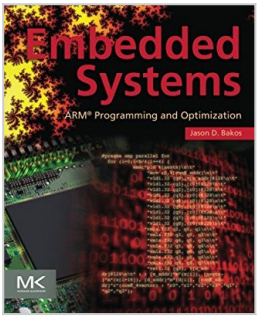

Embedded Systems: ARM Programming and Optimization

By Jason D. Bakos

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Embedded Systems: ARM Programming and Optimization combines an exploration of the ARM architecture with an examination of the facilities offered by the Linux operating system to explain how various features of program design can influence processor performance. It demonstrates methods by which a programmer can optimize program code in a way that does not impact its behavior but improves its performance. Several applications, including image transformations, fractal generation, image convolution, and computer vision tasks, are used to describe and demonstrate these methods. From this, the reader will gain insight into computer architecture and application design, as well as gain practical knowledge in the area of embedded software design for modern embedded systems.

- Covers three ARM instruction set architectures, the ARMv6 and ARMv7-A, as well as three ARM cores, the ARM11 on the Raspberry Pi, Cortex-A9 on the Xilinx Zynq 7020, and Cortex-A15 on the NVIDIA Tegra K1
- Describes how to fully leverage the facilities offered by the Linux operating system, including the Linux GCC compiler toolchain and debug tools, performance monitoring support, OpenMP multicore runtime environment, video frame buffer, and video capture capabilities
- Designed to accompany and work with most of the low cost Linux/ARM embedded development boards currently available

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Editorial Review

From the Back Cover

The modern consumer electronics industry as we know it owes much of its success and popularity to two technologies: the ARM processor and the Linux operating system. ARM processor technology powers nearly all modern mobile devices?and most of these processors run the Linux operating system. It’s no exaggeration to say that having an understanding of embedded system design and development from the context of ARM and Linux technology is an important asset in today’s world.

This textbook combines an exploration of the ARM architecture with an examination of the facilities offered by the Linux operating system to explain how various features of program design can influence processor performance. It demonstrates methods by which a programmer can make changes to code without changing program semantics, but have a significant impact on code performance. Several applications, including image transformations, fractal generation, image convolution, and computer vision tasks, are used to describe and demonstrate these methods. From this, the reader will gain insight into computer architecture and application design, as well as gain practical knowledge in the area of embedded software design for modern embedded systems.

About the Author
Jason D. Bakos is an associate professor of Computer Science and Engineering at the University of South Carolina. He received a BS in Computer Science from Youngstown State University in 1999 and a PhD in Computer Science from the University of Pittsburgh in 2005. Dr. Bakos’s research focuses on mapping data- and compute-intensive codes to high-performance, heterogeneous, reconfigurable, and embedded computer systems. His group works closely with FPGA-based computer manufacturers Convey Computer Corporation, GiDEL, and Annapolis Micro Systems, as well as GPU and DSP manufacturers NVIDIA, Texas Instruments, and Advantech. Dr. Bakos holds two patents, has published over 30 refereed publications in computer architecture and high performance computing, was a winner of the ACM/DAC student design contest in 2002 and 2004, and received the US National Science Foundation (NSF) CAREER award in 2009. He is currently serving as associate editor for ACM Transactions on Reconfigurable Technology and Systems.

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