinky I/O
3	23rd Aug - 27th Aug	Lect4: GPIO Lect5: Interrupts	1. CPU & GPIO	Lab2. Port Interfacing for RGB LED
4	30th Aug - 3rd Sep	Lect5: Interrupts (Cont) Lect6: AnalogInterfacing	No Tutorial	Lab3. Lab ISR
5	6th Sep - 10th Sep	Lect7: Timers	2. Interrupts	Lab 4: PWM
6	13th Sep - 17th Sep	Lect8: Serial Communication	3. Timers & Serial	Lab 5: Lab Demo
Recess Week	18th Sep - 26th Sep			
7	27th Sep - 2nd Oct	Lect9: Intro to RTOS Lect10: Processes	No Tutorial	Lab6. Real-Time Multithreading
7	27th Sep - 2nd Oct	Lect11: Scheduling Lect12: Concurrency	4. RTOS & Process Concepts	Lab: Mini-Project
8	4th Oct - 8th Oct	Lect13: RTOS RTX Lect14: Messaging & Synchronization	5. Scheduling & Concurrency	Lab7. Data Protection & Message Passing
9	11th Oct - 15th Oct	MIDTERM	6. Task Synchronization	Lab: Mini-Project
10	18th Oct - 22nd Oct	Lect15: Memory	7. Communication	Lab8. Events and Flags
11	25th Oct - 29th Oct	Lect16: Watchdog and DMA	8. Memory	Lab: Mini-Project
12	1st Nov - 5th Nov	Lect17: Virtual Memory	9. DMA, Watchdog	Lab: Mini-Project
13	8th Nov - 12th Nov	No Lecture	No Tutorial	Mini-Project Demo

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Curriculum

- SIGNIFICANTLY Different (for the better) than in the past (Before AY1920SEM2)!
- Why?
  - Long Story….(to be explained in class)
- What is covered now?
  - A lot of really cool stuff that you can brag about!
- The content is relatively NEW and EVOLVING. Expect changes for the better.
- THANK YOU for your Understanding and Patience!
- If you don't see new material uploaded by Saturday Night, Whatsapp or Email me.

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Textbook

- No Particular Reference Text is needed.
- All required material will be provided.
- Lots of reference material and sample HW/SW solutions available online.

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Tutorials

- Starts from Week 3
- Attendance will be marked.
- Participation ("Volunteering") is required for at least 4 sessions.
- All tutorial questions will be available in **LumiNUS**
- Necessary to attempt questions before tutorial
- Feedback channel is always open.
- Video Explanation will be released ~1 week after current tutorial.

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Lab Arrangements

- ARM Cortex M0+ Processor Core (32-bit)
- THREE/FOUR per team (Preferably FOUR).
- Certain Labs will have Demo Requirements.
- The TA will also ask some basic questions which you SHOULD be able to answer.
- Marks will be allocated based on your demo and answers.
- There is NO report submission for these Demos.
- There is Final Report Submission.
  (to be discussed at a later time)

FRDM KL25Z Board

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Project

- Items will be issued starting from **Week 2**
- THREE/FOUR students per team
  - One Robotic Kit will be issued to each team
- You are to complete the assembly of the items and code the software in **RTOS RTX**.
- More details of the actual requirements will be released soon.
- Deliverables: Working Prototype that fulfills all the basic requirements
- Assessment:
  - Basic Deliverables
  - LeaderBoard Ranking (x3)
  - 2-3 Min Video

Sample from you Seniors!

https://youtu.be/iLDavXZqZ5o

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What is this course about?

- This course teaches you about Real-Time Operating Systems.
  - Advanced Microcontroller Programming.
  - Real Time Programming Models.
  - Basic operating systems concepts like processes, scheduling, inter-process communication and coordination, etc.
- This is an mixed course.
  - Advanced Embedded Systems concepts with Intermediate RTOS concepts.
- However it prepares you for future courses and projects on real-time embedded systems.

