Klaus-Peter Zauner

- Email: kpz@ecs.soton.ac.uk
  Use "COMP2215" in the subject line
- Office: Bld. 32 (South), Room 4031

- Do not hesitate to get in touch if you have problems or questions!
Klaus-Peter’s Research
Molecular Computing

“Wetware”
Klaus-Peter’s Research
Molecular Computing

“Wetware”
Klaus-Peter’s Research
Robotics
Autonomous Vehicles
Klaus-Peter’s Research
Biorobotics

“Living Devices”

Robot Controlled by Emotions of Slime Mould

Slime mould used to create first robot run by living cells

Une moisissure pouvant contrôler un robot!

Slimevamps... skæg styrer robot

Bеспокойная слизь загоняет робота в тёмный угол
Klaus-Peter’s Research

Biorobotics

“Living Devices”

Imagine if Stanley Kubrick and Douglas Trumbull were tasked with making a 1970’s educational science film about the pods from Don Siegel’s Invasion of the Body Snatchers and you’re some way to understanding The Creeping Garden.
Who...

- has a soldering iron at home?
- used a microcontroller before?
- thought about building a robot or an Arduino project?
Who...

- has a soldering iron at home?
- used a microcontroller before?
- thought about building a robot or an Arduino project?
Who...

- has a soldering iron at home?
- used a microcontroller before?
- thought about building a robot or an Arduino project?
Who . . .

- has a soldering iron at home?
- used a microcontroller before?
- thought about building a robot or an Arduino project?
Who...

- is here because they have no choice?
- is here because the other options seem even worse?
- is here and is not registered for this module?
Who...

- is here because they have no choice?
- is here because the other options seem even worse?
- is here and is not registered for this module?
Who . . .

- is here because they have no choice?
- is here because the other options seem even worse?
- is here and is not registered for this module?
Computer Science
50 years from now?
Computer Science
50 years from now?

What about
5 years?
A brief history... 

Over this time we went from thousands of transistors to billions—but the users did not see this progress.
Where did all those transistors go?

With the advent of the world wide web demand in programming drove a large proportion of the computing power gained from Moore’s Law into run-time support to reduce the cost of programming.

▶ Does the compiler produce 1 MB or 10 MB output?  
    → Who cares. . .

▶ Does it take 5 ms or 50 ms to execute?  
    → Who cares. . .

▶ Does the battery last 2 h or 20 h?  
    → Decides whether a product is feasible!
Where did all those transistors go?

With the advent of the world wide web demand in programming drove a large proportion of the computing power gained from Moore’s Law into run-time support to reduce the cost of programming.

▶ Does the compiler produce 1 MB or 10 MB output?  
   → Who cares...

▶ Does it take 5 ms or 50 ms to execute?  
   → Who cares...

▶ Does the battery last 2 h or 20 h?  
   → Decides whether a product is feasible!
Bare-metal Programming
Bare-metal Programming

Is it possible?
This would be impossible without:
Yes it is

...but we can’t start with hello-world.
Beware—this is an unusual module:

You will need

- your own computer and install stuff on it
- to learn a new programming language on the side
- to take the initiative (do & ask)
- to search through a vast amount of technical documentation
Beware—this is an unusual module:

You will need

- your own computer and install stuff on it
- to learn a new programming language on the side
- to take the initiative (do & ask)
- to search through a vast amount of technical documentation
Assessment

- 20 marks: Fun Exercises
- 75 marks: A tough Exam

5 marks: Exceptional contributions—to get from 95%–100%
Fun Exercises (20 marks)

- One a week (8–10 in total)
  - Tue to following Mo (16:00)
- You need to try these yourself!
- After trying seek help (peers, wiki, tutorial)
- Spent 2-3h on it more if you like…
You get full marks for any answer.
Why that?

This solves several problems:

▶ Solutions are just a few lines—copying is undetectable
▶ I don’t want to change tasks just to make it different from previous years—they tend to mutate away from the learning objective
▶ I don’t want to tempt you to download it from pastebin
▶ I don’t want to limit you from learning from each other because of fear of plagiarism
▶ I really really don’t want to mark 60–70 pieces of C-code every week
How do I get Feedback?

- If you submit in time you know you got your marks
  - late submissions $\Rightarrow$ 0 marks
- You fill and submit a self-evaluation form
- You get NO individual feedback from me
  - unless you ask in the tutorial or on the wiki
The tough Exam (75 marks)

- It is tough: not the usual 20 marks you get for showing up

- To do well you’ll need to:
  - try to solve all exercise tasks
  - know, understand, and be able to apply the material covered in the lectures
Page 2 of this form should be completed by the external examiner, followed by the Module Leader and then signed by the moderator and the relevant Director of Programmes.

Report – External Examiner

Comments:

Very good exam. Some little issues are

limited in exam copy.

Applied Understanding,

rather than straight reproduction.
How to fail this module?

Several easy steps:
▶ Delay in getting your tool chain working
▶ Assume reading slides can substitute for the lectures
▶ Don’t do the exercises, just read the model answers
▶ Don’t ask questions

This is not a module where you can lean back, enjoy the show and then study, hard the week before the exam.
How to fail this module?

Several easy steps:

- Delay in getting your tool chain working
- Assume reading slides can substitute for the lectures
- Don’t do the exercises, just read the model answers
- Don’t ask questions

This is not a module where you can lean back, enjoy the show and then study, hard the week before the exam.
15/16 Exam:

Module Analysis Summary COMP2215.xlsx

- Average: 55.6
- Expected average: 60
- Range +: 67.5
- Range -: 52.5
- Average (no zeros): 57.2
- Standard deviation: 18.7
- Qual: 25
- Fail: 40
- Expected failure rate: 15%

Graphs showing distribution of scores with corresponding frequency and cumulative distribution functions.
Exceptional Contributions (5 marks)

- Those are the A* marks
- Exceptional Contributions to the delivery of the module
  - Create good pages on the wiki
  - Fix problems in the course material
  - Participate in Competition
Tough Exam
Resources

- Notes Page
- Student Wiki
  - Post not only questions, but also success with particular machines/environments
FOR YOU TO DO this week:

1. Install the AVR Cross compilation tool-chain
   ▶ Start this tonight!

2. Setup a useful programming environment (esp. editor)
   ▶ Share your experience on the student wiki

3. Friday: pick up your LaFortuna?
   ▶ 2nd Floor Zepler building (59) South entrance
   ▶ Any weekday 09:00–13:00 and 14:00-17:00