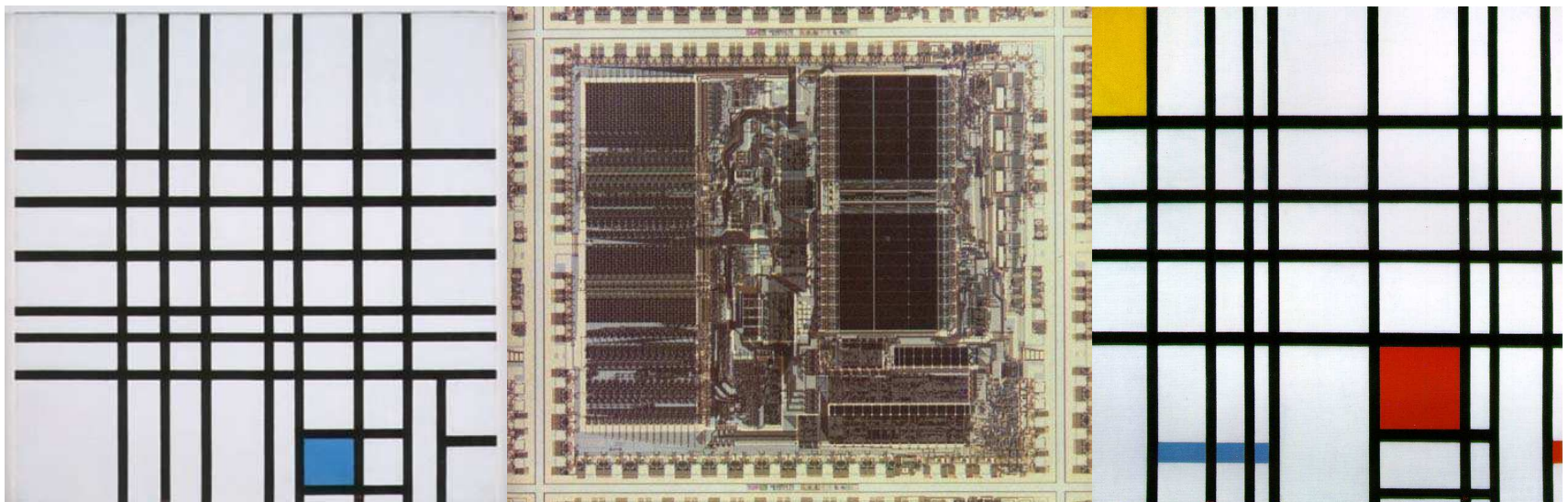


Microprocessor based digital Systems

Fundamentals of Microprocessor Based Digital System (MbDS)

Guillermo Carpintero

Universidad **Carlos III** de Madrid



Course guidelines

“I hear and I forget.
I see and I remember.
I do and I understand”
Confucius

“For the things we have to learn before we can do them, we learn by doing them”
Aristotle, 'Nichomachean Ethics'

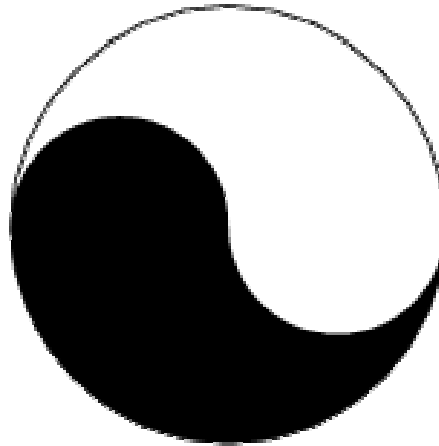
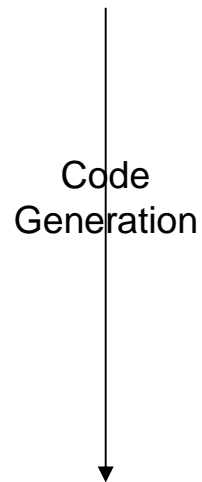
“One must learn by doing the thing; though you think you know it, you have no certainty until you try.”
Sophocles, "Trachiniae.

