ARM Cortex-M Microcontrollers

Chapter 0
Course Introduction

Ninh Khánh Duy
ninhkhanhduy@gmail.com
Department of Embedded System, Faculty of IT

Spring 2017

Course's objectives

- To understand the architecture of ARM Cortex-M family
- To master the interfacing between μC and other devices
- To acquire skills on programming & debugging these μCs
- To be familiar with simple applications of ES

Course's materials

- Required textbook:

Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language and C, First edition, Yifeng Zhu. E-Man Press LLC, 2015

- Visit http://web.eece.maine.edu/~zhu/book/tutorials.php for tutorials and lectures

Course's labs

- Referential labs:

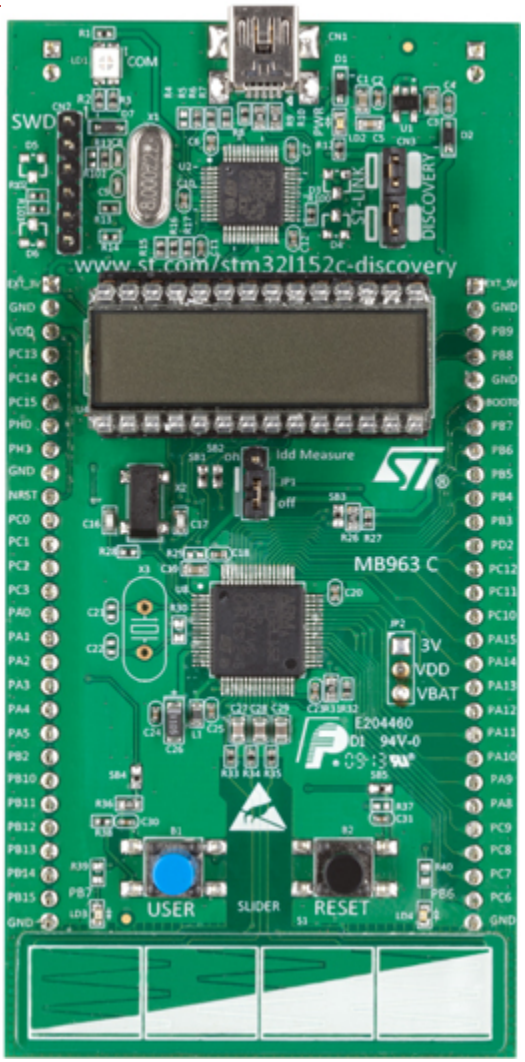
http://web.eece.maine.edu/~zhu/book/lab.php

- Lab's kit:

STM Discovery kit with **STM32L152RCT6**

http://www.st.com/web/en/catalog/tools/PF258515

- 10 groups per lab
- Each group should prepare:
  - USB type A to mini-B cable
  - Laptop PC with Windows
  - 3 labs intended



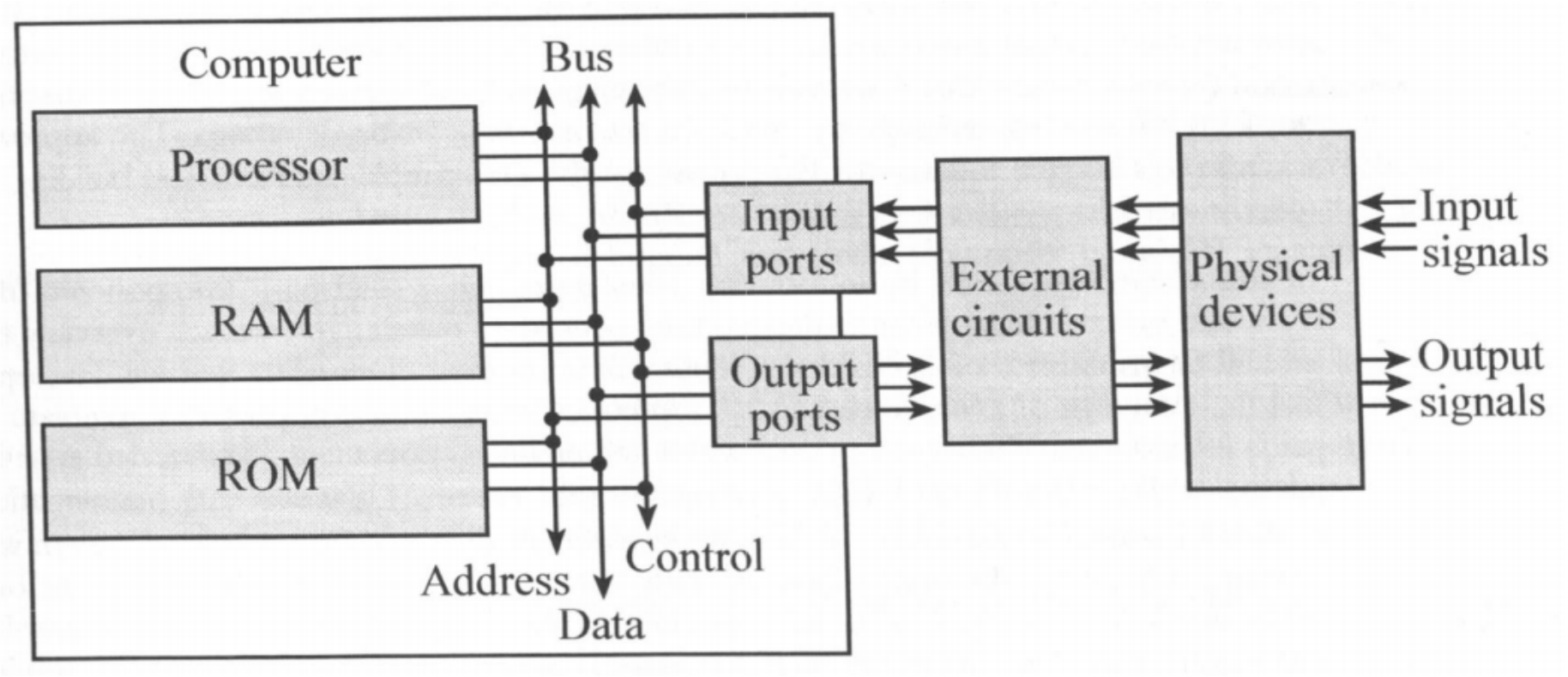
Grading

- Midterm: 20%
- Homework: 20%
- Final exam: 60%

All are paper-based tests

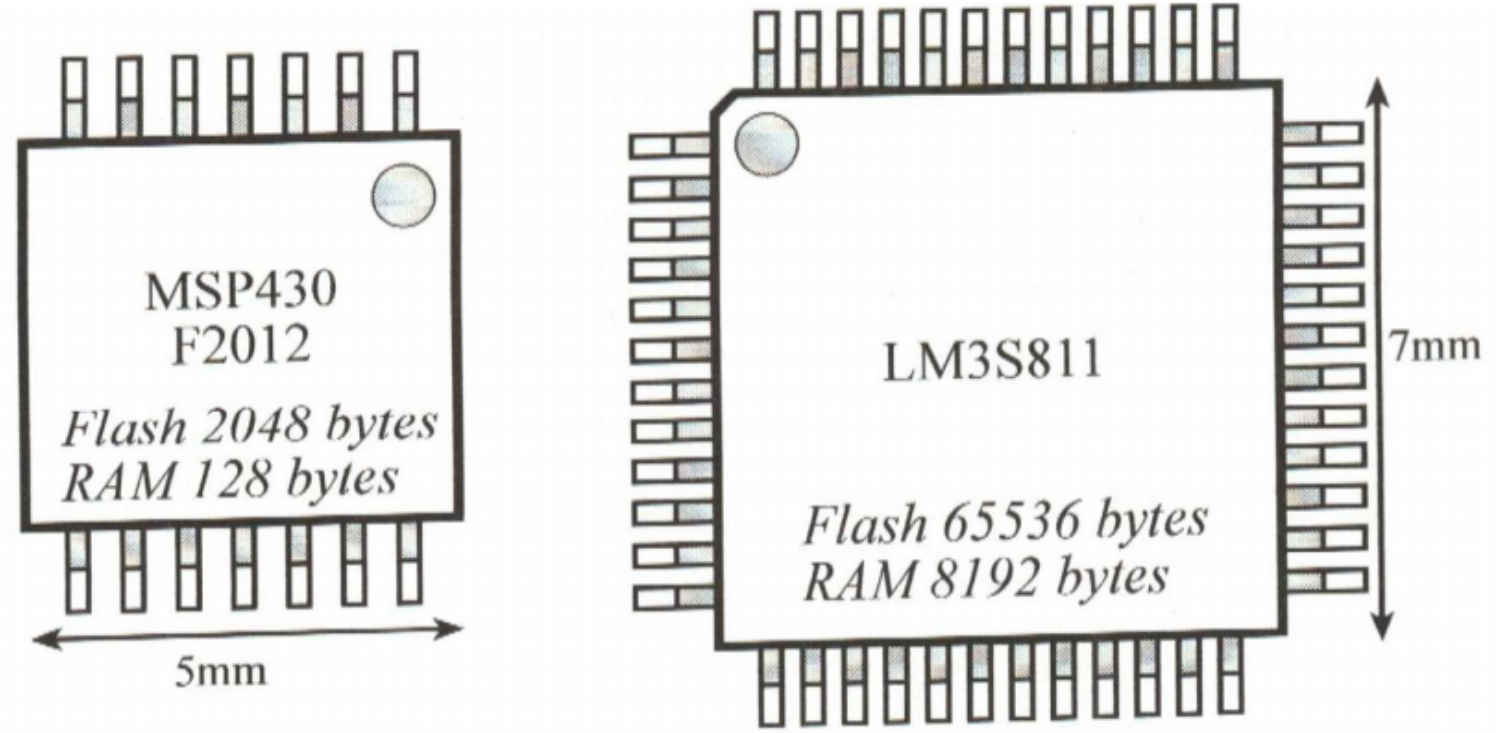
Computer

- A computer includes processor, memory, and I/O ports



Microcontroller

- A microcontroller (μC) is a complete computer on a chip



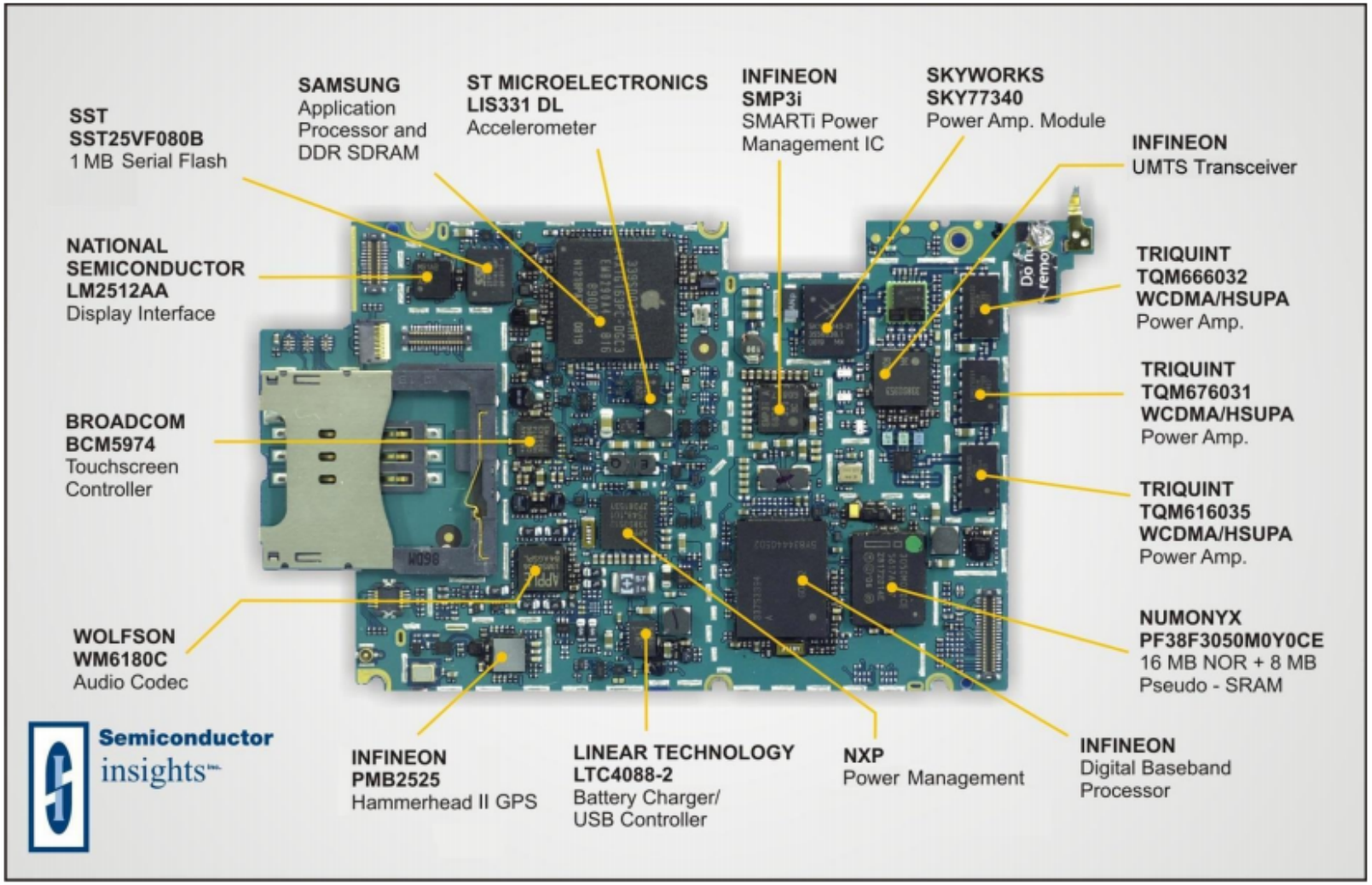
- RAMs are volatile, while ROMs are nonvolatile
- Static RAM is much faster than Flash ROM, but information density is lower

→μCs have large Flash to store the software & smaller RAM to store temp. data

Embedded system (ES)

- An ES is an electronic system that includes one or more μCs configured to perform a specific dedicated app
  - "Embedded" means "a computer is hidden inside so one can't see it"
  - "System" means that there are many components which act in concert achieving the common goal

Example of an embedded system: iPhone



General categories of embedded systems

General Computing

- Applications similar to desktop computing, but in an embedded package
- Video games, set top boxes, wearable computers, automatic tellers

Control Systems

- Closed loop feedback control of real time system
- Vehicle engines, chemical processes, nuclear power, flight control

Signal Processing

- Computations involving large data stream
- Radar, Sonar, video compression

Communication & Networking

- Switching and information transmission
- Telephone system, Internet