The Imagination University Programme (“IUP”)

We want to empower you to use our technologies in your teaching labs and student projects! Our 22 years’ experience in this field means that we are widely copied but rarely matched.

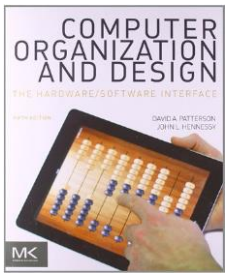
There are four vital components in each teaching package:

- Low-cost, robust, & effective hardware from our platform partners
- Free to download software tools such as PowerVR SDK & Codescape MIPS Essentials. These are full versions with no code size or time limits!
- Effective support through active forums, expert online video tutorials, and on-campus workshops
- The best quality teaching materials. Not in-house or commercial training materials, but genuine **teaching** materials written by academics who are renowned experts in their field
- Generous licensing that allows sharing with students, cut & paste, editing, translation and unrestricted academic use

The majors & courses we focus on:

- Computer Science (CS)
- Electric & Electronic Engineering (“EE”)
- Computer Engineering (“CE”)
- Computer Architecture/Organisation
- System-on-Chip (“SoC”)
- Design Verification
- Embedded systems
- Microcontrollers (“MCUs”)
- Internet of Things (“IoT”)
- Mobile Graphics
- GPU compute

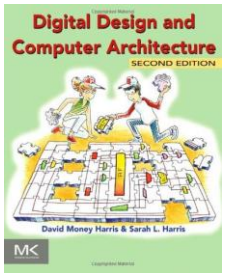
Popular Textbooks



Computer Organization and Design

David Patterson & John L. Hennessy

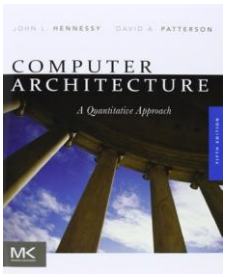
Available in:



Digital Design and Computer Architecture, 2nd Edition

David Harris & Sarah Harris

Available in:



Computer Architecture - A Quantitative Approach

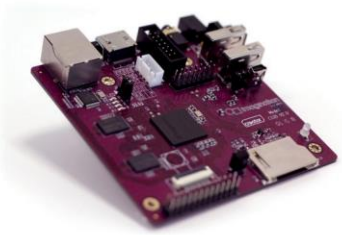
John L. Hennessy & David Patterson

Available in:

Popular Hardware Tools

Digilent chipKIT Wi-FIRE

Based on the Microchip PIC32MZ MCU with Warrior M class MIPS CPU @200 MHz, Wi-Fi, SD card and Arduino shield interface. Runs Creator IoT Framework.



Imagination Creator Ci20

A Debian, Linux and Android platform based on the Ingenic JZ4780 SoC with a 1.2GHz MIPS32 dual-core CPU, PowerVR SGX540 GPU.

On-board Ethernet, Wi-Fi and Bluetooth 4.0.

Imagination Creator Ci40

The ultimate IoT-in-a-box dev kit: 550 MHz dual-core MIPS interAptiv CPU, running GNU or Linux distributions, lowest power wireless connectivity, with many I/Os & peripherals.

Teaching Materials

Our Teaching Materials consist of presentation slides, an instructor's guide, a student handbook, reference guides and lab exercises, supplied in both PDF and source PowerPoint & Word formats.

There are three packages:

Introduction to Mobile Graphics

Scope The first full semester course on Mobile Graphics, with Lectures and Labs

Audience 3rd year BSc/MSc Gaming and CS Students

Author Darren McKie, Univ. of Hull, UK

Hardware Ci20, iPad/iPhone, Android phones/tablets, BeagleBoard/BeagleBone, CubieBoard4 or 5, OR: Software Emulator

Tool-Chain PowerVR SDK

Videos 7 modules incl: Architecture, PVR framework, Open GL ES 2.0, Debugging with PVR Trace

Support PowerVR Insider forum

Languages English

Partners AllWinner, CubieTech

Lecture Topic	Week	Details
Introductiion to mobille graphiics technollogiies	1	Introductiion to the diifferent graphiics technollogiies avaiillabille and how we compare them.
Introductiion to mobille graphiics archiitectures	1-2	Compariison of mobille"s dominant graphiics hardware, and an iintroductiion to the concerns rellating to power consumptiion and performance. The PowerVR Graphiics archiitecture case study wiill be outlliined
Understandiing the siimplle triiangllle code, and siimplle Objject Oriientated Desiign	2-3	How the siimplle triiangllle graphiics program has been wriitten usiing the PVRShelll framework. How to separate the triiangllle code out of the maiin drawiing functiion and iinto iits own cllass.
Introductiion to graphiics SDKs and forums	4	How to use some of the PVRTools framework, iincludiing how to diisplllay text. The benefiits and the iimportance of hardware IP forums to gaiin support and hellp.
Texturiing	5	How texturiing works, iincludiing the coordiinate system and performance concerns.
Siimplle transformatiions and lliightiing	6	How transformatiions and lliightiing can be appllied to vertiices, iincludiing transllatiions, rotatiions, and how to applly lliightiing.
3D graphiics utiilliitiies	7	How to use some of the PowerVR utiilliitiies, iincludiing the texture compressor and shader profiiller.
OpenGL ES 2.0 shader programmiing	8, 9, 10	How to program OpenGL ES 2.0 shaders, iinclludiing more advanced lliightiing, reflllectiion and refractiion.

Complete 10 week lecture course

The Connected Microcontroller Lab

Teaching 32-bit Microcontrollers:

Scope A full semester MCU course with an IoT theme

Audience Start here! Intended to be the first MCU course taken by undergrads in EE, CE, Mechatronics, or CS undergrads taking an Embedded Systems option

Hardware ChipKIT Wi-FIRE by Digilent. 200MHz Microchip PIC32MZ based on MIPS microAptiv/Warrior M class core

Tool-Chain MPlab X, MPlab Harmony

Videos Full series online Q4'16

Support Forums – Microchip, Digilent and MIPS Insider

Languages English, Chinese, Russian

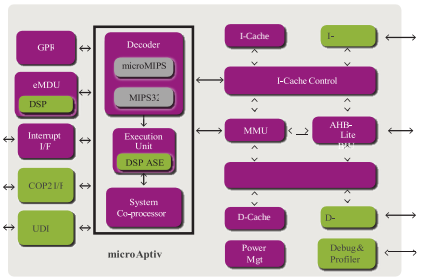
Partners Microchip and Digilent

Author Prof. Alex Dean, NC State, USA

Status English now, Chinese & Russian Q4'16

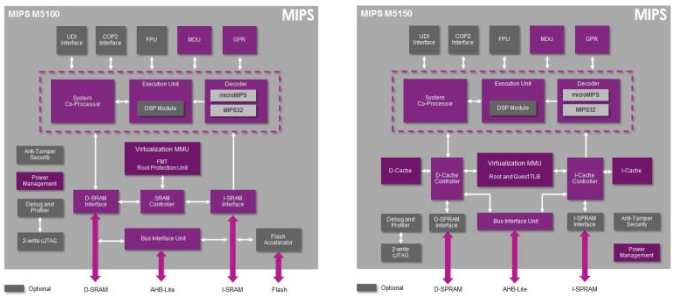
Topics Embedding a computer in a system
MCUs versus computers. Connectivity. The tool chain.
Software design concepts and tools.
Debugging. Basic peripherals: Introduction and Digital I/O Basic concurrency. Threads, Interrupts, Debouncing.
Peripherals: Analog interfacing, timing and counting, communications, interfacing with Arduino Shields
Advanced concurrency: real-time kernel RTOS, multi-rate threads, adding interrupts
Improving CPU throughput: software analysis and optimisation, architectures, what's 'under the hood?'
IoT: overview, building a connected system using the Creator IoT framework.

MIPS by Imagination



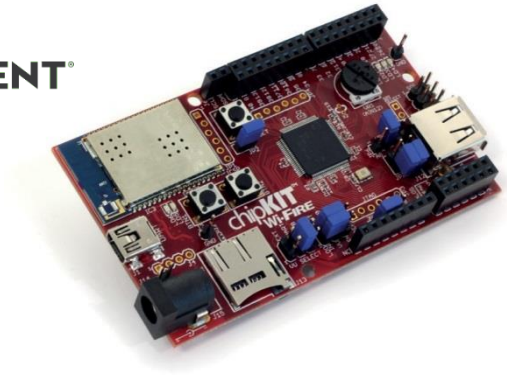
Warrior M class MIPS32 processor runs the program's instructions

