

“The Brain of Robots”

An introductory workshop on the use of Microcontrollers

Using the TI MSP430 Launchpad development kit

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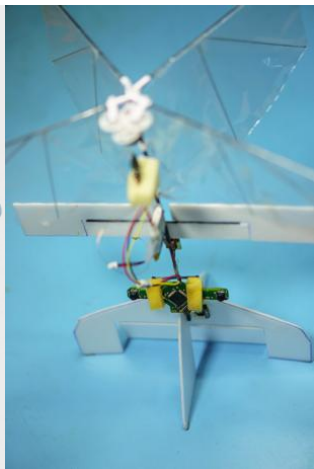
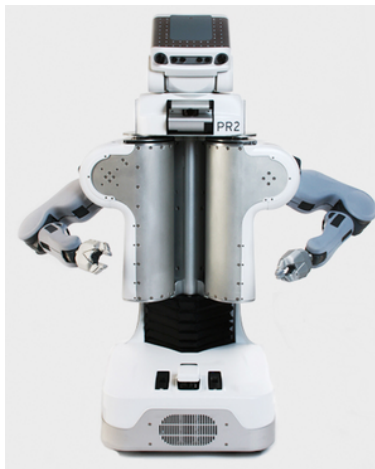
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Goal of today

Learning how microcontrollers work
and how these can be used for robotics



What is the difference?



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Not every robot can carry and power a full sized computer



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But, do all robots need one?

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Is there an alternative that is small, low power and relatively cheap?

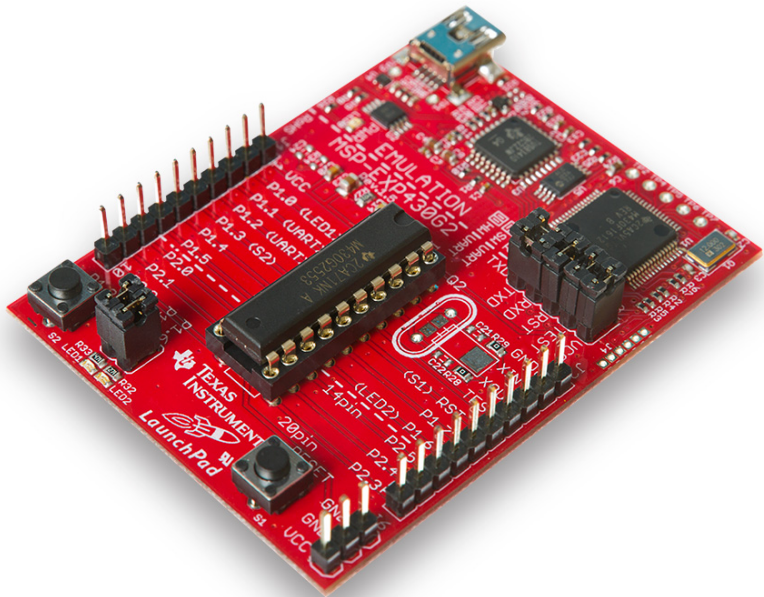
What is a microcontroller (MCU)?

MCU: a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals

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In other words: *a small computer* (which is lightweight and cheap)



(Unfair) Comparison

	PR2	MSP430G2553
Processing power	Two Quad-Core Processors	16Mhz
Memory	24GB	512 Bytes
Storage	2 TB	16kB
Power	650W	0.000858W
Price	\$ 280.000	\$ 0.90*

*Without the development board, just the chip itself

Setup of the workshop

1. List of exercises (with examples) and extra challenges
2. Competition at the end, who is the fastest?

Tip: Only do the *Extra challenges* when you have enough time, they can be hard!

Some safety instructions

- ▶ Do not touch any of the pins or components of the board, this can destroy them.
- ▶ Do not put the board (or any connected component) on a metallic surface.

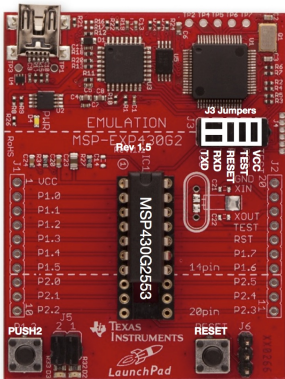


LaunchPad with MSP430G2553

Revision 1.5

Flash 16 KB
Serial Hardware

+3.3V				1
RED_LED		A0	P1_0	2
	RXD	A1	P1_1	3
	TXD	A2	P1_2	4
PUSH2		A3	P1_3	5
		A4	P1_4	6
	SCK (B0)	A5	P1_5	7
	CS (B0)		P2_0	8
			P2_1	9
			P2_2	10



Hardware
Pin number
IPC
Serial UART
SPI
analogRead()
digitalRead() and digitalWrite()
digitalRead(), digitalWrite() and analogWrite()

20				GROUND
19	P2_6			XIN
18	P2_7			XOUT
17				TEST
16				RESET
15	P1_7	A7	SDA	MOSI (B0)
14	P1_6	A6	SCL	MISO (B0)
13	P2_5			GREEN_LED
12	P2_4			
11	P2_3			

Rei Vilo, 2012-2013
embeddedcomputing.weebly.com

version 1.3 2102-09-09