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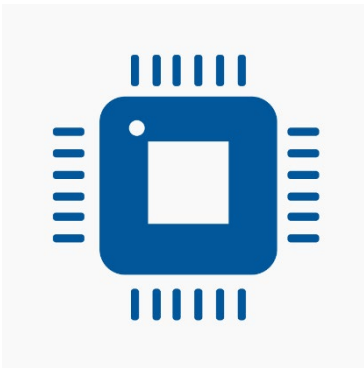
Learning Material

- Primary information source is LumiNUS.

https://www.docr.sg/



http://www.emkernel.com/

- Subscribe to the YouTube Channel to get timely updates on weekly videos that will be released.

https://www.youtube.com/c/docrsg

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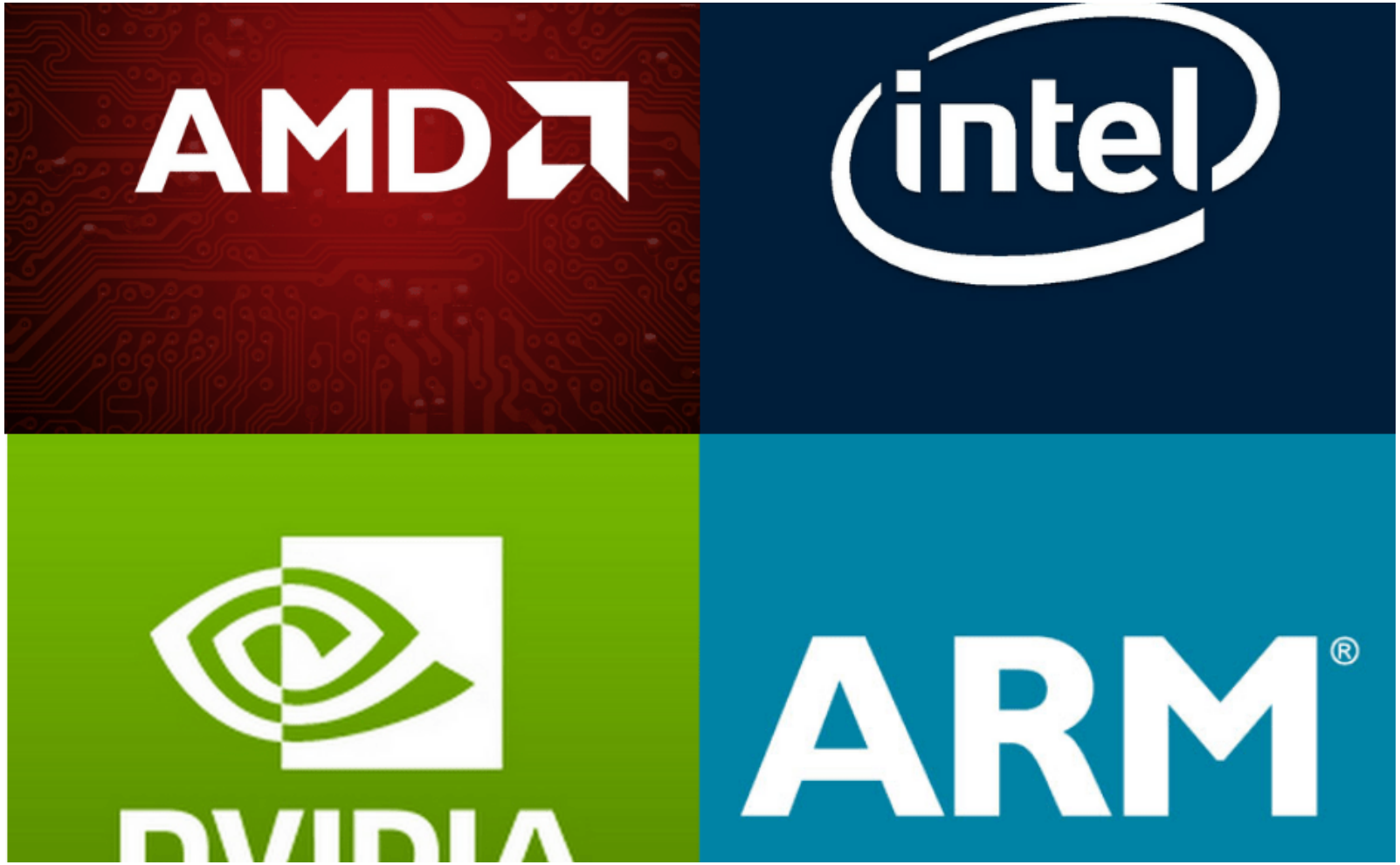
Some Motivation!



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Food for thought…

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Thank You!

- Lets do a Poll!
- https://pollev.com/rsnus

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