MICROCHIP



Microchip designed SoC with MIPS CPU and rich peripherals

DIGILENT

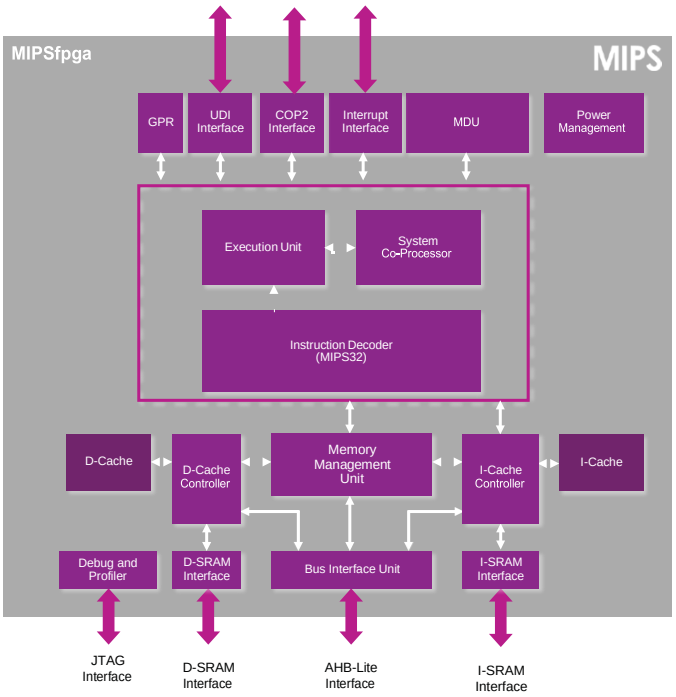


Digilent's Wi-FIRE board adds inputs, outputs and power supply

MIPSfpga

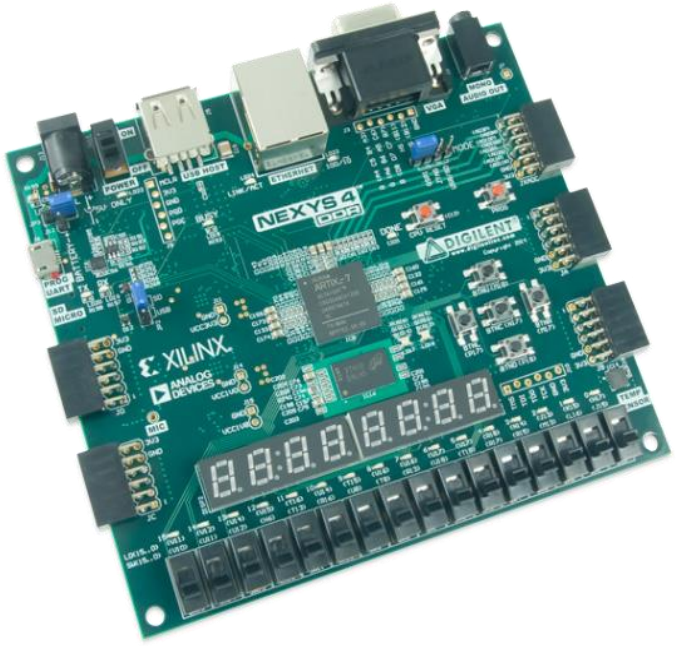
A real-world verified un-obfuscated MIPS core for academic use

- Until now, none of the 'Big 3' architectures has been openly available to academia
- The core is a standard verified configuration of microAptiv
- It's in silicon and in academia already: in Microchip's PIC32MZ and Samsung's Artik1 IoT solution. This creates synergy with student projects and mass- production embedded systems
- 40K gates – small enough to fit the common FPGA platforms found in academia, large enough to run Linux
- Tools: all available free of charge
- Simple online license that allows use only on FPGA, not in silicon. Delivered via web download
- Active partnerships with Xilinx and Digilent giving joint workshops, access to tools, and technical support
- Route to silicon for Universities through partners:
  - Europractice for EMEA & Russia
  www.europractice.stfc.ac.uk
  - MOSIS for USA, Canada, Mexico, Brazil, Japan, China, Hong Kong, Singapore, Taiwan, s. Korea, India:
  www.mosis.com



