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Online Course and Textbook Catalogue 2017

ARM EDUCATION MEDIA

ARM Education Media

A subscription-based digital content hub offering interactive online courses and e-first textbooks

ARM Education Media is a new publishing operation within ARM Ltd, the world's leading computer hardware IP supplier. ARM develops and licenses technology that is at the heart of many digital devices, from sensors to smartphones and servers. ARM Education Media is the culmination of several years of collaboration between ARM and thousands of educational institutions, industrial partners, students, recruiters and managers worldwide. ARM Education Media's online courses and e-first textbooks help students and engineers innovate with state of the art ARM-based technologies as deployed throughout the vast ARM partner ecosystem.

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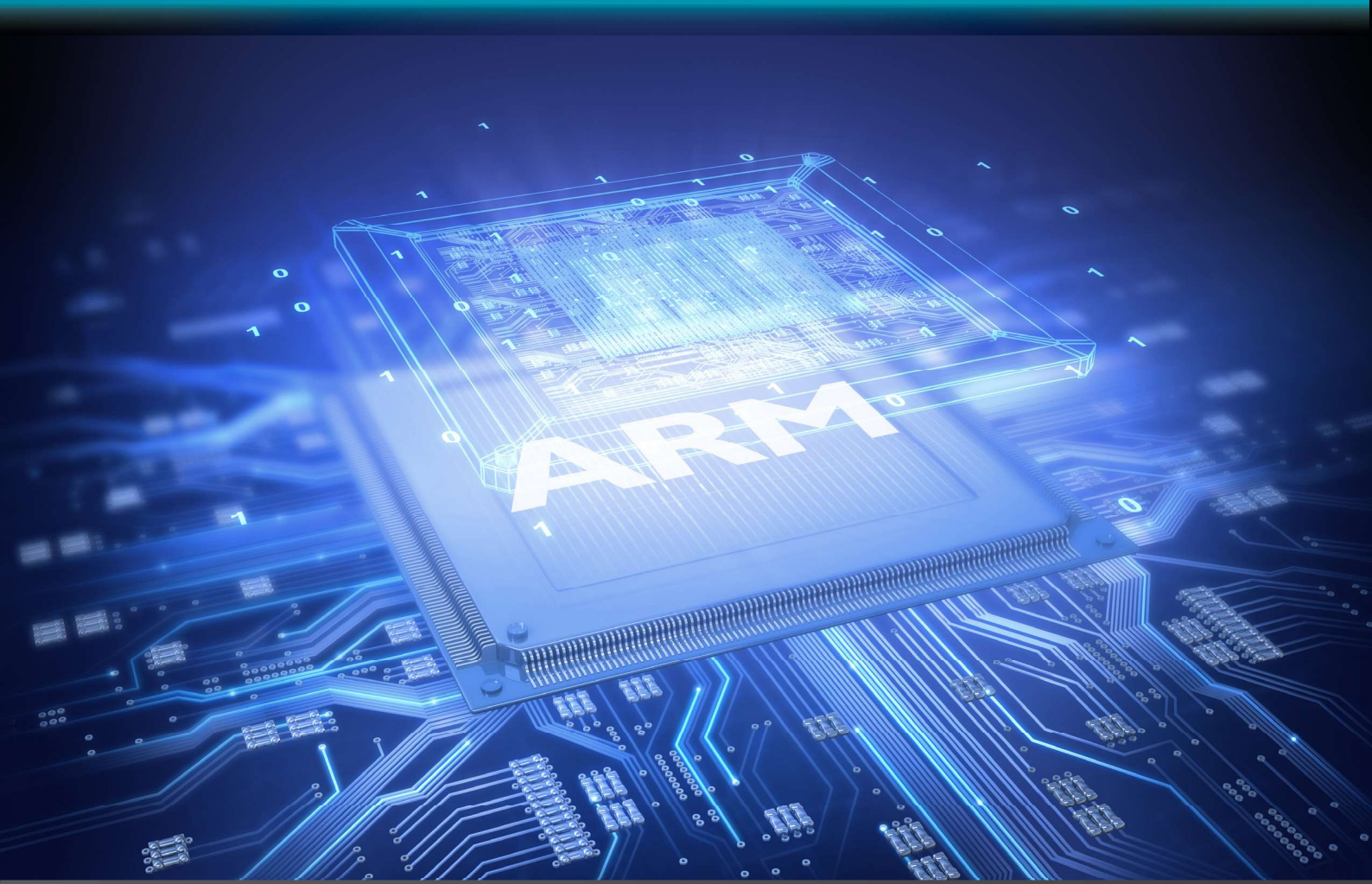

ARM Education Media Online Courses

Our online courses have been developed to help your students learn about state of the art technologies from the ARM partner ecosystem. Each online course contains 10-14 modules, and each module comprises lecture slides with notes, hands on labs and lab solutions. The courses will give your students an understanding of ARM architecture and the principles of software and hardware system design on ARM-based platforms, essential for today's computer engineering workplace.

