# DIY: Meteo stanica

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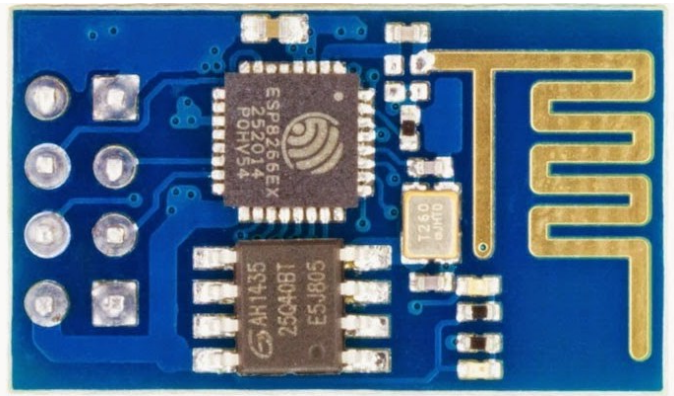
http://L.valky.eu/meteo

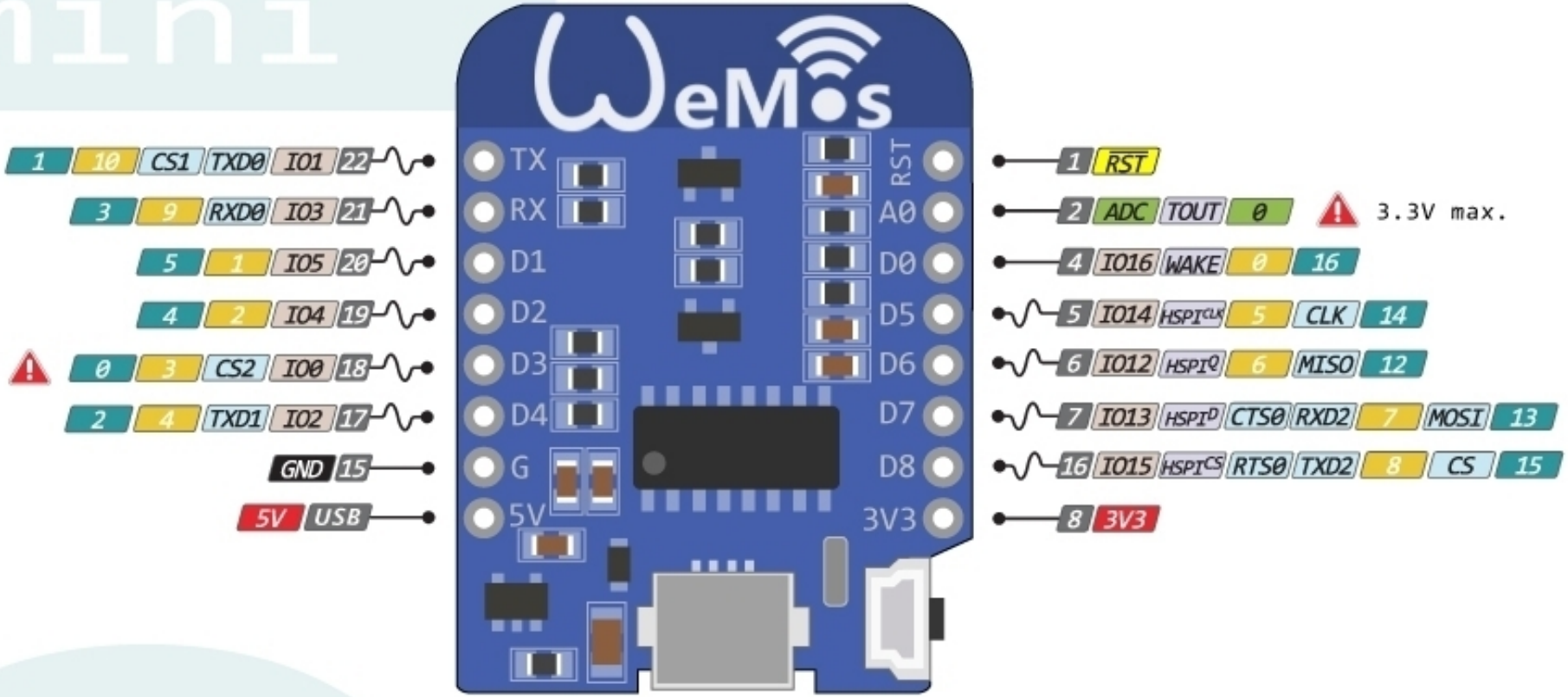
# Internet of things

- Označenie pre sieť fyzických zariadení, vozidiel, domácich spotrebičov a ďalších zariadení, ktoré sú vybavené elektronikou, softwarom, senzormi, poprípade pohyblivými časťami a sieťovou konektivitou, ktorá umožňuje týmto zariadeniam sa vzájomne prepájať a vymieňať si dáta
- Rozdelenie:
  - Napájanie (Batéria, solárny článok, sieť, PoE)
  - Komunikačná platforma (Wifi, GPRS 2G-4G, Ethernet, špeciálne bezdrôtové platformy LoRaWAN, SigFox)
  - Smer komunikácie (Simplexné, duplexné)
  - Poloha (Statické, mobilné)