MIPSfpga block diagram

Scope	The first course to give open access to a current real-world processor core.
Audience	Fundamentals:undergrad students in CS,CE&EE SoC Advanced: graduate and PhD students
Courses	Computer Architecture/Organisation, Embedded Systems, System-on-Chip "SoC", & Verification
Core	microAptiv ~40K gate UP configuration
Hardware	Digilent Nexys 4 DDR and Basys 3 with the Xilinx Artix 7. Terasic DE0-CV and DE2- 115 (Altera). + SEEED Studio MIPS Bus Blaster Probe
Tool-chain	FPGA: Vivado (Fundamentals & SoC), Quartus (Fundamentals only) MIPS programming: Codescape MIPS Essentials Debug: Open OCD
Videos	8 tutorials from the workshop with Sarah Harris, incl: Vivado projects, Codescape programming, adding peripherals and porting to other boards
Support	MIPSfpga forum
Languages	English, Chinese, Japanese, Russian, Spanish
Packages	(i) Getting Started Package (ii) MIPSfpga Fundamentals: for teaching Computer Architecture (iii) SoC: System-on-chip design, running BuildRoot Linux. (English only).
Authors	Sarah Harris and David Harris Authors of complementary textbook "Digital Design and Computer Architecture" (2nd Edition)
Partners	Xilinx, Digilent and E-Elements (China)



Digilent Nexys 4 DDR platform with a Xilinx Artix 7 FPGA


SEEED Studio MIPS Bus Blaster Probe Package

IUP online

The IUP is part of the Imagination Community website providing: teaching materials, video tutorials, forums, suggested hardware, recommended textbooks, activity gallery, news, workshops & events listings

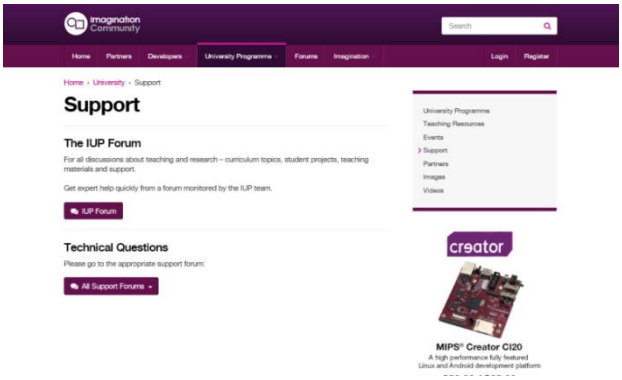
Joining the IUP

1. Register online at:
   http://community.imgtec.com/register
   Remember to tick “Join the IUP”

2. Activate your account from the verification email
3. Visit the IUP Resources page:
   http://community.imgtec.com/university/resources/
   - Request the materials you want
   - Tell us what you plan to do
4. Downloads are usually approved within 48 hours.

The IUP homepage at www.imgtec.com/university



Talk to us and get effective support:

The Imagination Forums are the best way to get our attention!

http://community.imgtec.com/forums/

The IUP has its own University forum, ideal for any questions about the IUP, curriculum, visits or training.

There are dedicated technology forums for all technical questions:

- **MIPS Insider:** MIPSfpga & Connected MCU https://community.imgtec.com/forums/cat/mips-insider/
- **PowerVR Insider** https://community.imgtec.com/forums/cat/powervr-insider-graphics
- **Creator Forum:** Ci20 & Ci40 support https://community.imgtec.com/forums/cat/creator-platforms
- IUP Forum https://community.imgtec.com/forums/cat/university/

DIGILENT®

Training partner and providers of PIC32 ChipKit and Xilinx FPGA platforms

MICROCHIP

Manufacturers of MIPS PIC32MX, PIC32MM and PIC32MZ MCUs

XILINX®

Manufacturers and our Training Partners for MIPSfpga

方糖电子 CUBIETECH LIMITED

Allwinner Technology

Cubietech’s CubieBoard4 platform incorporates Allwinner’s A80 with leading-edge PowerVR Series6 GPUs

TEXAS INSTRUMENTS

TI’s BeagleBoard and BeagleBone Black use PowerVR GPUs

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

Provide PIC32 Lab/Development Boards and Compilers

E-ELEMENTS

Training partner of MIPSfpga

EUROPRACTICE

A route to MIPS-in-silicon for Universities in EMEA and Russia

MOSIS

A route to MIPS-in-silicon for Universities outside EMEA. Providing Multi-Project Wafers (MPWs) and related services that drive IC innovation

Onion

Onion Omega, is a low-cost tiny Linux hardware dev kit with built in WiFi and is programmable with web languages such as Python, PHP and Node.js

Our Partners

The IUP is grateful to a select group of key partners. They provide best-in-class training, hardware & software tools, and access to SoC-in-silicon.