

Rapid Prototyping and Embedded Systems Design

with the NXP mbed Development System

The NXP mbed prototyping system is a flexible and advanced development kit which empowers engineers with the ability to prototype embedded analysis, control and display systems rapidly. The mbed system is based on the LPC1768 microprocessor which allows 100MHz operation, with 512KB FLASH, 64KB RAM and a number of interfaces including Ethernet, USB Device, CAN, SPI, I2C and other general purpose analogue and digital I/O. Additionally the mbed system allows engineers direct access to all IO pins and a direct route to mass manufacture.

These short courses will cover the basics of embedded systems and embedded C/C++ coding and quickly move through a steep learning curve to allow engineers to engage with complex designs and solutions. Software engineering skills in C/C++ are covered implicitly in the course delivery, allowing engineers with limited design experience to gain embedded system design skills flexibly and rapidly.

Courses are taught with a high weighting to practical skills in embedded systems design. Participants will be taught the underlying theory but will focus primarily on building systems hands-on and developing systems of their own. The course tutor is Dr Rob Toulson (contact: rob@rt60.co.uk) who has a number of years of experience as a research and design engineer in rapid prototyping and the development of embedded systems and as a provider of HE education.

Course ES01 – 4 days - £1200

Rapid Prototyping of Embedded Systems

This course is for all engineers involved in embedded systems design who are interested in using the mbed development system for rapid prototyping. Engineers may have a range of experience working with microprocessors or C/C++, however the course is tailored to allow engineers to learn at their own pace, giving sufficient time to cover basics concepts, but incorporating open ended tasks to allow participants of all abilities to challenge their knowledge and embedded design skills.

Learning sessions are weighted to approximately 75% practical hands on development, utilising the mbed hardware and software development environment. A number of peripheral devices will also be used to create solutions to practical design specifications.

Course breakdown:

	9:30 am - 12:30 pm	1:30 am - 4:30 pm
Day 1	Introduction to the mbed and C/C++ programming Using analogue and digital inputs and outputs	Pulse width modulation Using PWM to control analogue peripherals
Day 2	Modular design and programming methods in C/C++	Interfacing an LCD alphanumeric display with modular programming
Day 3	Serial communications with I ² C devices I ² C temperature sensor and ultrasonic range finder	Serial communications with SPI devices SPI accelerometer and mobile phone LCD display
Day4	Timers and interrupts Scheduled programming techniques	Event driven programming Hardware interrupts and data logging

Course fees include:

- Course material, notes, handouts and datasheets
- Electronics components for each delegate to keep:
 - mbed prototyping board and USB cable
 - Bread board for prototyping, LEDs and connecting wires
 - Servo motor and battery pack
 - Alphanumeric LCD display
 - I²C temperature sensor and ultrasonic range finder
 - SPI accelerometer and mobile phone LCD display
- Lunch and refreshments provided each day

Course ES02 – 3 days - £900

Advanced Embedded Systems

This course is for all engineers involved in embedded systems design who are experienced in embedded systems design and C/C++ programming. This course serves as an ideal continuation for engineers who have already taken the ES01 course.

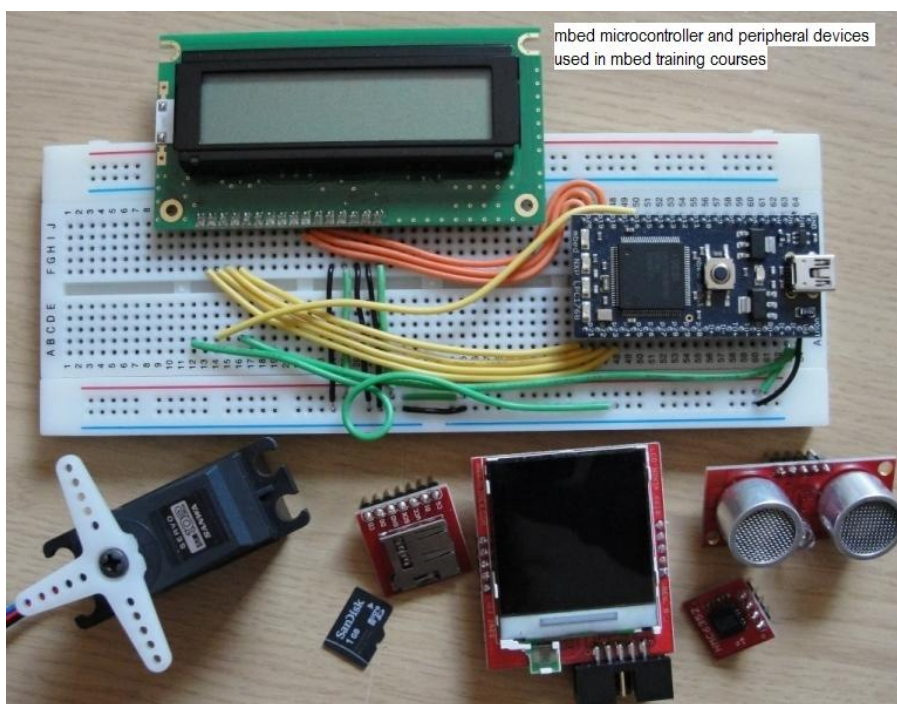
Learning sessions are weighted to approximately 75% practical hands on development, utilising the mbed hardware and software development environment. A number of peripheral devices will also be used to create solutions to practical design specifications.

Course breakdown:

	9:30 am - 12:30 pm	1:30 am - 4:30 pm
Day 1	Recap / Introduction to the mbed and C/C++ Using external memory with the mbed (SD flash)	Working with audio data Implementing a real-time audio playback feature
Day 2	An introduction to digital signal processing Implementing DSP algorithms on the mbed	Communicating with CAN Using the mbed CAN bus for communication
Day 3	Closed loop control Closed loop design – digital compass exercise	From mbed to manufacture Low level coding techniques

Course fees include:

- Course material, notes, handouts and datasheets
- Electronics components for each delegate to keep:
 - mbed prototyping board and USB cable
 - Bread board for prototyping, LEDs and connecting wires
 - SD Card reader and Flash SD Card
 - Audio connectors and headphones
 - Digital compass module
 - Servo motor and battery pack
- Lunch and refreshments provided each day



Visit the mbed site at www.mbed.org

Visit RT Sixty Ltd at www.rt60.co.uk for details of course dates and locations