# Wemos D1 mini

- ESP8266
- 80 MHz
- 32 KB RAM
- 0.5 MB FLASH
- 16 GPIO
- 10 bit SAR ADC

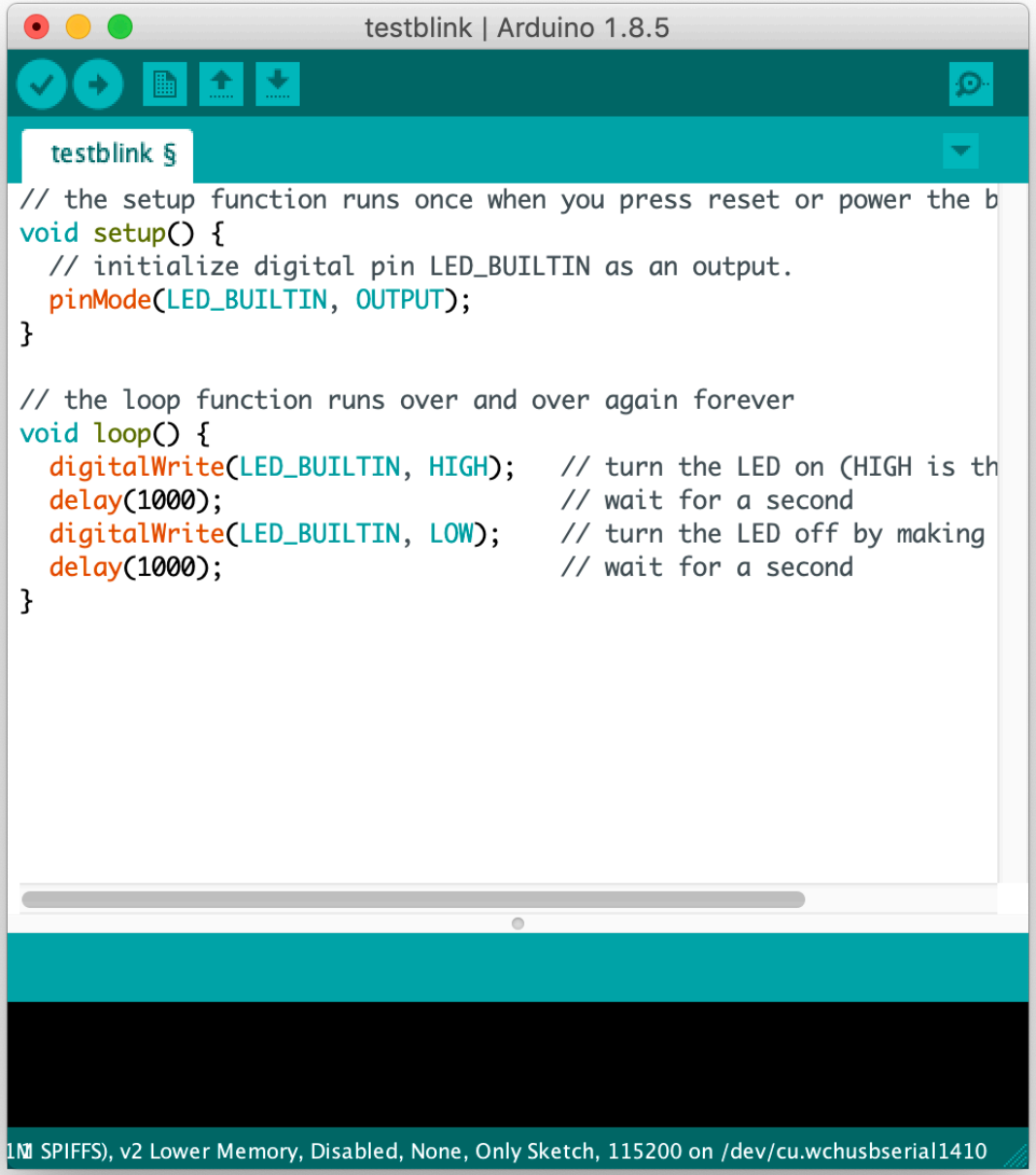