MbD\$ Course contents

Software
(SW)

Compiler

Programmable component
logic program flow



Hardware
(HW)

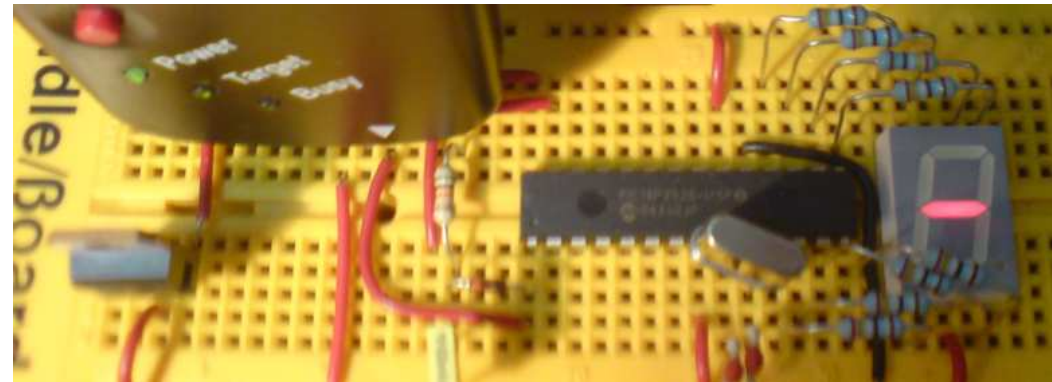
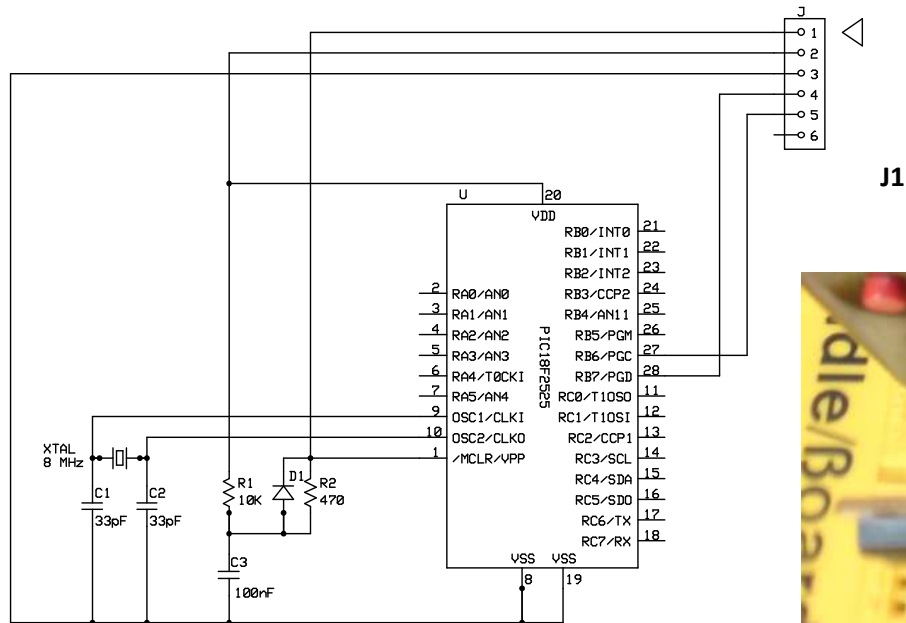
Processor

Electronic component
electrical wirings

MbD\$ Tools: Hardware

Specification

Realization



Schematic

Breadboard

MbD\$ Tools: Hardware

Schematic Capture

Use any software to capture schematics. Please!

Free software at:

www.expresspcb.com/ExpressPCBHtml/Free_schematic_software.htm

Breadboarding

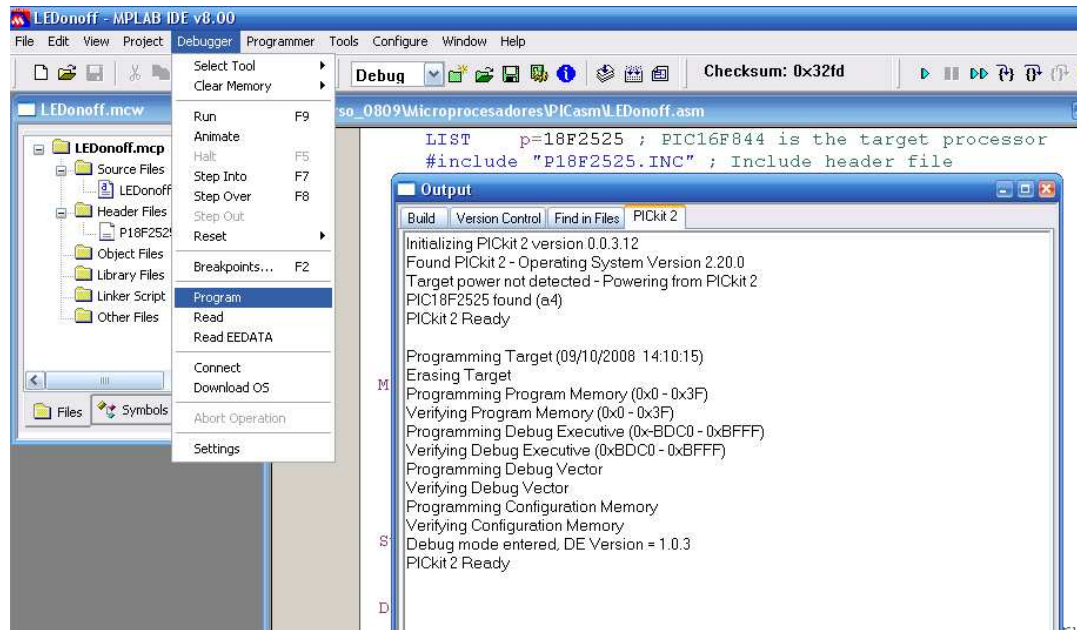
Keep signal lines as short as possible.