For a quote or to request a free trial contact
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Available Now:


Efficient Embedded Systems Design and Programming


Rapid Embedded Systems Design and Programming


Digital Signal Processing


Internet of Things

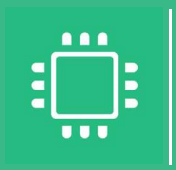
Coming Soon:


Mobile Gaming


System on Chip Design


Real Time Operating Systems


Linux Kernel



Efficient Embedded Systems Design and Programming Online Course

This online course from ARM Education Media is suitable for introductory and mid-level learners working in Electrical, Electronic and Computer Engineering and Computer Science related subjects. It includes lecture slides, lab videos, lab code with solutions, quizzes and more.

The course covers both fundamentals and practical knowledge. State-of-the-art hardware platforms are harnessed in the labs to support the course's learning outcomes. These use the industry-standard Keil MDK-ARM tool for application development.

Learning outcomes:

Knowledge and understanding of

- ARM processor architectures
- ARM-based microcontrollers as modern embedded computing platforms
- Software design basics, software engineering principles

Intellectual

- Ability to choose between different programming techniques for embedded system design
- Ability to evaluate implementation results (e.g. speed, cost, power) and correlate them with the corresponding programming techniques

Practical

- Ability to use commercial tools to develop ARM-based embedded systems
- Ability to build an ARM-based embedded system and program to satisfy given user specifications

Course Syllabus

Prerequisites: Basic C programming

Modules

1. Introduction to Embedded Systems Design
2. Software Design Basics
3. The ARM Cortex-M4 Processor Architecture - Part 1
4. The ARM Cortex-M4 Processor Architecture - Part 2
5. C Code as Implemented in Assembly Language
6. Interrupts
7. General Purpose Digital Interfacing
8. Analog Interfacing
9. Timers
10. Serial Communication

Rapid Embedded Systems Design and Programming Online Course

To keep up with the growth of various embedded applications, the Rapid Embedded Systems Design and Programming Online Course is designed to provide an easier and quicker way of designing embedded systems and reduce the development cycle for embedded applications using high-level API tools. It is suitable for introductory and mid-level embedded system developers.

Based on the industry-standard ARM mbed API tool and Keil MDK, this course teaches how to accelerate the development of embedded systems and rapidly prototype various embedded applications.

Learning outcomes:

Knowledge and understanding of

- ARM processor architectures
- ARM-based microcontrollers as modern embedded computing platforms
- High-level programming API as a prototype tool for rapid development of embedded applications

Intellectual

- Ability to choose between different programming techniques for embedded system design
- Ability to evaluate implementation results (e.g. speed, cost, power) and correlate them with the corresponding programming techniques

Practical

- Ability to build an ARM-based embedded system and program to satisfy given user specifications
- Ability to use commercial API and tools to accelerate the development cycle of ARM-based embedded systems

Course Syllabus

Prerequisites: Basic C/C+ programming

Modules

1. Introduction to Embedded Systems
2. The ARM Cortex-M0+ Processor Architecture - Part 1
3. The ARM Cortex-M0+ Processor Architecture - Part 2
4. Introduction to Cortex-M0+ Programming
5. Digital Input and Output
6. Interrupts and Low Power Features
7. Software Libraries: CMSIS and mbed SDK
8. Analog Input and Output
9. Timer and Pulse-Width Modulation
10. Serial Communication
11. Real-Time Operating Systems

Digital Signal Processing Online Course

The explosion of digital data in today's world means it is crucial for learners to understand and practice how to manage and process digital signals that come in from a wide variety of sources. ARM Education Media is addressing this need with the creation of our Digital Signal Processing (DSP) online course.

This online course is powered by ARM Cortex-M4-based microcontrollers, which enable high performance yet energy-efficient digital signal processing at a very affordable price. By reducing the barrier of entry with the introduction of these low cost development boards, the DSP online course will allow students to practice theory with advanced hardware.