# Arduino IDE

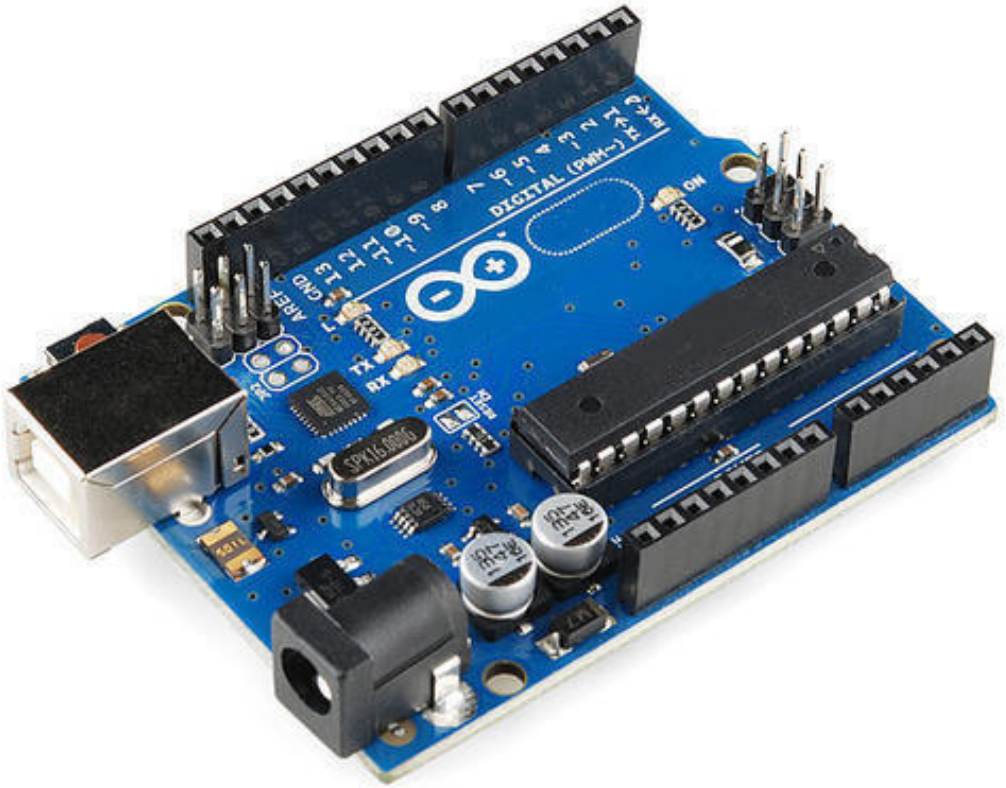
- Integrované vývojové prostredie
- Editor
- Preprocesor
- Kompilátor
- Linker
- Programátor

