



Queen Mary
University of London

Science and Engineering

School of Electronic Engineering and Computer Science
QMUL-BUPT Joint Programme

EBU6475 Microprocessor System Design

EBU5476 Microprocessors for Embedded Computing

Module Introduction

arm

Last updated: 26 February, 2022

University Program Education Kits

Teaching Team

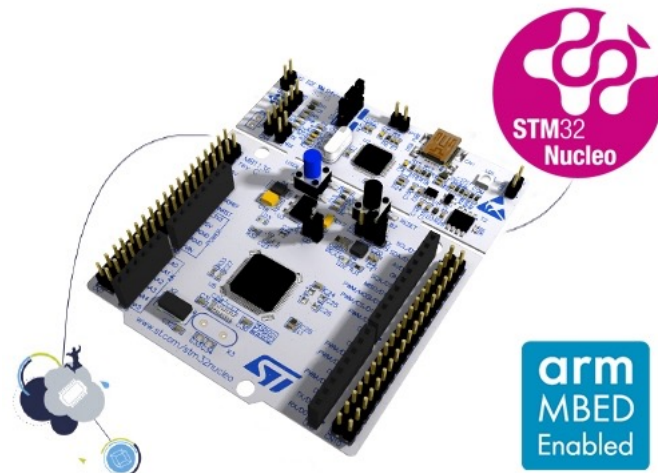
Lecturer	Email
Dr Ethan Lau MO (Telecom Wireless)	e.lau@qmul.ac.uk
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Dr Matthew Tang MO (IoT)	matthew.tang@qmul.ac.uk

Communication Channel

- For questions & discussions, use QMPlus message board
- For personal issues, use emails with a proper subject [EBU6475] ... (or [EBU5476 ...])

Embedded Microprocessors - Examples

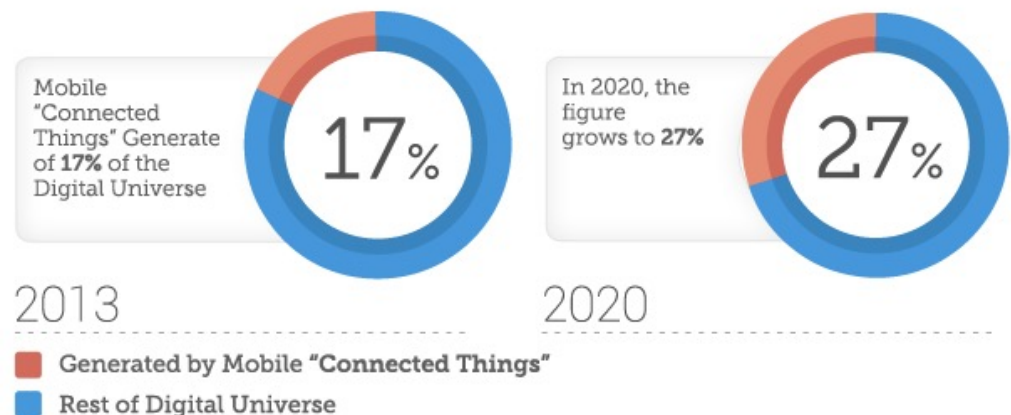
- We use general purpose computers like desktop and laptop PCs (personal computer) a lot every day.
 - Inside, there is a microprocessor that handles the majority of the computation.
- Actually there are many more microprocessors hidden in printers, thermostats, calculators, cars, etc. to provide intelligent control of the systems. These are called **embedded microprocessors**.



Embedded Systems: What they do?

How are embedded systems used in our modern world?

- Data acquisition: sensors from different environments generate a huge amount of data
- Local computation: we need proper filtering and some processing of data
- Network connectivity: the system communicates with each other and share information.
- Local actuation: affect and change the physical world with messages.



source: <http://www.emc.com/leadership/digital-universe/2014iview/internet-of-things.htm>

Module Theme:

Efficient Embedded Systems Design

- Understand the basic working principle of a computer.
- Familiarise with the architecture and organisation of ARM Cortex-M microcontrollers (MCU)
- Learn and master C and Assembly programming techniques of Cortex-M MCUs.
- Investigate and practise important embedded system software development with GPIOs, interrupts and hardware protocols like I²C or SPI.
- Study programming techniques for Power-Efficient Computing (if time allows)

Assessment

Coursework	Items	Weights	Remarks
	Keil uVision setup	1%	
	Labs x 3	24% Each 8%	ARM C/assembly programming Present your code and simulation and/or board verification in short video.
	Exam	75%	Covers everything - lectures, labs and other coursework.

All other exercises, quizzes, etc. are **formative** and they are useful learning resources even though no marks are given.

Blended Learning

- Live sessions: summary lectures, tutorials and discussions, exercises. These are led by lecturers on MS Teams.
- Pre-recorded videos: explanation of the slides, demonstrations of lab tools, etc.
- Office hours (live): lecturers will collect and questions from the class and answer them.
- Revision: cover taught material and help build the concepts.

QMPlus

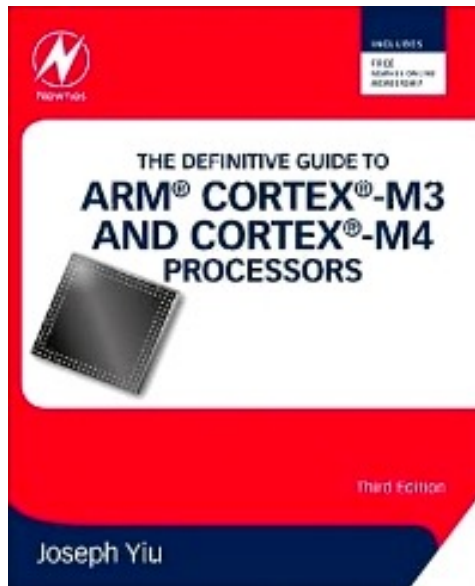
- Course materials: link to live and pre-recorded videos on Echo360, lecture notes, quizzes, exercises
- Lab materials: softwares/tools, lab manuals, submissions, feedbacks
- Coursework: all to be submitted online
- Administration: announcements, updates, grades, etc.

**Please make sure that you can access the course area.
Remember to check the site regularly for news/updates.**

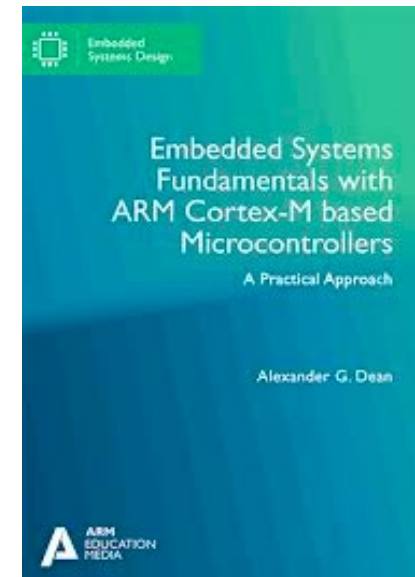
Suggested Readings

Note: There is NO a single textbook that covers the various materials in this module.

These are available online via QMUL library website.



The Definitive Guide to ARM® Cortex®-M3 and Cortex®-M4 Processors
3rd Edition by Joseph Yiu

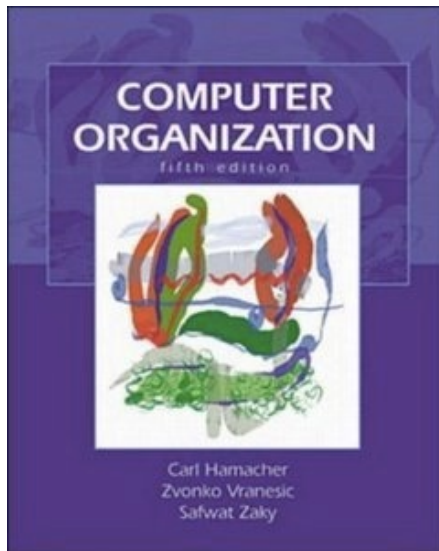


Embedded Systems Fundamentals with Arm Cortex-M Based Microcontrollers: A Practical Approach by Alexander G. Dean

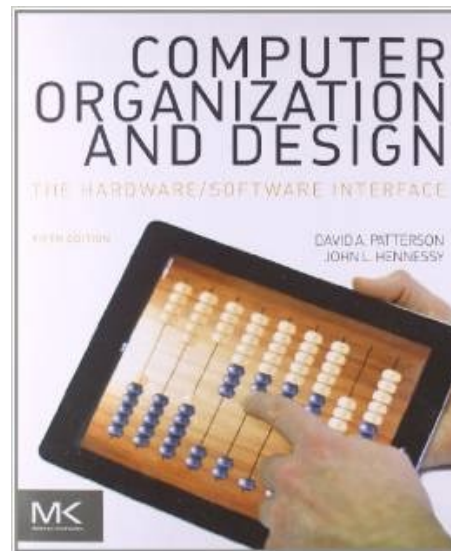
Useful References

These are also available online via QMUL library website.

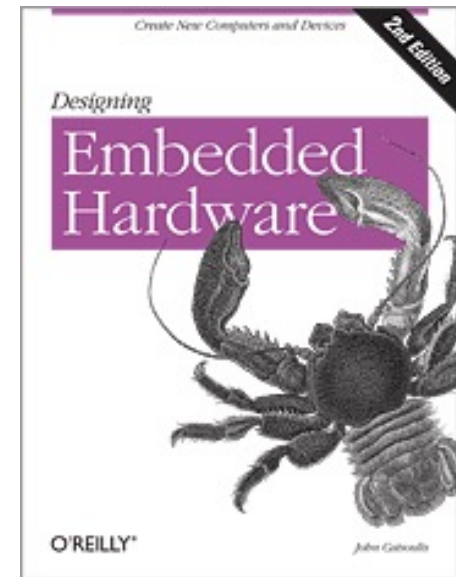
Computer Organization
(5th edition)
By Carl Hamacher et. al.



Computer Organization and
Design: The Hardware/Software
Interface (5th edition)
By David A. Patterson, John L.
Hennessy



Designing Embedded
Hardware, 2nd Ed
By John Catsoulis



Do you have any questions?

Please make use of the QMPlus student forum / message board for questions and discussions outside live sessions.