Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

00–Introduction

CS1022 – Introduction to Computing II

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Learning Outcomes

On successful completion of **CS1022** you will be able to:

Describe the characteristics, structure and operation of a microprocessor system, **including the execution of subroutines and interfacing with external components and devices**;

Translate between high-level programming language constructs, including **data structures and subroutines**, and their assembly language equivalents;

Design, construct, document and test assembly language programs to solve small-scale problems of moderate complexity **by decomposing the problems into smaller parts and implementing solutions consisting of one or more assembly language subroutines**;

Construct assembly language programs that can process input from and output to external devices.

Why? Some samples …

embedded systems software development (including embedded operating systems)

understanding and reasoning about innovations in microprocessor design

reasoning about hardware and software performance

developing performance-critical software using advanced microprocessor features (e.g. parallelism)

understanding and reasoning about vulnerabilities (e.g. “Spectre” and “Meltdown”)

…

Assessment

CS1021

- Introduction to Computing I
- 5 credits
  (out of 60 for the full year of your degree course)
- Labs (4)
- Assignments (2)
- 2 hour examination
  (worth 70% of CS1021)

CS1022

- Introduction to Computing II
- 5 credits
  (out of 60 for the full year of your degree course)
- Graded Exercises (4)
- Mid-Term Assignment
- 2 hour examination
  (worth 70% of CS1022)

Timetable

Lectures

Monday 2pm in LB01

Wednesday 9am in LB04

Tutorials

Tuesday 9am **or** 2pm in LB107 **every second week**

Check which time and which weeks you should attend on Blackboard (available next Monday)

No tutorial in Week 1

Labs

Friday 11am, 12 noon or 1pm in LG35/LG36

Check which lab you should attend on Blackboard (available next Monday)

No labs in Week 1

New Lab Pairs

Attendance and Deadlines

Attendance at all lectures, labs and tutorials is compulsory

In practice … catch up as quickly as you can (e.g. by working through lecture notes, tutorials and lab exercises in your own time)

- obtain material not available on-line from other students
- inform your tutor if you miss (or will miss) a major deadline or will be absent for more than a day

Zero marks for late coursework without explanation

You may be returned as Non-Satisfactory (see College Calendar) if you miss more than one-third of your Lectures, Labs or Tutorials, if you fail to participate in more than one third of your Lab Exercises or if you fail to submit the term Assignment.

Your Own Work

When you submit work as part of an exercise or assignment, you are implying that it is your own work

DO indicate where you received help from someone other than a lecturer, teaching assistant or demonstrator

DO indicate where you have used other sources of information (e.g. websites or text books)

DON'T share your work with other students – in your year or any other year – you will make it harder for them to succeed in College

DO discuss your work with each other, ask another student for hints to solve problems, ask for assistance fixing bugs, etc.

DO be prepared to explain any work that you submit and expect us to use plagiarism detection tools such as *TurnItIn*

Taking credit for someone else's work without giving them due recognition is a serious academic offence (plagiarism, see your course handbook)

Recipe for Success

Do all of the coursework (tutorials / labs / assignments)