- http://L.valky.eu/arduino



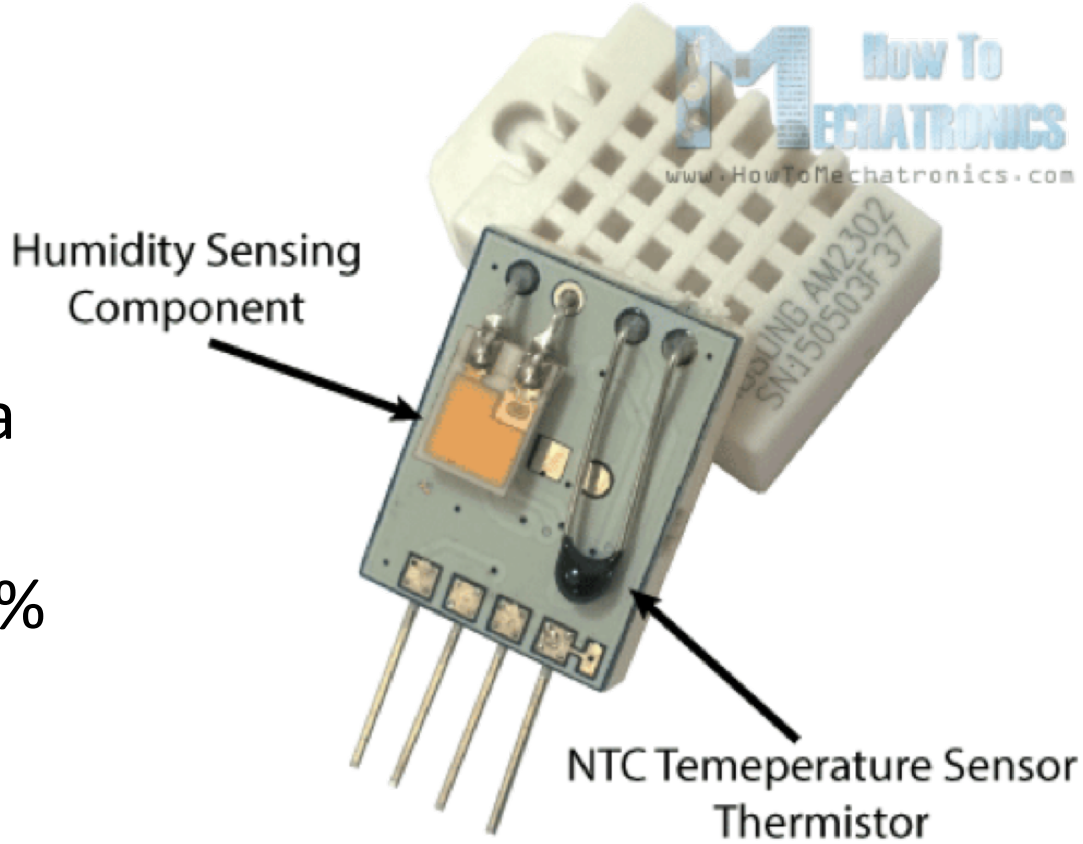
# Arduino Uno R3

- Atmel MEGA ATmega328P
- 32KB FLASH
- 2KB RAM
- 23 GPIO
- 6 channel 10 bit ADC
- PPTC fuse
- USB to TTL (UART)
- bootloader



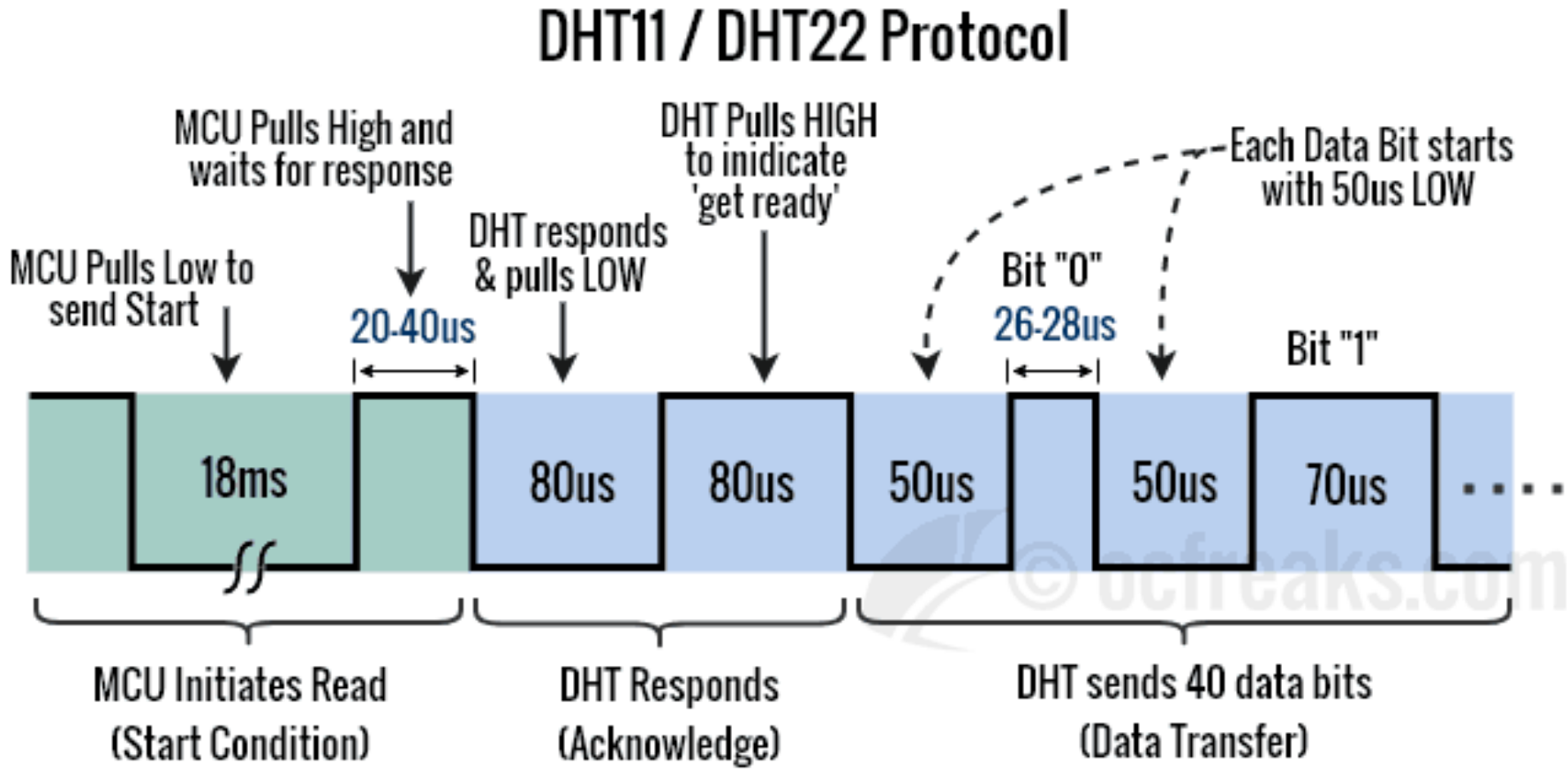
# Senzor DHT22 / AM2303

- Kombinovaný senzor vlhkosti a teploty
- Teplota v rozsahu -40°C až +80°C Celzia s presnosťou ±0.5°C a rozlíšením 0.1°C
- Relatívna vlhkosť vzduchu v rozsahu 0 % – 100% s presnosťou ±2%




