



**CESANTA**

Embedded Communication

# Smart.js

## A tale of two platforms

Deomid 'Rojer' Ryabkov

[rojer@cesanta.com](mailto:rojer@cesanta.com)

[@CesantaHQ](https://twitter.com/CesantaHQ)

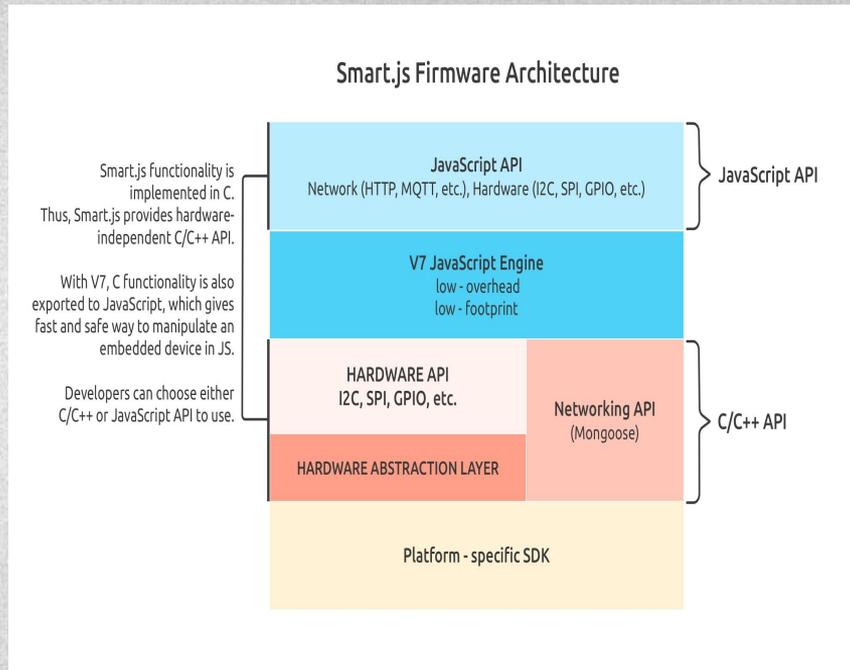
# Who is Cesanta?

- Irish Startup founded by ex-Googlers in 2013
- Makers of the Mongoose embedded web server, over 1M downloads since 2004
- Developers of Smart.js - full-stack, open source IoT platform
- Goal: make it easy for everyone to make connected devices



# Smart.js Overview

- Aiming at Web devs
- Own JavaScript engine
  - Targeting ECMAScript 5
  - Emphasis on small footprint
- Complete solution
  - Device and cloud parts
  - Communication protocol (Clubby)
- Open source device part (GPLv2)
- Targeting multiple platforms
  - Started with ESP8266 and CC3200
  - + "POSIX" port (think Raspberry Pi; any Linux)



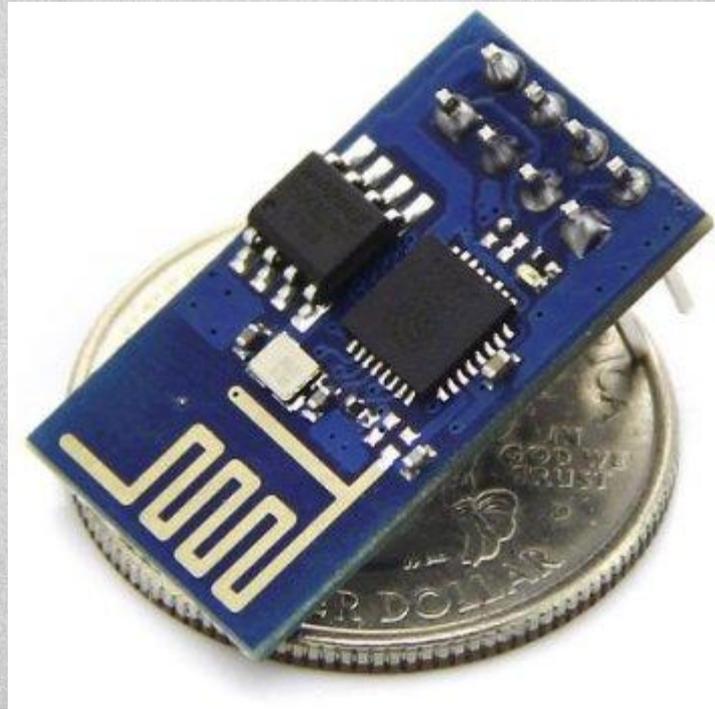
# CC3200 Overview

- IoT play by a major vendor
- CC3100 Network Processor + 80 MHz Cortex M4 app CPU
  - On the same die but still separate, communicate over internal SPI
  - 256K RAM (I + D), no built-in Flash (SPI only)
- Wifi: station, AP
- I2C, SPI, 2xUART, PWM, timers, HW crypto, RTC, 4xADC
- SDK: OS-less & FreeRTOS; good code quality and docs
- HW well documented (datasheets!)
- Price: CC3200MOD - \$25 on Digikey, \$12.5 on Aliexpress

# ESP8266 Overview

- Accidental IoT success by a small Chinese vendor (Espressif Systems)
- Fully custom design; relatively obscure ISA
  - 80/160 MHz Xtensa lx106 CPU; RAM: 96K D, 32K I; Flash: SPI only
  - GCC toolchain is a one-man effort; GDB support is still pretty shaky
  - Rudimentary MMU: transparent SPI flash -> RAM mapping (w/ cache)
- WiFi: STA, AP, AP + STA
- I2S, SPI, 1.5X UART, 1 ADC, RTC
- SDK
  - OS-less - sucks
    - Custom networking API over LWIP; no headers
  - FreeRTOS - blows
- No HW docs (datasheets? what datasheets?)
- Price: ESP-12E module: \$1.94 on Ali

