F28HS Hardware-Software Interface

Lecture 0: Overview/Edinburgh

Lecturers

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- EM G51
- X3421

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See Vision page for the course for contact details.

Aims

- To gain an understanding of low-level, hardware-oriented and systems programming.
- To develop skills in resource-conscious programming.
- To develop programming skills in such languages.

Syllabus

- Low-level, assembler programming
- Low-level, C programming
- Advanced computer architecture issues impacting software performance (caches, multi-cores, etc)
- Operating system interfaces for low-level software

Syllabus

- Operating system concepts such as device handling, interrupts, BIOS etc
- Embedded systems programming
- Resource-conscious programming techniques (memory, performance; programming techniques, tools, monitoring)

Subject mastery

- Critical understanding of computer architecture concepts and their performance implication for low-level software.
- Detailed theoretical and practical understanding of hardware and operating system concepts, interfacing to low-level software.
- Ability to develop efficient, resource-conscious code, interfacing to hardware components.
- Practical skills in low-level, systems programming, with effective resource management.

Personal abilities

- Ability to articulate system-level operations and to identify performance implications of given systems

Assessment

- Coursework: 40%
- Exam: 60%

Timetable

- 2 lecture slots
- Monday 11.15-12.15 PG G01
- Monday 16:15-17:15 JW2
- 1 tutorial slot
- Tuesday 12.15-13.15 JW 2
- 2 lab slots
- Thursday 11:15-12:15 (EM 2.50): surnames A-K
- Friday 11:15-12:15 (EM 2.50): surnames L-Z

ALM and HWL will alternate in running the tutorial and lab sessions:
- ALM on even weeks
- HWL on odd weeks

Assessed coursework

- CW1: C programming
  - 1 programming in C exercise
    - 20%
    - distributed: week 3
    - submission: week 8
  - coursework will be individual

Assessed coursework

- CW2: Systems Programming on the RPi
  - 1 coursework on systems programming on the Raspberry Pi 2
    - 20%
    - distributed in Week 7
    - submission in Week 12
  - bringing together C & assembler programming, applied to systems programming
  - coursework will be done in pairs

ALM stuff

- she works 3 days a week:
  - Mon, Tue, Thu (and some Fris)
- See Vision page for contact info and office hours
- last year's teaching material is on this www page: www.macs.hw.ac.uk/~greg/courses
- This year's material will be on Vision and on her web page (location still to be fixed)
- always happy for you to drop by my office or send me email if you need help with anything.

HWL stuff

- his main course information page, with all teaching material is at: http://www.macs.hw.ac.uk/~hwloidl/Courses/F28HS
- material is also available through Vision
- office hour is Thu 2:15-3:15pm or
- just contact me per email, or after a lecture

