

ESP_x

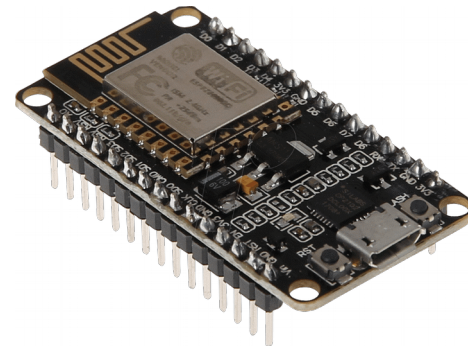
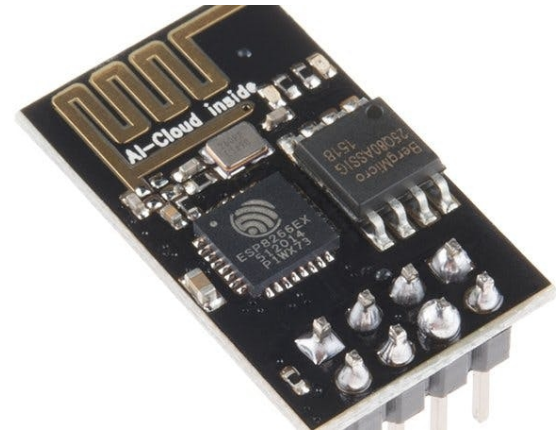
CCC Salzburg / 20.11.2019

ESP8266

- Espressif (Chinabude)
- 80 MHz
- 32 bit
- 16x GPIO
- WLAN nach 802.11n + WPA2
- Je nach Flash: 512 KB – 16 MB (4 MB üblich)