Do the coursework yourself

Don’t expect to understand every concept the first time you see it

If you don’t understand something, spend extra time studying it

If necessary, get help from classmates demonstrators or lecturer

Don’t wait before seeking help

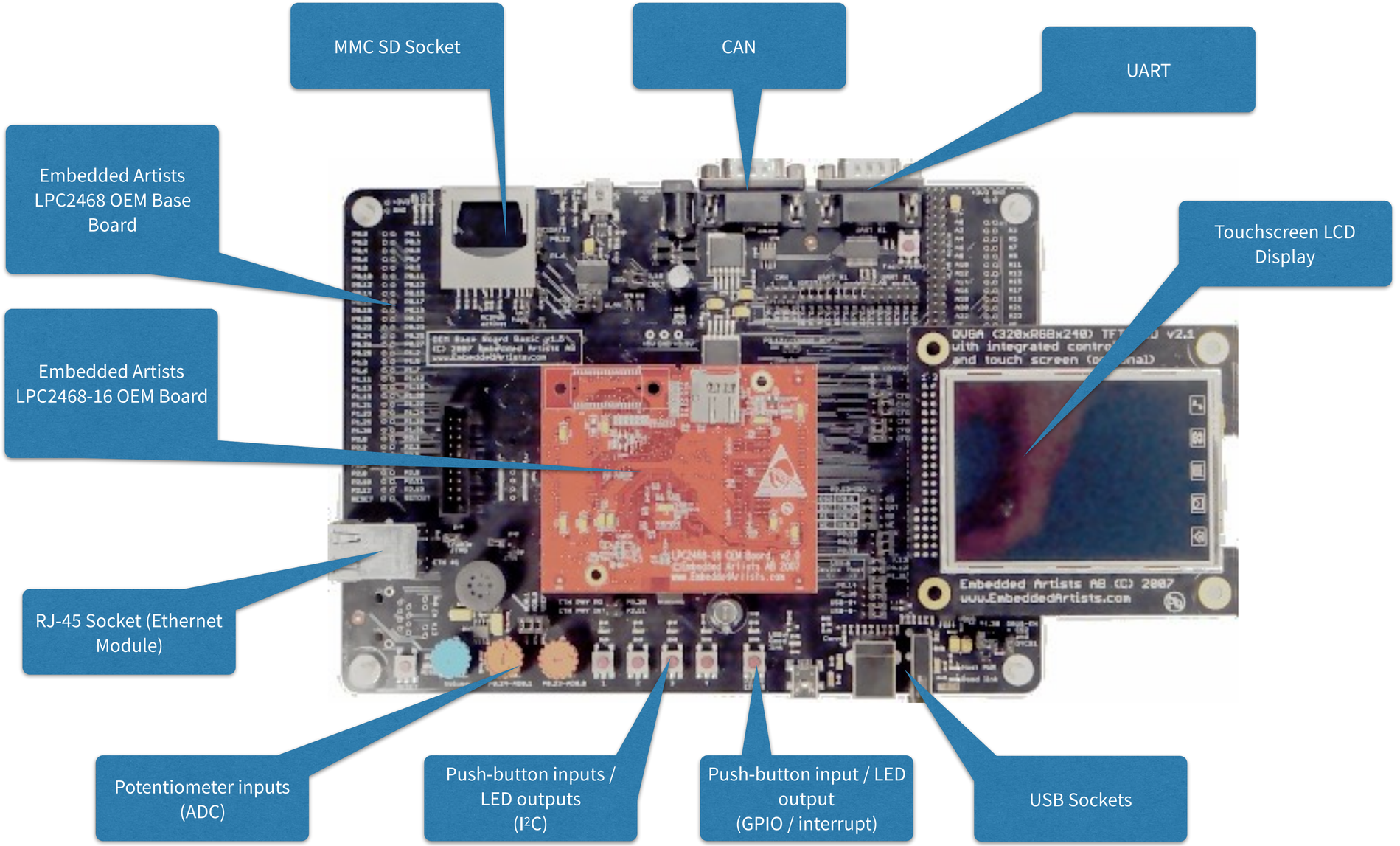
Don’t wait for someone to tell you that …

- you haven’t handed in coursework
- you don’t understand something
- you haven’t been attending lectures / tutorials / labs

Don’t think that if you don’t understanding something now, you can fix it later before the exam … this module doesn’t work that way!

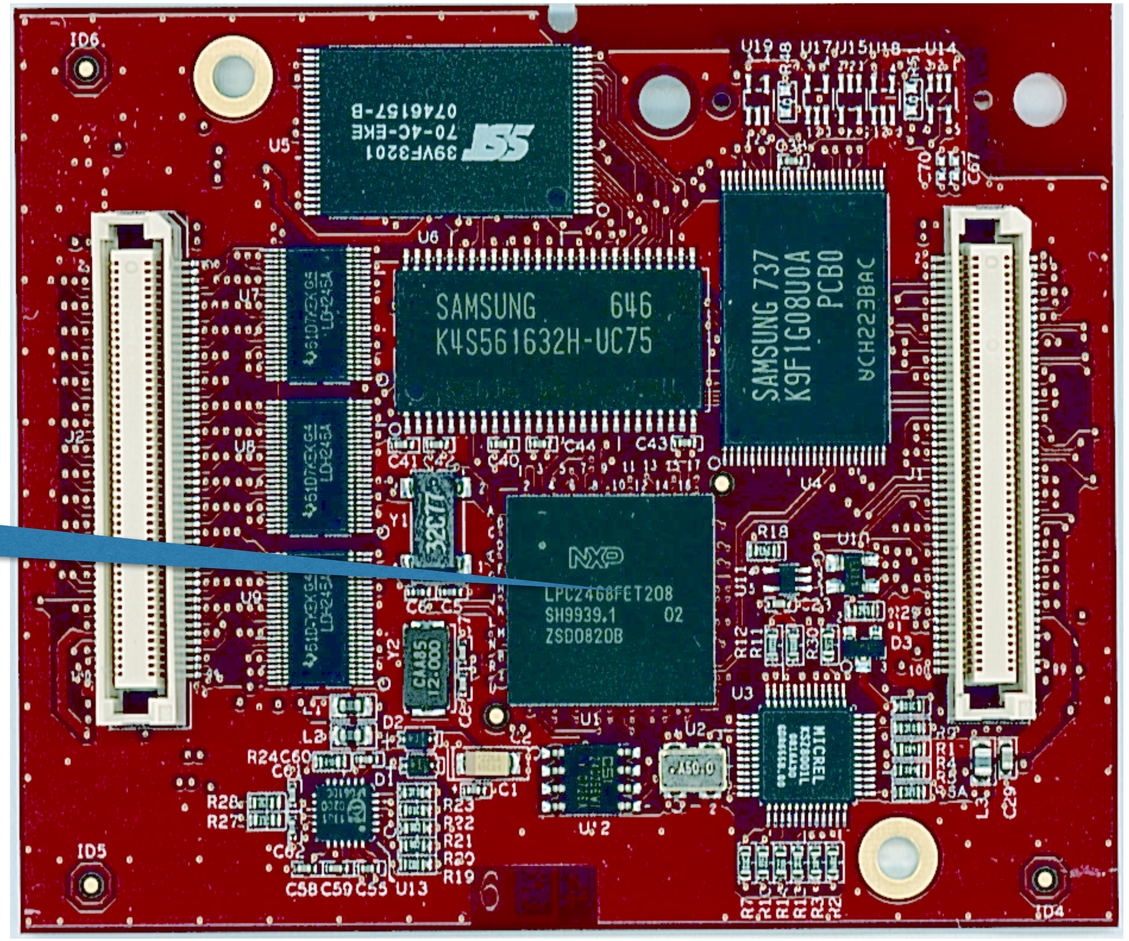
5 credits implies 100 to 125 hours of effort