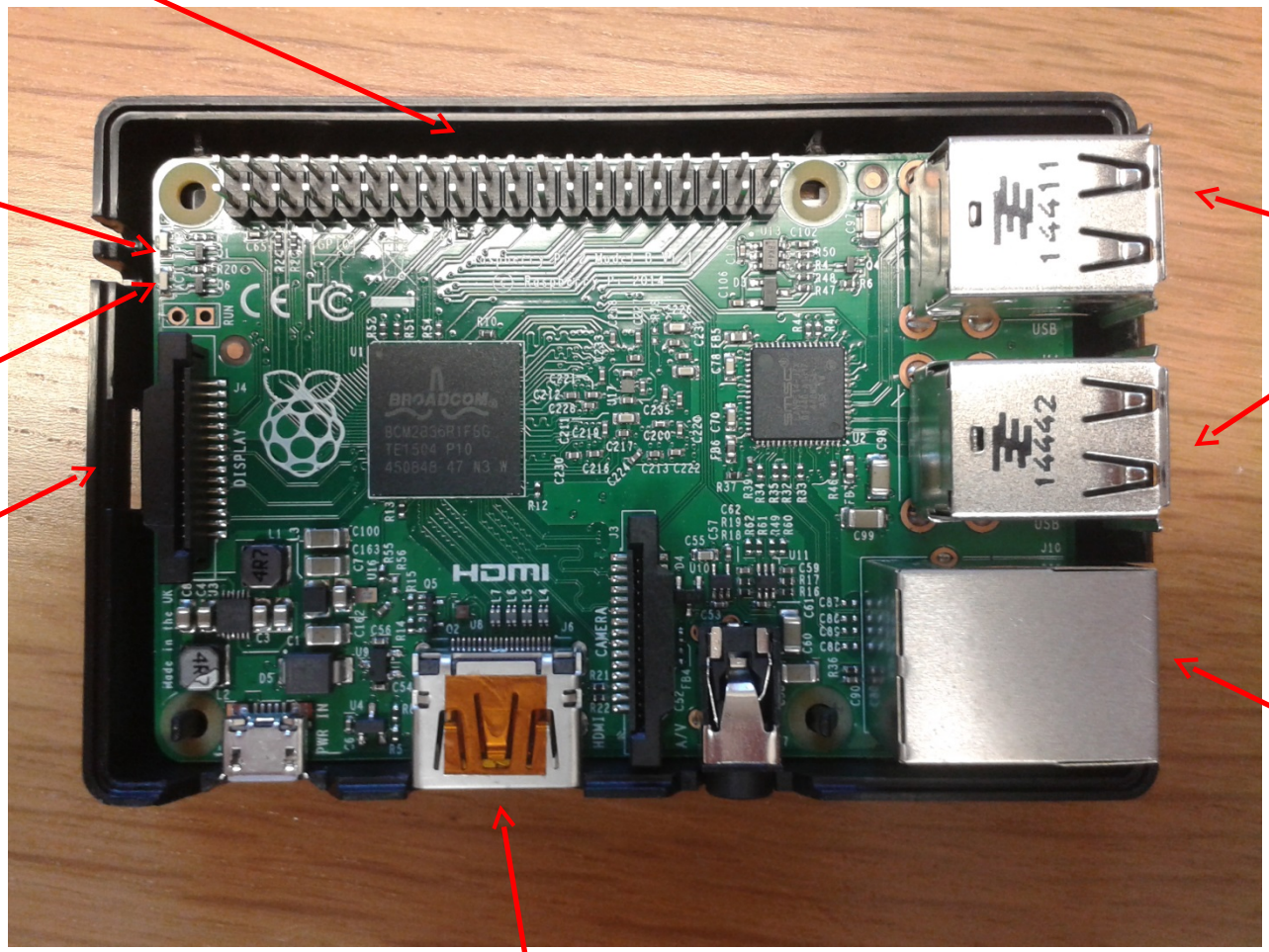
Raspberry Pi

- course based around Raspberry Pi 2 computer
- single board system
- 900 MHz quad-core ARM Cortex-A7
- 1 GB RAM
- runs Raspbian variant of Linux
- BCM 2835 General Purpose I/O (GPIO) chip for hardware/software experiments

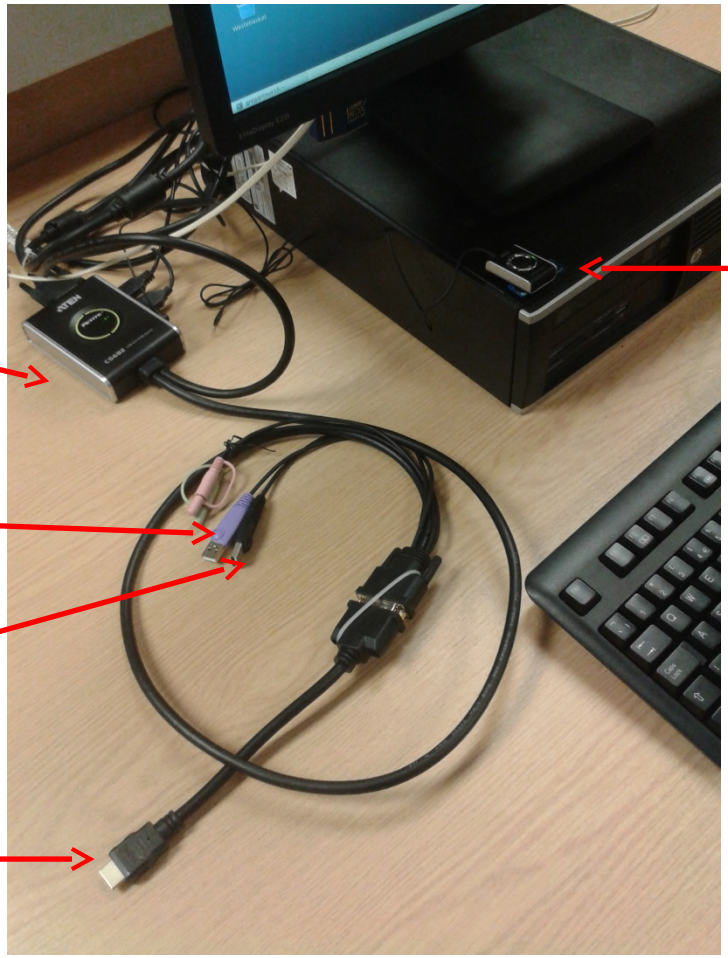
Raspberry Pi

- Raspberry Pi 2 + hardware kit
- available on loan from Computer Technician
- plug in to monitor/mouse/keyboard for Linux desktops in EM 2.50
  - KVM (keyboard-video-mouse) switch

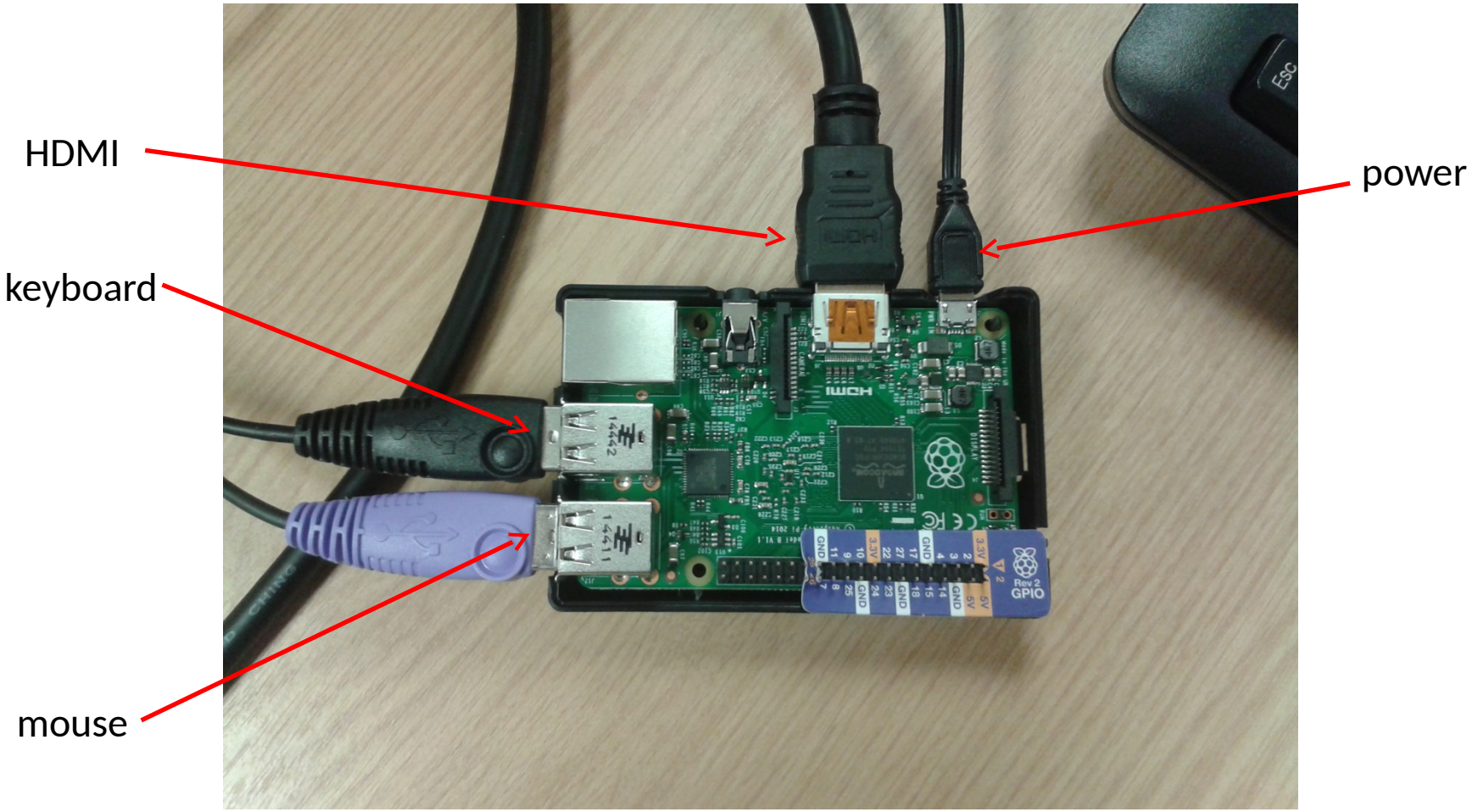
Raspberry Pi



Raspberry Pi

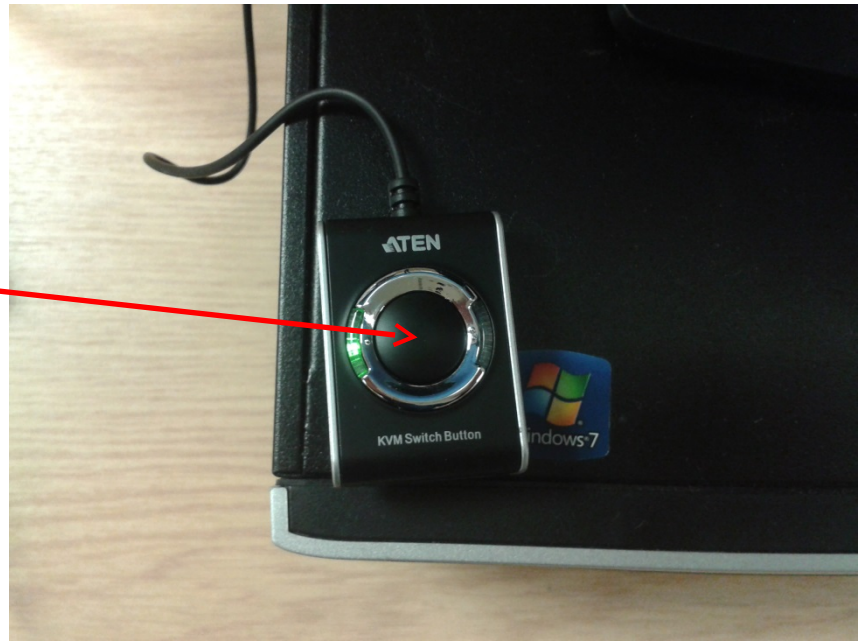


Raspberry Pi



Raspberry Pi

- plug in mouse, keyboard &HDMI
- push KVM button
- login: `pi`
- password: `raspberry`
- to run GUI: `startx`



Raspberry Pi

- must collect from:
  - Computing Technician, **EM 1.32**
  - ***before week 1 lab***
  - Best: **Tue 1:15-2:15** right after the tutorial
  - Or: **Mon 12:15-1:15** right after the lecture

You'll need to return the complete kit after the course

If you don't we may withhold releasing your marks on the course!