Outline

Motivation

Overview of the Week

Reading

How?
Motivation

Software *most complex component* of critical systems
# Overview of the Week

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D. Kroening: [AIMS Embedded Systems Programming MT 2016](#)
Monday

- Introduction

- Micro-architectures
  - CPUs, busses, memory, caches

- Assembler
  - x86 vs. MIPS, ARM
Basics of C

- language
- bit-vector semantics
- functions
- pointers, structs, data structures
- compilation units and modularisation
- memory-mapped I/O, interrupts, threads
Wednesday

- C++
  - classes and objects
  - inheritance
  - exceptions and resources
  - templates

- IEEE floating point
  - representation of numbers and rounding
  - compiler support in C
  - common mistakes and problems
  - basic numerical recipes

- Tooling
  - git, subversion
  - unit testing, regression testing
  - coverage metrics and safety standards, MISRA-C
Thursday

- Labview
- Done by Alessandro Abate
Unified Modeling Language (UML)
  - design spiral
  - behavioural diagrams
  - class diagrams
What?

Prerequisites

▶ Basic imperative programming
▶ Basics of computing hardware

Learning Outcomes

At the end of the course students will:
▶ Be able to undertake basic programming assignments
▶ Self-instruct further techniques and details, as needed
What?

There is more. I am not covering

- Tools for project management
- Requirements
- DSPs and other highly deterministic CPUs
- SoCs
- Power management
- GPUs or vector units
- FPGAs
- ...

No background assumed on any of these either.
Reading

The C++ Programming Language
Bjarne Stroustrup

Programming for Engineers: A Foundational Approach to Learning C and Matlab
Aaron R. Bradley
Schedule

Lectures: MT week 6 Mo–Fr 10–12, LR7

Labs: MT week 6 Mo–Fr 14–16
Labs

- Run by Pascal Kesseli
- DPhil in CS
- He has emailed you!
Assessment

- Assessment is by report
- Due Monday week 7
- Primarily cover what you have done, i.e., your labs, and the lab sheets
- You can skip the trivial stuff
- You can skip Thursday’s stuff