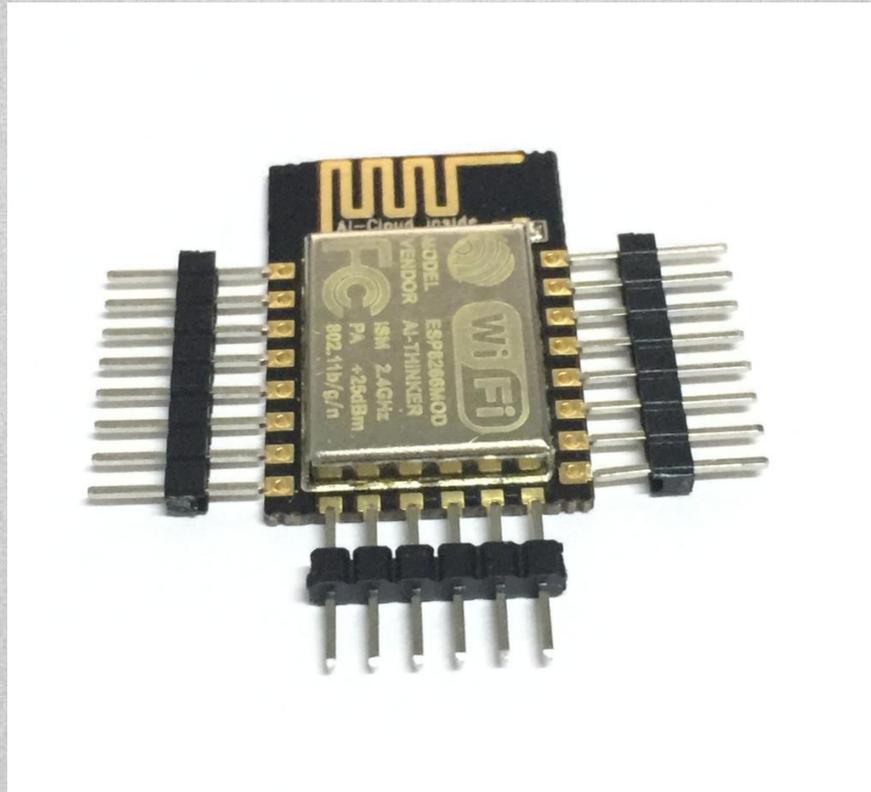
ESP-01



ESP-01 GPIO breakout :)



## ESP-12E



# Tales from the trenches: ESP8266

- Origin
- OS-less SDK is a joke
- Old LWIP w/no headers; espconn butchers the API and adds overhead
- Constant state of WTF
- Gathering scraps of information on forums
- Superfast flashing with Flash'N'Chips

# Tales from the trenches: CC3200

- Uniflash fail
- TI FailFS
  - Why embedded devs should not be allowed to write file systems
- O RAM, whither didst thou go?
- SDK win

# Smart.js to the **rescue**

We suffer so you don't have to.

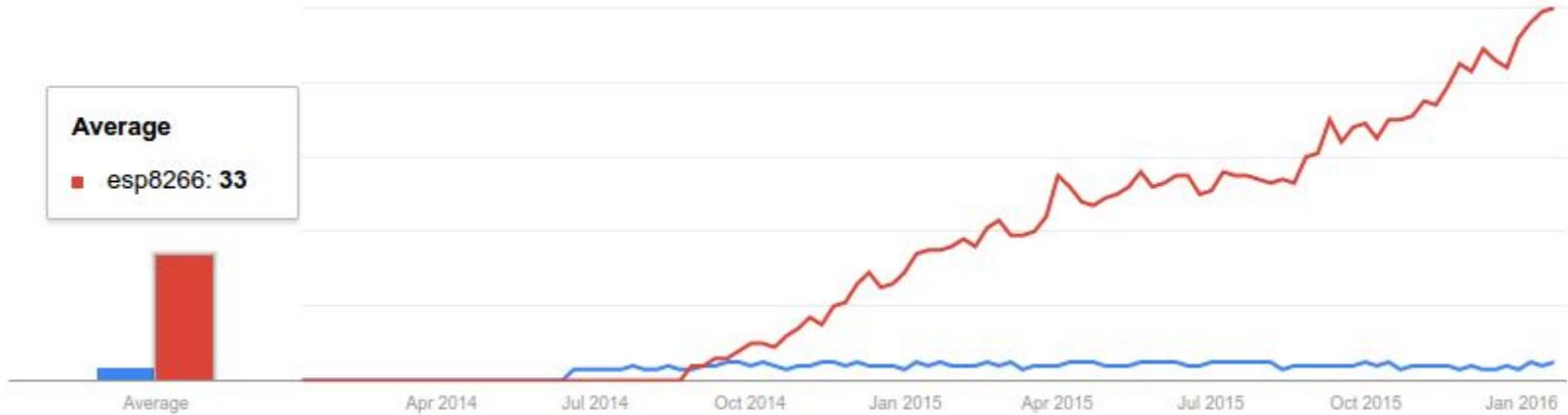
# ESP8266 vs CC3200

Interest over time

News headlines Forecast

Average

esp8266: 33



</>

# ESP32

- Next gen chip from Espressif
- Adds Bluetooth
- Second core (optional, independent or SMP)
- More RAM
- More peripherals (notably I2C, PWM, better ADC)
- HW crypto, SPI encryption, intrusion detection, OTP area
- Currently in beta, release expected in the coming months



*That's all Folks!*  
*Any Question?*