| DHT piny | |
|---|---|
| 1 | VCC |
| 2 | DATA |
| 3 | NC |
| 4 | GND |

# Protokol DHT22 / AM2303



# Protokol DHT22 / AM2303

**DATA=16 bits RH data+16 bits Temperature data+8 bits check-sum**

Example: MCU has received 40 bits data from AM2302 as

**0000 0010 1000 1100  0000 0001 0101 1111  1110 1110**

16 bits RH data  16 bits T data  check sum

Here we convert 16 bits RH data from binary system to decimal system,

0000 0010 1000 1100 → 652

Binary system  Decimal system

**RH=652/10=65.2%RH**

Here we convert 16 bits T data from binary system to decimal system,

0000 0001 0101 1111 → 351

Binary system  Decimal system

**T=351/10=35.1**℃

**Sketch -> Include library -> Manage Libraries... -> "DHT sensor libraries for ESPx"**

# Arduino & ESP8266

Postupovať podľa návodu

http://L.valky.eu/esp

Úloha 1: S použitím funkcií **digitalWrite** a **delay** vyblikajte morzeovkou signál SOS

. . . _ _ _ . . .

# Úloha 2

- File -> Examples -> DHT sensor library for ESPx -> DHT_ESP8266
- Tools -> Serial monitor

| DHT piny | |
|---|---|
| 1 | VCC |
| 2 | DATA |
| 3 | NC |
| 4 | GND |


/dev/cu.wchusbserial1410

Send

```
Status    Humidity (%)        Temperature (C)     (F)       HeatIndex (C)       (F)
ESP8266_WEMOS_D1MINI
OK        64.6                25.1                77.2              25.4              77.6
OK        65.8                25.1                77.2              25.4              77.7
OK        65.7                25.0                77.0              25.3              77.5
OK        65.8                25.1                77.2              25.4              77.7
```

Autoscroll | Both NL & CR | 115200 baud | Clear output

DHT_ESP8266 | Arduino 1.8.5

DHT_ESP8266 §

```
#include "DHTesp.h"

#ifdef ESP32
#pragma message(THIS EXAMPLE IS FOR ESP8266 ONLY!)
#error Select ESP8266 board.
#endif

DHTesp dht;

void setup()
{
  Serial.begin(115200);
  Serial.println();
  Serial.println("Status\tHumidity (%)\tTemperature (C)\t(F)\tHeatInd
  String thisBoard= ARDUINO_BOARD;
  Serial.println(thisBoard);

  dht.setup(D4, DHTesp::DHT22);
}

void loop()
{
  delay(dht.getMinimumSamplingPeriod());

  float humidity = dht.getHumidity();
  float temperature = dht.getTemperature();

  Serial.print(dht.getStatusString());
```

Uploading...

Uploading 257792 bytes from /var/folders/7r/v78qfkpd1sl5sv8wsflsq3fw0

.....

(4M (SPIFFS), v2 Lower Memory, Disabled, None, Only Sketch, 115200 on /dev/cu.wchusbserial1410

# Úloha 3: Jednoduchý web server

- http://L.valky.eu/esp3a

- Raw string literal (C++11)

  *prefix*(optional) **R** "*delimiter*( *raw_character** )*delimiter*"

- http://L.valky.eu/esp3b

```
char* html = R"HOCICO(
<HTML>
<BODY>
  <CENTER>
      <B>Hello World....</B>
  </CENTER>
</BODY>
</HTML>
)HOCICO";
```

# Úloha 4: Web server & DHT22

- http://L.valky.eu/esp4

# Úloha 5: Soft AP režim

- http://L.valky.eu/esp5

# Úloha 6: Captive portal

- http://L.valky.eu/esp6

# Úloha 7: Integrácia s Dweet.IO

- http://L.valky.eu/esp7

# Hotovo!

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