

ESP32

THE chip of the future



INTRODUCTION

• Instead of using a microcontroller and add-on WiFi, Bluetooth modules for building connected **things**, this is the only chip you might want to use.





WHY WE CHOOSE ESP32 ?!





WHY WE CHOOSE ESP32 ?!

Differences:

- Not only they look different, but their architecture is also totally different.
- They have different hardware architecture.
- Their built-in capabilities are very different.
- Almost as different as BLACK AND WHITE.
- The ESP32 dev kit is actually cheaper than Arduino Uno, which means that you get a more powerful board for a lower price.
- At the level where you use your existing Arduino skills to work with the ESP32, you can treat the ESP32 as a supercharged Arduino Uno: faster, better in many respects.



WHY WE CHOOSE ESP32 ?!

Similarities :

- We can use the Arduino IDE as the development environment.
- We can use a programming language that matches almost one-on-one with the language that we have learned for the Arduino.
- And, to a large extent, we can reuse almost 90 percent of the Arduino libraries in software that we write for the ESP32.



BLOCK DIAGRAM ESP32

SPI	Bluetooth	Bluetooth	
12C	link controller	baseband	RF receive
125	[-]		Clock vitch
SDIO	Wi-Fi MAC	Wi-Fi	RF
UART		baseband	transmit
CAN	Core and	memory	Cruptographic bardware
ETH	2 x Xtensa® Micropro	32-bit LX6	acceleration
IR		CDAN	SHA RSA
PWM	ROM	SRAM	AES RNG
Temperature sensor		PTC	
Touch sensor		nic	,
DAC	PMU	ULP coprocess	Recovery for memory
ADC			

• The block diagram on the left shows all that is in there!



ESP32 PINOUT





- There's an add-on for the Arduino IDE that allows you to program the ESP32 using the Arduino IDE and its programming language.
- 1. In your Arduino IDE, go to File> Preferences





2. Enter https://dl.espressif.com/dl/package_esp32_index.json into the "Additional Board Manager URLs" field as shown in the figure below. Then,

click the "OK" button:

Preferences		×
Settings Network		
Sketchbook location:		
C: \Users\ruisantos\Documents\Arduino		Browse
Editor language: System Default	~	(requires restart of Arduino)
Editor font size: 17		
Interface scale: 🖂 Automatic	100 🗘 % (requires restart of Arduing)
Show verbose output during: compilation [upload	
Compiler warnings: None $$		
Display line numbers		
Enable Code Folding		
Verify code after upload		
Use external editor		
Aggressively cache compiled core		
Check for updates on startup		
Update sketch files to new extension on sav	/e (.pde -> .ino)	
Save when verifying or uploading		
Additional Boards Manager URLs: https://dl.es	pressif.com/dl/package_esp32_index.js	on, http://arduino.esp8266.com/stable/package_e
More preferences can be edited directly in the fi	le	
C: \Users \ruisantos \AppData \Local \Arduino 15 \pr	eferences.txt	
(edit only when Arduino is not running)		



3. Open the Boards Manager. Go to Tools > Board > Boards Manager...





4. Search for **ESP32** and press install button for the "**ESP32 by Espressif Systems**":

💿 Boards Manager	×
Type All v esp32	
esp32 by Espressif Systems Boards included in this package:	^
ESP32 Dev Module, WEMOS LoLin32. <u>More info</u>	Installing
	~
Downloading toos (3/3). Downloaded 30,228kb of 125,719kb.	Cancel



- That's it!
- Now we can choose ESP32 bord in Tools menu.

🥺 sketch_dec12a	Arduino 1.8.5		
File Edit Sketch	Tools Help		
	Auto Format	Ctrl+T	
	Archive Sketch		
sketch_dec12	Fix Encoding & Reload		
1 void se	Serial Monitor	Ctrl+Shift+M	
2 // pi	Serial Plotter	Ctrl+Shift+L	in once:
3	WiFi101 Firmware Undater		
4 }	thin nor himmarc opaater		
5	Board: "DOIT ESP32 DEVKIT V1"	;	≜
6 void lo	Flash Frequency: "80MHz"	2	Adafruit ESP32 Feather
7 // 10	Upload Speed: "921600"	2	NodeMCU-32S
8	Core Debug Level: "None"	2	MH ET LIVE ESP32DevKIT
91	Port: "COM4"	2	MH ET LIVE ESP32MiniKit
- 1	Get Board Info		ESP32vn loT Uno
			DOIT ESP32 DEVKIT V1
	Programmer: "AVRISP mkll"	1	OLIMEX ESP32-EVB
	Burn Bootloader		OLIMEX ESP32-GATEWAY
			ThaiEasyElec's ESPino32
			M5Stack-Core-ESP32
			Heltec_WIFI_Kit_32
			Heltec_WIFI_LoRa_32
			ESPectro32
			Microduino-CoreESP32

CEPEDERIC AVANTA

LED CLOCK

- Now we will try to make LED clock
- For this task we need:
 - ESP 32
 - Breadborad
 - Few cables
 - Led ring WS2812B



CORPORTING CONTRACTOR OF CONTA

LED CLOCK

ESP32

- We need to use only 3 pins:
 - VIN for power supplay
 - GND for ground
 - And pin D12 for INPUT/OUTPUT







Breadboard

- We use it to connect ESP32 pins.
- First row is first pin, second row is second pin etc.
- It will help us to connect ESP32 with LED RING.
- All holes in the selected row are connected together, so the holes in the selected column. The set of connected holes can be called a node.

	0					Y		•	0		•				17			-		1 0			12					1		0	0	1		0		3	0	0	0		0	0			0	0			0	0	
00000	00000	00000	00000	00000		00000	00000	00000	00000	00000	00000	00000	0 0 0 0 0	00000	00000		0 0 0 0 0				00000	00000				00000	00000			00000				00000	0000	00000		0 0 0 0 0	00000	0000			00000	0 0 0 0 0	00000	00000	0 0 0 0 0	0000	00000	0 0 0 0 0	0 0 0 0
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									10				67				0		0.0					12		100			0.0				1 12			2							1.10						0		

LED CLOCK



THE PUT HASHIS- SCHOOL EUCHANGE PARTNERSHIPS

LED CLOCK

LED ring

- It will be used to show time our a LED CLOCK.
- It has 60 LEDs
- LEDs are connected in series. If one of them fail down, ring doesn't work.
- Blue color shows seconds
- Red color shows minutes
- Green color shows hours



THE PLANES SCHOOL EXCHANGE PARIMERSHIPS

LED CLOCK

How to put it all togother

- 1. Connect ESP32 to breadboard
- 2. Connect LED RING to breadboard
- 3. Connect USB cable to computer
- 4. Open Arduino IDE
- 5. Create new File and now you are ready to programming





THE LED CLOCK – FINAL PRODUCT





