F28HS Hardware-Software Interface

Lecture 0: Overview/Edinburgh

Lecturers

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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

- Monday 12.15-13.15 LT 2
  - lecture - always HWL
- Tuesday 10.15-11.15 JW 2
  - tutorial - week 1 only HWL
  - lecture - week 2-12 always GJM

Timetable

- Thursday 10.15-12.15 EM 250
  - – laboratory * 2
  - - HWL weeks 1 3 5 9 10 11
  - - GJM weeks 2 4 6 7 8
- Thursday 16.15-17.15 PG 201
  - - lecture - week 1 only GJM
  - – tutorial
  - - HWL weeks 3 5 7 9 11
  - - GJM weeks 2 4 6 8 10

Assessed coursework

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

Assessed coursework

- HWL
  - 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

GJM stuff

- I work 3 days a week:
  - office hour is Tues 13.15-14.15
- all my teaching material will be on Vision & my www page: www.macs.hw.ac.uk/~greg/courses
- I'm always happy for you to drop by my office or send me email if you need help with anything.

HWL stuff

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

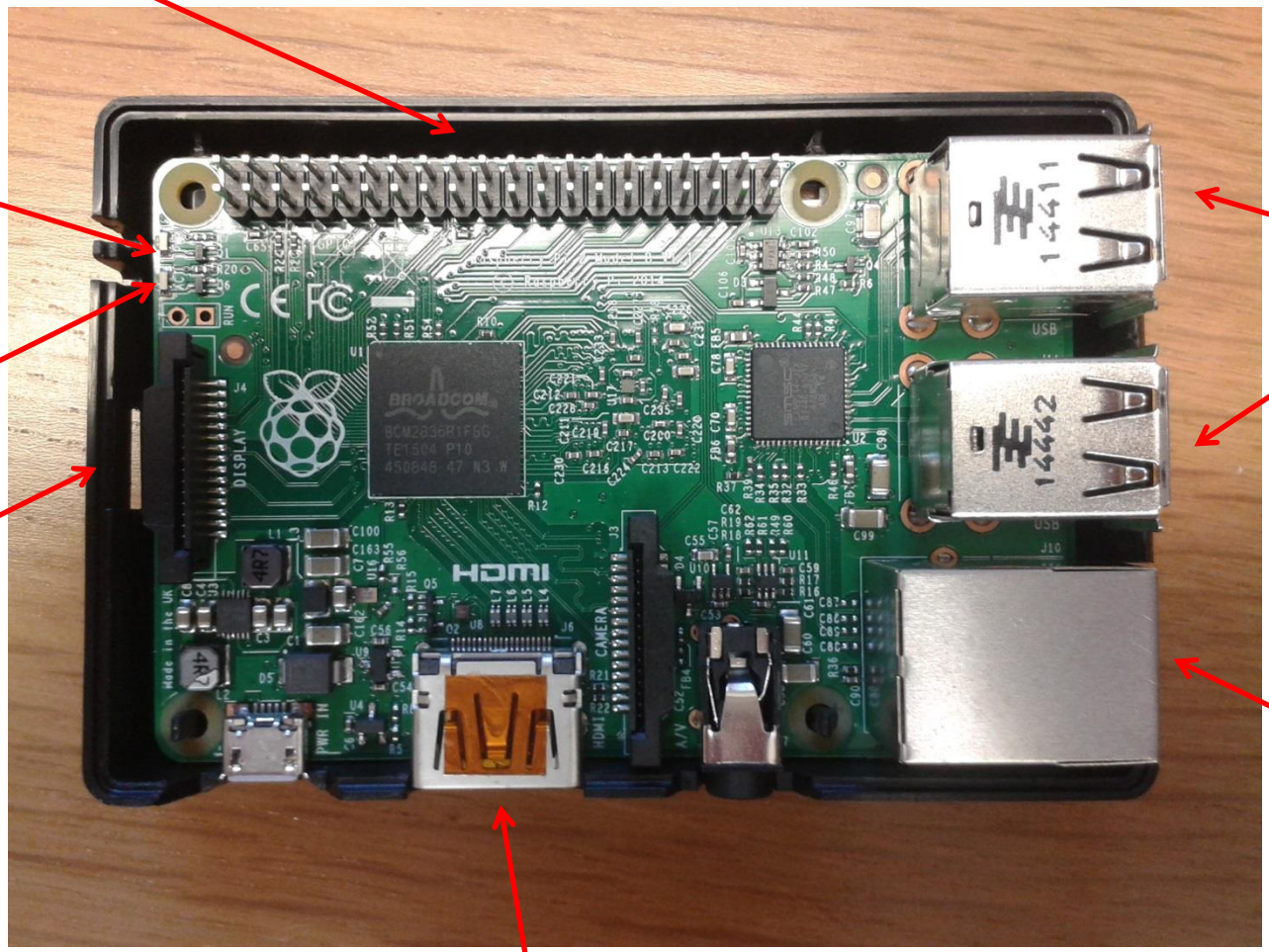
Raspberry Pi

- 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

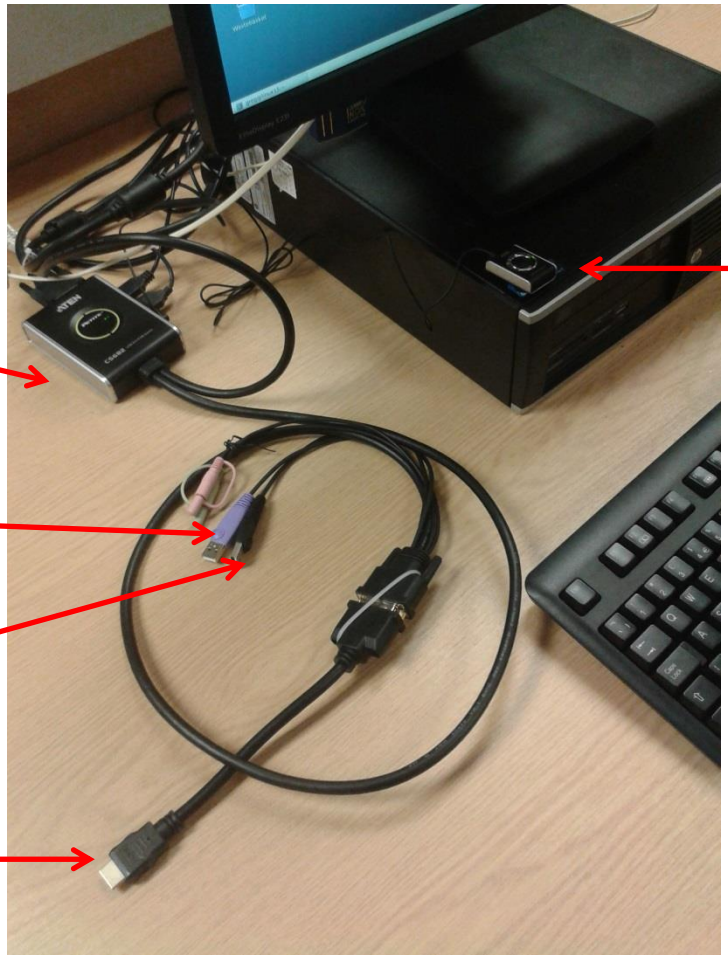
Raspberry Pi

- 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

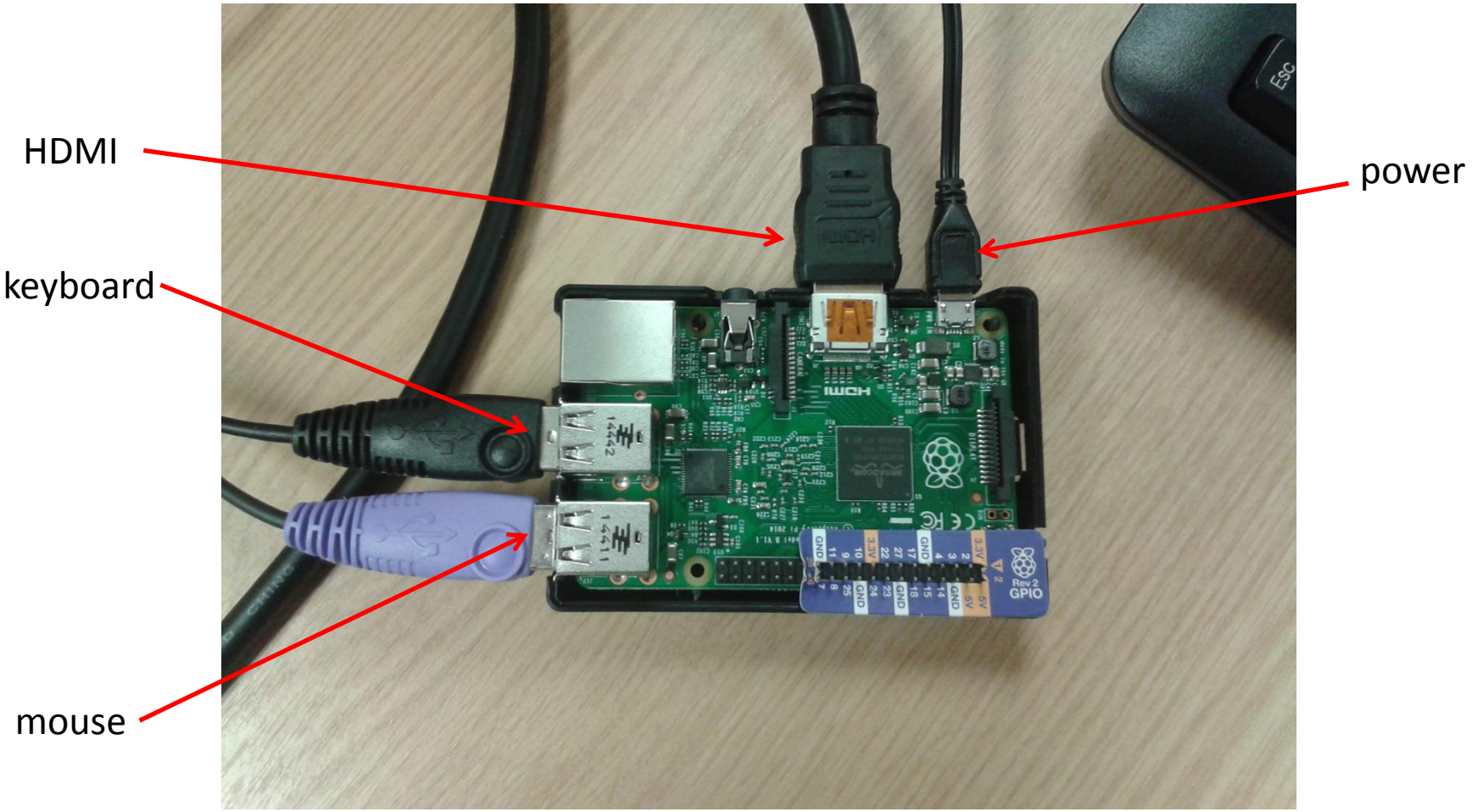
Raspberry Pi



Raspberry Pi

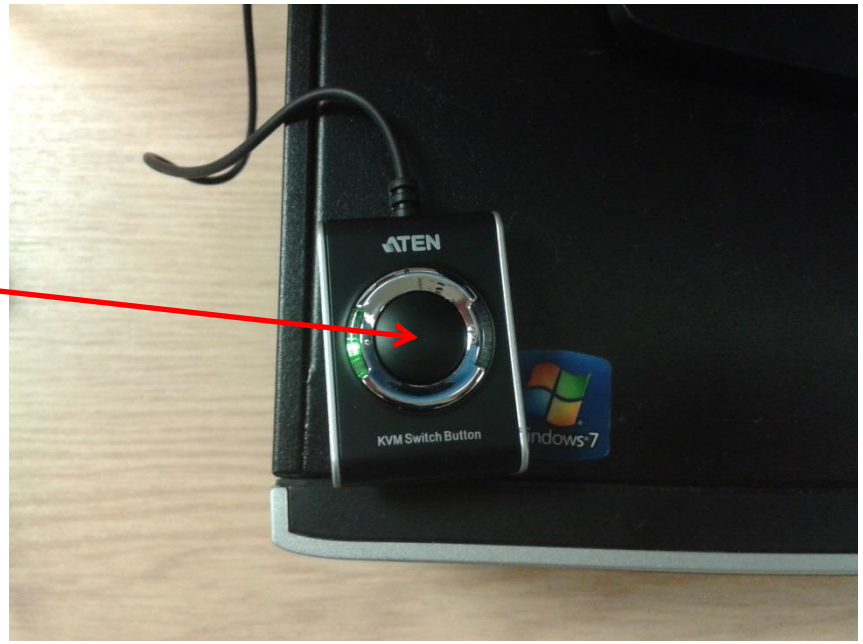


Raspberry Pi



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***