Learning outcomes:

Knowledge and understanding of

- DSP basic concepts such as sampling, reconstruction and aliasing
- Fundamental filtering algorithms such as FIR, IIR, FFT
- ARM-based microcontrollers as low-power DSP computing platforms
- Software programming basics and principles

Intellectual

- Ability to choose between different DSP algorithms for different applications
- Ability to use different design methods to achieve better results
- Ability to evaluate experimental results (e.g. quality, speed, power) and correlate them with the corresponding designing and programing techniques

Practical

- Ability to implement DSP algorithms and design methods on ARM-based microcontrollers
- Ability to use commercial hardware and software tools to develop real time DSP application

Course Syllabus

Prerequisites: Basic C programming and elementary mathematics

Modules

1. Discrete Time Signals and Systems
2. Sampling, Reconstruction, and Aliasing - Complex Exponentials and Fourier Analysis
3. Sampling, Reconstruction, and Aliasing - Time and Frequency Domains
4. Z-Transform - Time and Frequency Domains
5. FIR Filters - Moving Average Filters
6. FIR Filters - Window Method of Design
7. IIR Filters - Simple Design Example
8. Fast Fourier Transform - Review of Fourier Transformation
9. Fast Fourier Transform - Derivation of Radix-2 FFT
10. Adaptive Filters - Prediction and System Identification
11. Adaptive Filters - Equalisation and Noise Cancellation
12. Adaptive Filters - Adaptive FIR Filter

Internet of Things Online Course

The transformative intersection between the Internet, mobile and sensor technology has motivated us to design and create the Internet of Things (IoT) online course, which will inspire learners to create the next generation of IoT-enabling technologies.

The IoT online course provides learners with the knowledge required to design an IoT system to connect embedded sensors using commodity smartphones via low power Bluetooth Low Energy. Skills such as app development and embedded system design are practiced and demonstrated using various applications including a robot control application.

Learning outcomes:

Knowledge and understanding of

- Smart phone architecture and technologies
- ARM-based SoCs: architecture and development
- Appcessory programming and embedded programming
- BLE technology
- Sensor networks and applications
- IoT fundamentals

Intellectual

- Ability to specify, design and develop a smartphone based networked electronic system, which entails appcessory development, MCU programming, and connected app development
- Ability to use the ARM mbed IoT Device Platform and Android SDK to create smartphone apps and control end devices such as a mini-robot or a wearable health device.

Practical

- Design and implement an appcessory with BLE connectivity using standard mobile application development tools
- Program an ARM based BLE-connected MCU using mbed development tools
- Develop demonstration applications e.g. smartphone-based remote robot control, sensor station

Course Syllabus

Modules

1. Introduction to Internet of Things
2. ARM-based Embedded System Design
3. ARM Cortex-M4 Processor –Part 1
4. ARM Cortex-M4 Processor – Part 2
5. Interrupt and Power Consumption
6. Embedded Programing using mbed
7. ARMv7 Architecture
8. ARM Cortex-A9 processors
9. Smartphones and Appcessory Programming
10. Bluetooth Smart Connectivity
11. High-level Programming using mbed SDK
12. System Integration

ARM Education Media Textbooks

Textbooks from ARM Education Media combine strong theoretical underpinnings with practical applications using state-of-the-art technologies from the wide ARM ecosystem. Featuring learning outcome-driven pedagogy, with student progress measurable through chapter-based exercises and labs, they are suitable for courses in areas of ECE, EE and CS.

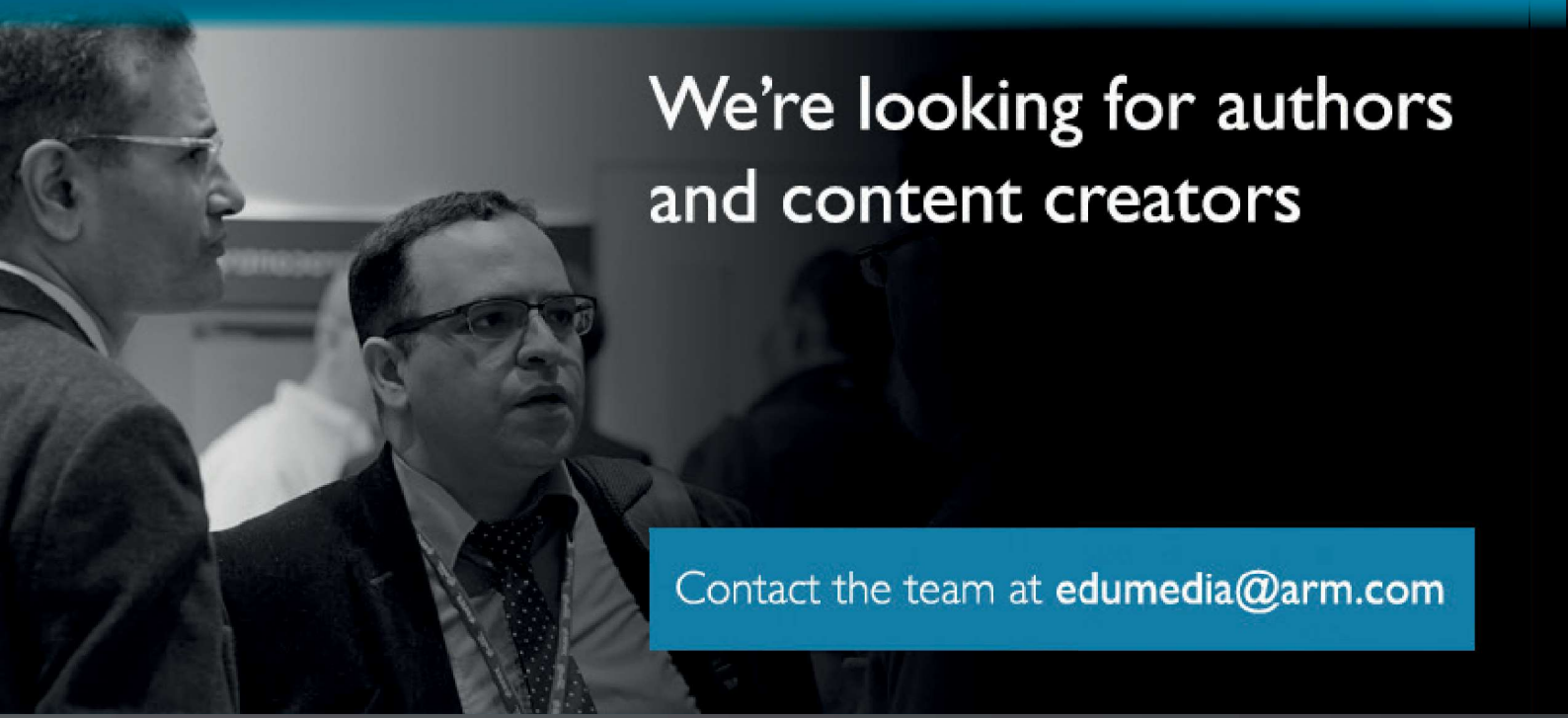
Available now, in print on demand and ePub format:

Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach

by Dr Alexander G. Dean
ISBN 978-1-911531-03-6

Forthcoming textbooks include:

Digital Signal Processing
Real Time Operating Systems
Rapid Embedded Systems Design and Programming
Internet of Things



Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach

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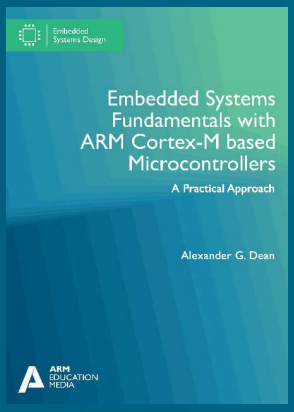

This textbook introduces students to creating embedded systems using the ARM Cortex-M0+ CPU-based Kinetis KL25Z MCU. Topics covered include the CPU, interrupt system, peripherals and programming. C is used as the programming language through the text. The concurrent operation of the CPU and peripherals is highlighted throughout as critical to creating cost-effective embedded systems. This book gives an early introduction to practical multitasking on the CPU, with the goals of improving responsiveness and software modularity while reducing CPU overhead. The interplay of interrupts, peripherals and schedulers is examined.

For use in ECE, EE and CS departments. The book targets the low-cost FRDM-KL25Z MCU development board.

Dr Alexander G. Dean has been a faculty member of the Department of Electrical and Computer Engineering at North Carolina State University (NCSU) since 2000. He received his BS (1991) from the University of Wisconsin – Madison, and his MS (1994) and PhD (2000) from Carnegie Mellon University.

Dr Dean has developed four courses on embedded systems at NCSU, ranging from fundamentals to architecture and design to optimization. He has created course packages targeting five different MCU families for the university programs of three companies, including the Education Kit on Efficient Embedded Systems Design and Programming for ARM.

Dr Dean's research involves using compiler, operating system and real-time system techniques to extract more performance from commodity microcontrollers in embedded systems while reducing clock speed, energy and memory requirements. His research also includes applying these methods for low-cost control of switch-mode power converters.

Dr Dean has worked at United Technologies Research Center developing embedded systems and their communication network architectures. He holds three patents in the area. He has performed over sixty in-depth, on-site embedded software reviews for industry both domestically and internationally since 2001.

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