Leave the long leads for GNDs and VCCs. Use bigger wires for GNDs and VCCs.

Keep capacitors as close as possible to the nodes

MbD\$ Tools: Software

Integrated Development Environment



Programming Language

**Assembler
C**

MbDS Tools: Software

www.microchip.com/

The screenshot shows the Microchip website interface. At the top left is the Microchip logo with the tagline "A Leading Provider of Microcontrollers & Analog Semiconductors". To the right of the logo is a search bar and a "GO" button. Below the logo is a horizontal navigation menu with items: Home, Products, Design, Support, Applications, Buy/Sample, Corporate, and What's New. The main content area is divided into several sections:

- Products:** Lists categories like MCUs & DSCs (8-bit, 16-bit, 32-bit), nanoWatt XLP, Analog, Interface, Memory, Safety & Security, and Wireless.
- News:** Lists recent news items such as "MASTERS Conference 2009" and "Microchip acquires R&E International Inc."
- Design:** Lists resources like Application Notes, Data Sheets, Design & Simulation Tools, Development Tools, Getting Started, MPLAB® IDE, and Software. A red arrow points to "MPLAB® IDE", which has a sub-menu "Code Examples" visible.
- Support:** Lists resources like Technical Support, Training, Design Partners, Change Notification, Academic Exchange, Forum, ICwiki/Blog, and Quality and Environmental.
- Applications and Markets:** Lists various application areas such as Audio & Speech, Automotive, CAN / LIN, Ethernet, Graphics & LCD, Home Appliance, Intelligent Power Supply, KEELOQ Authentication, Lighting, eXtreme Low Power, Mechatronics, Medical Solutions, Motor Control, Utility Metering, Touch Sensing Technology, USB, Utility Metering, WiFi, and ZigBee®.
- Get Parts:** Features the "microchip DIRECT" logo and lists "Distributors", "Sales Contacts", "Samples", and "Books for Sale". A red arrow points to this section.

A large banner in the center of the page promotes the "ESOC" event in Boston, MA, from September 22-23, 2009, at the Hynes Convention Center. The banner includes the text "Register NOW for FREE Technical Training Sessions" and "Visit Booth 201". Below the banner is a pagination control showing numbers 1 through 10, with "2" highlighted.

MbD\$ Tools: Debugger

PICKit 2 Microcontroller Programmer



Código RS	381-582
Fabricante	Microchip Technology
Referencia del Fabricante	PG164120
Precio Ud.	28,86 €



Código RS	615-3059
Fabricante	Microchip Technology
Referencia del Fabricante	DV164120
Precio Ud.	39,15 €

Schedule

sep-09								Octubre								Noviembre								Diciembre							
sem	l	m	x	j	v	s	d	sem	l	m	x	j	v	s	d	sem	l	m	x	j	v	s	d	sem	l	m	x	j	v	s	d
			1	2	3	4	5	3				1	2	3	7								1	12			1	2	3		
		7	8	9	10	11	12	4	5	6	7	8	9	10	8	2	3	4	5	6	7	8	13	7	8	9	10	11	12		
1	14	15	16	17	18	19	20	5	12	13	14	15	16	17	9	9	10	11	12	13	14	15	14	14	15	16	17	18	19		
2	21	22	23	24	25	26	27	6	19	20	21	22	23	24	10	16	17	18	19	20	21	22	15	21	22	23	24	25	26		
3	28	29	30					7	26	27	28	29	30	31	11	23	24	25	26	27	28	29		28	29	30	31				
															12	30															

Week 1 – 8 Wed & Thu Lectures

Week 8 – 12 Lab seminars

Lab sessions:

- November 2 - It's Alive Lab
- November 9 - C Programming Lab
- November 16 - ADC Lab
- November 23 - Communication Lab

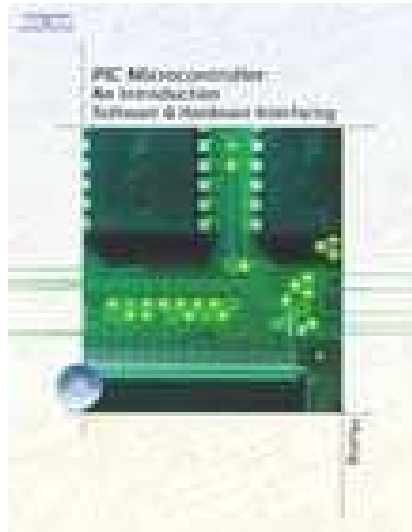
One last comment

That which we persist in doing becomes easier,
not that the task itself has become easier,
but that our ability to perform it has improved.

Ralph Waldo Emerson

Take your time!

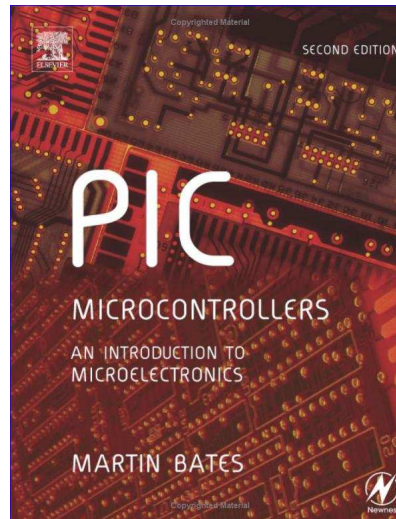
Some have written books



PIC Microcontroller:
Software and Hardware
Interfacing

[Han Wei Huang](#)

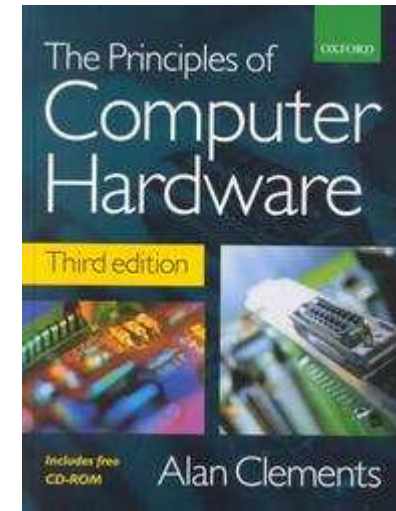
Thomson Learning, 2000



PIC Microcontrollers

[Martin Bates](#)

Newnes, 2004



Principles of Computer
Hardware

[Alan Clements](#)

Oxford Univ Press, 2000

And there are many information sources

Sistemas digitales basados en microprocesador: del bit al sistema — OpenCourseWare - Universidad Carlos III de Madrid - Windows Internet Explorer pro

http://ocw.uc3m.es/tecnologia-electronica/sistemas-digitales-basados-en-microprocesador-del-bit-al-sistema

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Sistemas digitales basados en microprocesador: del bit al sistema

OpenCourseWare
Universidad Carlos III de Madrid

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Contenidos del Curso:

- Sistemas digitales basados en microprocesador: del bit al sistema **Höme**
- Programa
- Lectura obligatoria
- Material de clase
- Ejercicios
- Prácticas
- Pruebas de evaluación
- Otros recursos
- Guía de aprendizaje
- Profesorado
- Download this Course

inicio » tecnología electrónica » sistemas digitales basados en microprocesador: del bit al sistema

Sistemas digitales basados en microprocesador: del bit al sistema

Última modificación 17/07/2008 10:49 Autores: Guillermo Carpintero, Marta Ruiz.



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RUIZ LLATA, MARTA

Departamento de Tecnología Electrónica.
Universidad Carlos III de Madrid.

Sistemas Electrónicos Digitales.

Ingeniero de Telecomunicación.

Junio 2008.

Apple II - under the hood

Horas de clase:

- 14 sesiones de teoría
- 5 sesiones de laboratorio
- 7 sesiones de problemas

Little survey

Do you have a computer at home? Yours / Family?

Did you get it for your University studies?

Do you have Internet at home?

What is your budget for this course? (How much are you willing to spend?)

Have you previously used schematic capture software programs?

Have you previously used software compilers? If yes, which language, which purpose?

What is your experience at building electronic circuits?

Who are these?



Clues:

