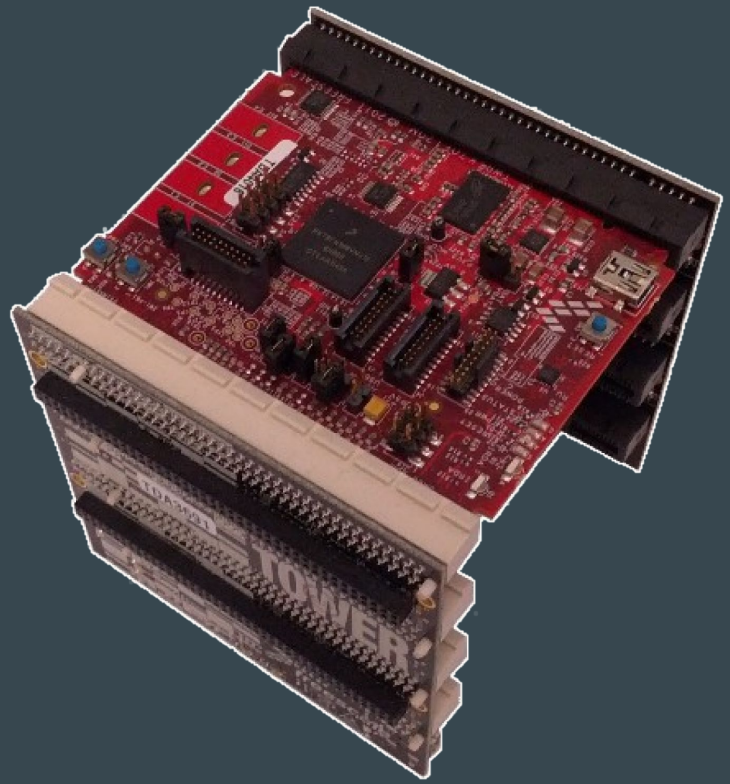
ES Coursework 1



Agenda

1. Brief overview of coursework
2. Introduction to hardware/software being used
3. Information on 4 tasks to be completed
4. Lab info
5. Submission

1. Overview

- Coursework consists of programming for an embedded device running an RTOS
- First three tasks are introductory – these should be straightforward (most of the code you need is provided)
- Final task is more freeform and you may need to consult documentation on some features
- Final submission is by demonstration, although code should also be submitted
- This coursework is worth 12.5% of your final mark

2. K70 Board

- Part of the Freescale Tower System
- K70 SOC contains:
  - ARM Cortex-M4F Core
  - Flash Memory
  - DRAM
  - Many peripherals (UART, Memory Controllers...)
- Fairly powerful for an embedded device
- Lots of memory – usually this is a constraint in embedded systems

2. MQX

- RTOS ported to various Freescale devices
- Contains standard library and drivers for many devices
- Lots of useful features and fairly easy to use

2. Freescale Toolchain

- Based on Metaware compiler – behaves differently to GCC!
- We're using the ARM backend (not surprisingly)
- Command line interface – A simple Makefile is provided – Could be wrapped by an IDE but you will need to do this yourself!
- Scripts are also provided for communicating with the board using OpenOCD (for flashing/debugging) [/group/teaching/espractical/OpenOCD/*]

3. Coursework Tasks

- Three easy tasks
  - Blink some LEDs
  - Set up the network interface/HTTP server
  - Set/display the Real Time Clock over HTTP
- One longer task: Security system

3. Task 1 - LED Control

- Mainly a 'getting started' task
- Introduction to using the board
- Two parts
  - LED constantly on
  - LED on in response to button press

3. Task 2 - Web Server

- MQX has a built in network stack including an HTTP server
- This task involves serving a static web page over the network connection
- Only one part
  - Serve static web page

3. Task 3 - Real Time Clock

- K70 board includes an accurate Real Time Clock module
- This task involves configuring and displaying the value of the RTC using the web server
- Three parts
  - Handling CGI requests in MQX
  - Display the value of the RTC over HTTP
  - Set the value of the RTC over HTTP

3. Task 4 - Security System

- Much longer task – create a web-controlled security system running on the board
- Touch sensors represent sensors, LEDs represent alarms
- Each sensor/LED represents a different room

3. Task 4, Part 1 - Basic System

- Capacitive touch buttons represent motion sensors
- LEDs represent alarms
- Push buttons used to switch the alarm on or off, and stop the alarm if it has gone off
- When a touch button is pressed, the attached LED should flash

3. Task 4, Part 2 - Web Control

- Builds on Part 1
- The user should be able to
  - Switch on/off the alarm via the web interface
  - Stop the alarm if it is going off
  - View the current status of each room
  - Individually enable/disable the sensor for each room

3. Task 4, Part 3 - Timing Control

- Builds on Part 2
- The user should be able to
  - Use the web interface to view and set the current RTC value
  - Set times at which each alarm zone is enabled/disabled (or have a zone always enabled, or never enabled)

4. Labs

- The boards are in G.A11 and can only be connected to the free network ports in this lab
- Boards and cables are in brown lockers in the corner of G.A11 and should not be removed from the lab
- Labs are in G.A11 running
  - Wednesday 14:10 – 16:00
  - Friday 16:10 – 18:00
- Some of the boards are failing: try with another one if you seem to have an obscure error

4. Groups

- Due to hardware restrictions you need to work in pairs
- Form pairs, choose a preferable lab slot, and send an email to the TA by the end of today (Monday, 25th)
- Otherwise you will be assigned a buddy and a slot automatically
- Try to go to your allocated slot, but if for some reason you cannot, you can go to the other lab, as long as there are free computers/ports

5. Submission

- The first three tasks due 4PM February 12th
- Final task is due 4PM February 26th
- Submission consists of a demonstration during the lab, plus submission of code using submit system

Discuss Feedback