ESP8266

- I2C
- I2S
- SPI
- UART
- ADC
- „RTC“ / Deep-sleep ~71min
- 5V tolerant



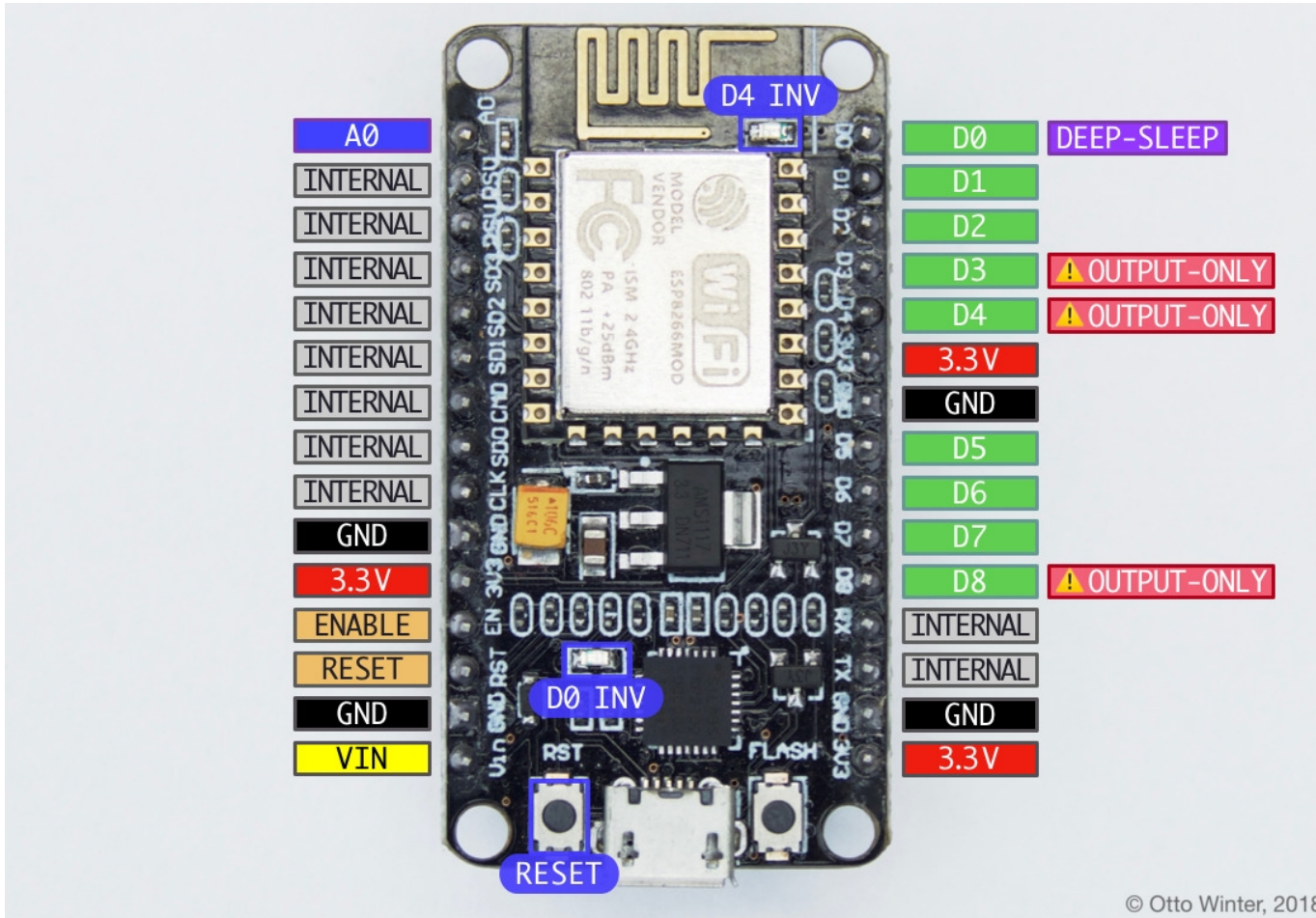
ESP32

- 160 MHz
- 32 bit
- WLAN + Bluetooth (4.2 und BLE)
- „Secure“ Boot – jetzt nicht mehr secure
 - <https://limitedresults.com/2019/11/pwn-the-esp32-forever-flash-encryption-and-sec-boot-keys-extraction/>

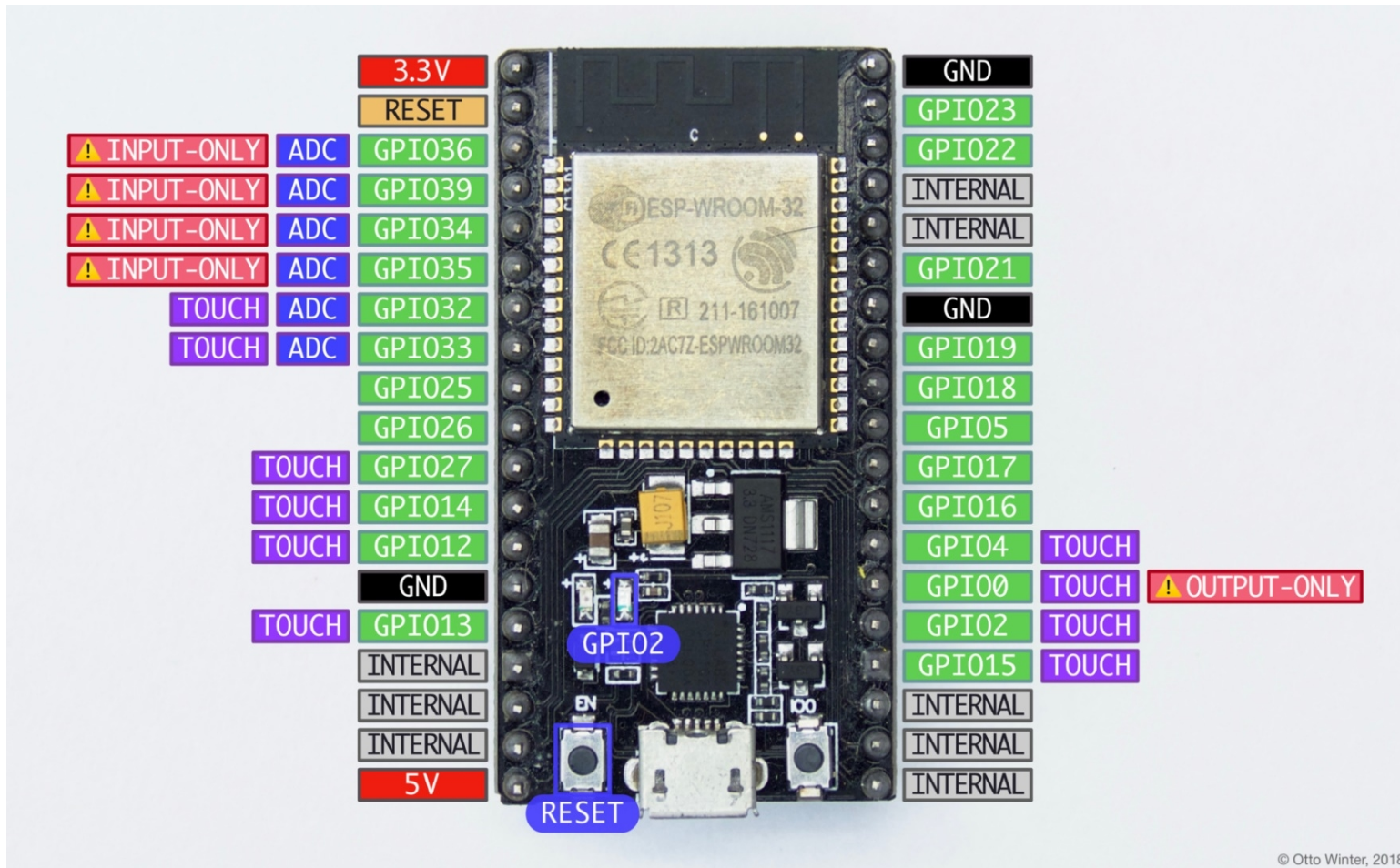
- SPI
- I2S
- I2C
- Ethernet MAC
- PWM
- ADC
- DAC
- ...



https://www.espressif.com/sites/default/files/documentation/esp32_datasheet_en.pdf



https://esphome.io/devices/nodemcu_esp8266.html



OS

- NodeMCU
 - Lua <https://nodemcu-build.com/>
- Micropython
 - Python - WebREPL
- Sonoff
 - Steckdosenzeug
- ESP Easy
 - Leichter Einstieg
- C/C++
 - Arduinostyle

Crypto

- mbedTLS
- axTLS
- ussl – Micropython
- Eingeschränkte Cipherwahl
- ESP8266 schwierig – ESP32 leichter

ESP Easy Mega: esp-ez-sensor-2

△Main ⚙️Config 💬Controllers 🛠️Hardware 🖱️Devices 📧Notifications 🛠️Tools

	Task	Enabled	Device	Name	Port	Ctr (IDX)	GPIO	Values
Edit	1	✓	Environment - BMx280	bme280		1	GPIO-5 GPIO-4	Temperature: 10.59000 Humidity: 53.18750 Pressure: 917.53925

RGB Smart Plug Module

Fernseher

Voltage	228.200 V
Current	0.024 A
Power	0.600 W
Apparent Power	5.477 VA
Reactive Power	5.400 VAR
Power Factor	0.11
Energy Today	2.09718 kWh
Energy Yesterday	1.42065 kWh
Energy Total	141.14815 kWh

ON **OFF**

Dark Bright



[Toggle 1](#) [Toggle 2](#)

[Configuration](#)

[Information](#)

[Firmware Upgrade](#)

[Console](#)

[Restart](#)

```
COM8 - PuTTY
>>> import port_diag
FlashROM:
Flash ID: 1640ef (Vendor: ef Device: 4016)
Flash bootloader data:
Byte @2: 00
Byte @3: 40 (Flash size: 4MB Flash freq: 40MHZ)
Firmware checksum:
size: 600872
md5: 35e285a80516e70242ebf7d780d6c70f
True

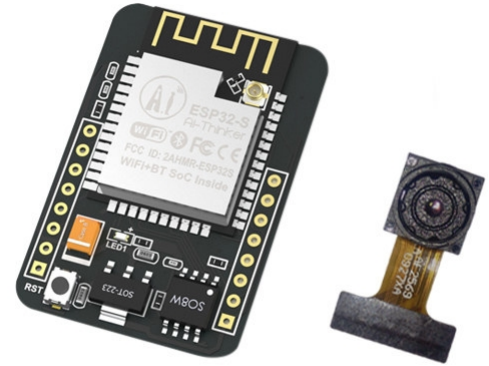
Networking:
STA ifconfig: ('10.0.0.23', '255.255.255.0', '10.0.0.1', '75.75.75.75')
AP ifconfig: ('192.168.4.1', '255.255.255.0', '192.168.4.1', '75.75.75.75')
Free WiFi driver buffers of type:
0: 8 (1,2 TX)
1: 0 (4 Mngmt TX(len: 0x41-0x100))
2: 8 (5 Mngmt TX (len: 0-0x40))
3: 4 (7)
4: 7 (8 RX)
lwIP PCBs:
Active PCB states:
Listen PCB states:
Local port 8266, foreign port 9530 snd_nxt 0 rcv_nxt 1073716632 State: LISTEN
TIME-WAIT PCB states:
>>>
```

Flashen

- flashtool.py
- ESP32/ESP8266 „NodeMCU“-Style
- Unterschied bei „embedded“, Limitierungen bei GPIO/Flash möglich

Ideen

- Serial bridge
- „Pflanzenwachstum“
- Umwelt: Temperatur/Feuchtigkeit/Druck/...
- Distanz: zB Schneefall, Wasserstand



MQTT

- Message Queue
- Broker
- Publish/subscribe
- Definiert nicht Payload!

- tcp/1883 tcp/8883 (tls)
- websockets
- 5.0 – 3.1 – MQTT-SN

MQTT

- QoS:
 - At most once (0) (Fire and forget)
 - At least once (1) (Puback)
 - Exactly once (2).
 - Retained Messages
 - Last Will and Testament
- Broker:
 - emqttd, mosquitto ...

```
> Transmission Control Protocol, Src Port: 49154, Dst Port: 1883, Seq: 711, Ack: 711, Len: 47
  v MQ Telemetry Transport Protocol, Publish Message
    > Header Flags: 0x31, Message Type: Publish Message, QoS Level: At most once delivery (Fire and Forget), Retain
      Msg Len: 45
      Topic Length: 35
      Topic: /esp-ez-sensor-2/bme280/Temperature
      Message: 31302e3539303030
```

```
0000 b8 ae ed 76 24 5a 18 fe 34 d1 73 b0 08 00 45 00  ...v$Z... 4.s...E.
0010 00 57 7c 89 00 00 ff 06 bd 3c c0 a8 00 84 c0 a8  .W|..... <.....
0020 00 06 c0 02 07 5b 00 06 05 63 0b ae c0 6d 50 18  .....[... c...mP.
0030 08 07 6a 7c 00 00 31 2d 00 23 2f 65 73 70 2d 65  ..j|..1- ./esp-e
0040 7a 2d 73 65 6e 73 6f 72 2d 32 2f 62 6d 65 32 38  z-sensor -2/bme28
0050 30 2f 54 65 6d 70 65 72 61 74 75 72 65 31 30 2e  0/Temper ature10.
0060 35 39 30 30 30 59000
```

Demo