LPC2468 Development Kit



LPC2468 OEM Board

NXP LPC2468
Microcontroller



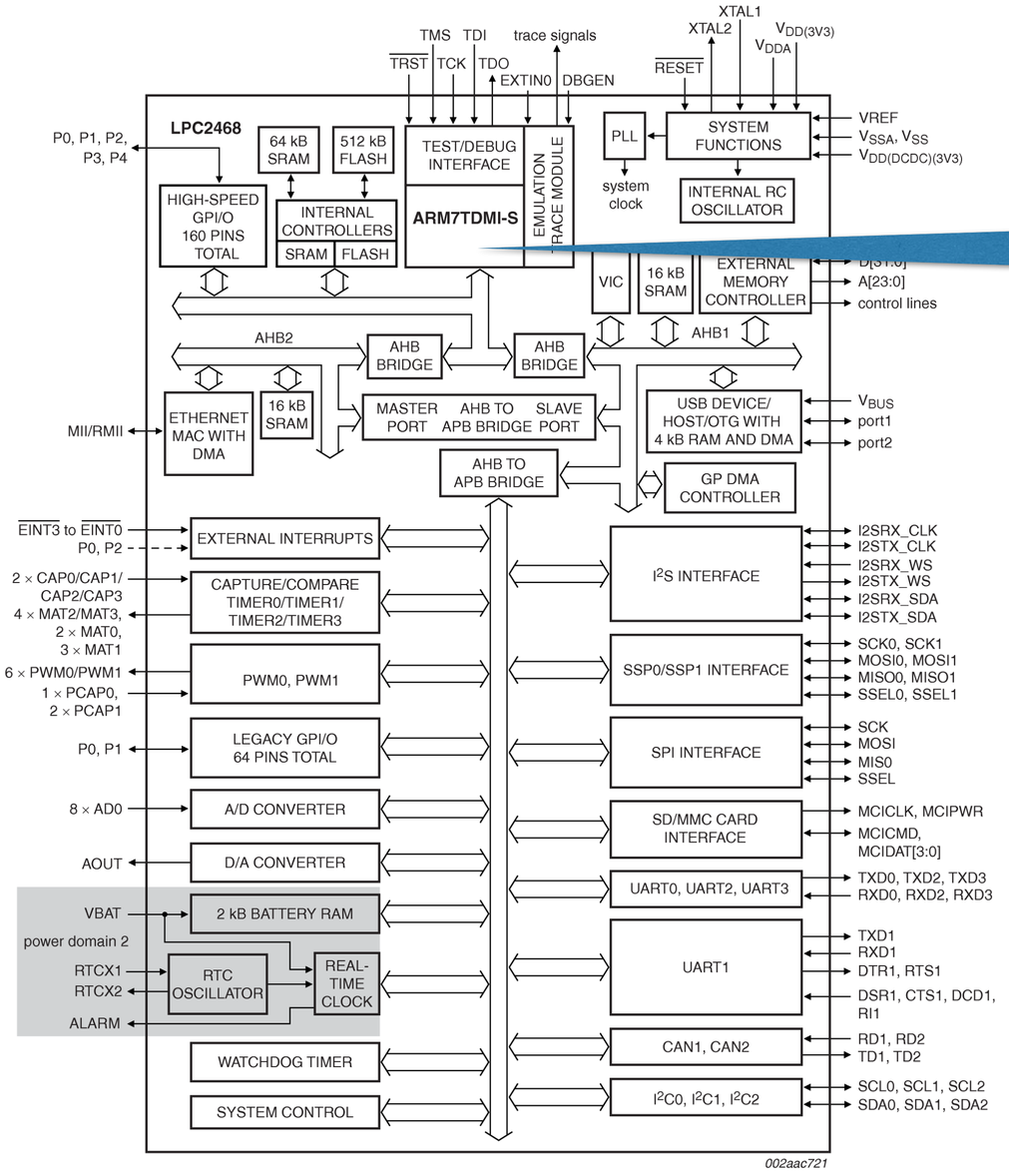
LPC2468 Microcontroller

"System-On-a-Chip"

Often used in **embedded systems** applications

Single chip integrates:

- Microprocessor
- Memory (RAM, ROM/Flash)
- I/O (UART, Ethernet, USB, I2C, SPI, CAN, SD, etc.)
- Mixed Signal (analog-to-digital, digital-to-analog)
- Support (clocking, "glue" logic)
- etc.



ARM7TDMI-S Microprocessor Core

LPC2468 User Manual

Successor to the ARM7TDMI?

ARM Cortex-M series (M0, M1, M3, M4, M7)

e.g. Nordic Semiconductors nRF52832

- ARM Cortex-M4 microprocessor core
- 2.4GHz radio (for Bluetooth Low Energy or ANT)
- 32kB RAM, 256kB flash memory
- Various other peripheral device
- Integrated in a 6mm x 6mm 48-pin package (“chip”)
- Cost – about €2

- Applications?