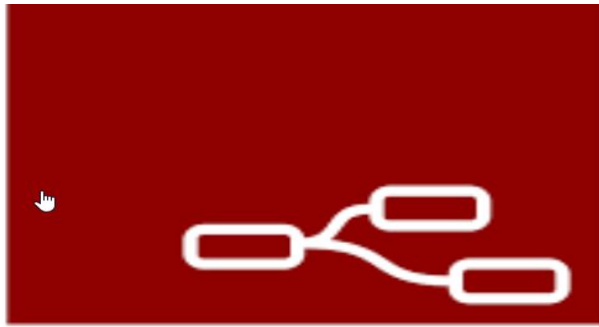


M015 Uf1 IoT



Node-RED



Curs: 2019-20

CFGs: DAM2

Alumne : Arnau Subirós Puigarnau

Data : 10-12-2019
versió 5- 18/12/2019

Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

Dashboard Node-Red -Mqtt i Esp8266

- Primer accedirem al Node- Red utilitzant navegador (amb la IP del pc i el port 1880

```
node-red
9 Dec 15:17:15 - [info]
Welcome to Node-RED
=====
9 Dec 15:17:15 - [info] Node-RED version: v0.20.8
9 Dec 15:17:15 - [info] Node.js version: v10.16.3
9 Dec 15:17:15 - [info] Windows_NT 10.0.18362 x64 LE
9 Dec 15:17:17 - [info] Loading palette nodes
9 Dec 15:17:18 - [warn] rpi-gpio : Raspberry Pi specific node set inactive
9 Dec 15:17:18 - [info] Dashboard version 2.17.1 started at /ui
9 Dec 15:17:18 - [info] Settings file : \Users\arnau\.node-red\settings.js
9 Dec 15:17:18 - [info] Context store : 'default' [module=memory]
9 Dec 15:17:18 - [info] User directory : \Users\arnau\.node-red
9 Dec 15:17:18 - [warn] Projects disabled : editorTheme.projects.enabled=false
9 Dec 15:17:18 - [info] Flows file : \Users\arnau\.node-red\flows_M10-ASP2019.json
9 Dec 15:17:18 - [info] Server now running at http://127.0.0.1:1880/
9 Dec 15:17:18 - [warn]

-----
Your flow credentials file is encrypted using a system-generated key.

If the system-generated key is lost for any reason, your credentials
file will not be recoverable, you will have to delete it and re-enter
your credentials.

You should set your own key using the 'credentialSecret' option in
your settings file. Node-RED will then re-encrypt your credentials
file using your chosen key the next time you deploy a change.
-----
9 Dec 15:17:18 - [info] Starting flows
9 Dec 15:17:18 - [info] Started flows
```

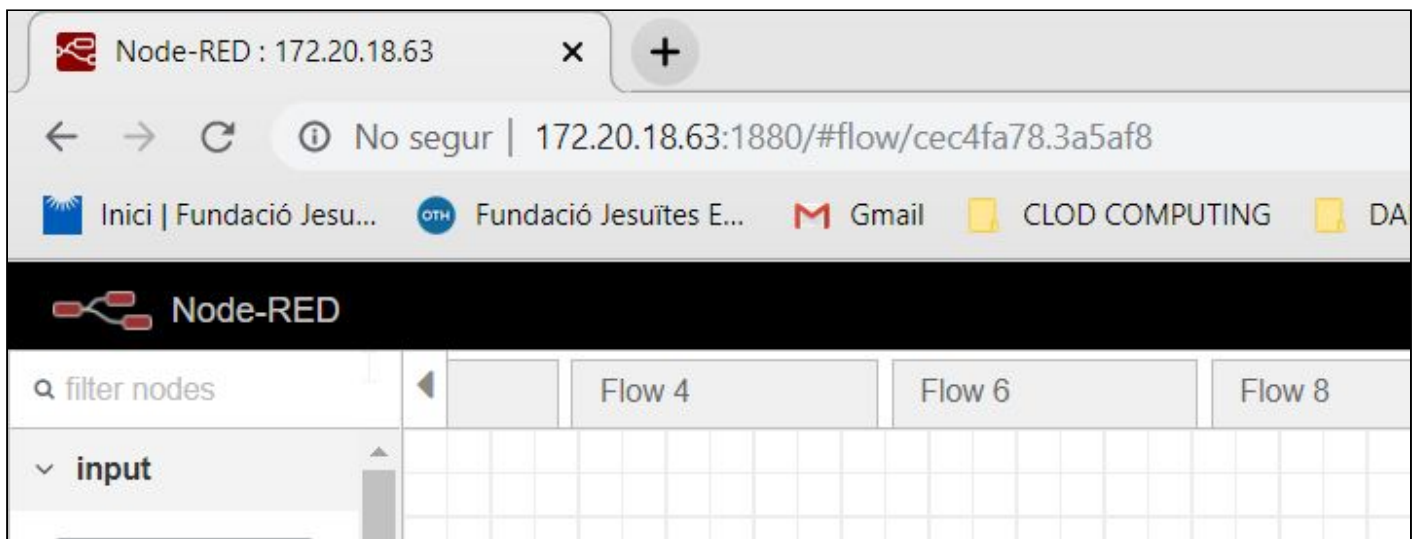
```
cmd Indicador d'ordres
Suñijo DNS específico para la conexión. . . :
Adaptador de LAN inalámbrica Conexión de área local* 3:
Estado de los medios. . . . . : medios desconectados
Suñijo DNS específico para la conexión. . . :
Adaptador de LAN inalámbrica Wi-Fi:
Suñijo DNS específico para la conexión. . . : etpc.edu
Vínculo: dirección IPv6 local. . . : fe80::70b7:ee0b:bcee:c1f0%5
Dirección IPv4. . . . . : 172.20.18.63
Máscara de subred. . . . . : 255.255.248.0
Puerta de enlace predeterminada. . . . : 172.20.23.254
Adaptador de Ethernet Conexión de red Bluetooth:
Estado de los medios. . . . . : medios desconectados
Suñijo DNS específico para la conexión. . . :
C:\Users\arnau>
```

Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019



- Un cop això utilitzant un nou fluxe.
- Hem de tenir habilitat el Dashboard per Node-Red
 - <https://flows.nodered.org/node/node-red-dashboard>
- Hem de tenir habilitat el Dashboard per Node-Red
- Ens interessa utilitzar el protocol MQTT i poder comunicant-se amb la ESP8266.
- Abans de continuar obrim el ARDUINO IDE
 - utilitzem el codi esp_8266_MQTT_PUB_04 on haurem de modificar alguns parametres

Es volia accedir desde la Raspberry PI (rasp-asp.ddns.net) on te un servidor mosquito però tot i que he intentat accedir desde la connexio desde meu mobil (degut al NO-IP) no he aconseguit conectar-me, tot i que a casa de forma local i en la variable "Const char * mqtt server anotava la meva ip local si que funcionaba correctament.

Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

```

#include <PubSubClient.h>
#include <Wire.h>

#define EXTERNAL_BUTTON 4

// Connect to the WiFi
//const char* ssid = "WLAN_FE55";
//const char* password = "XXXXXXXXXX";
//const char* ssid = "ASP";
//const char* password = "XXXXXXXXXX";

const char* ssid = "JESUITESFP_P5";
const char* password = "XXXXXXXXXX";

const char* mqtt_server = "test.mosquitto.org";
const int mqtt_port = 1883; // normally 1883
//const char* mqtt_server = "test.mosquitto.org";
//const int mqtt_port = 1883; // normally 1883

#define TEMA_PUBLICA_ESTAT_LDR "/arnau/ldr"
#define TEMA_SUBSCRIPCIO_ORDRES "/arnau/ordres"

WiFiClient espClient;
PubSubClient client(espClient);

```

Hem establert un publicador i subscriptor. (El broker en aquest cas, serà de prova test-mosquitto.org:1883. ja que la màquina virtual l'ha tinc instal.lada però en un disc extern.

```

#define TEMA_PUBLICA_ESTAT_LDR "/arnau/ldr"
#define TEMA_SUBSCRIPCIO_ORDRES "/arnau/ordres"

WiFiClient espClient;

```

- Aquesta línia de codi ens interessa per poder subscriure'ns i podrem canviar l'estat dels leds de la plaqueta via node.red

#define TEMA_SUBSCRIPCIO_ORDRES "/arnau/ordres"

Nom i Cognoms

Arnau Subirós Puigarnau

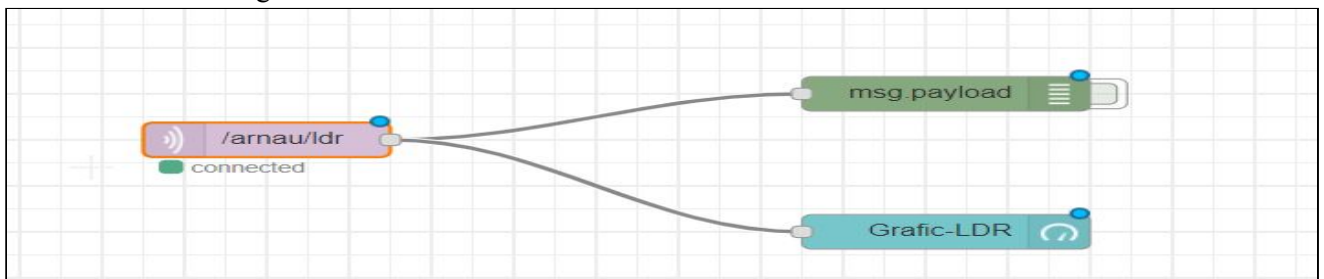
Data

18-12-2019

```
Serial.println(szRx);
if (szTema == TEMA_SUBSCRIPCIO_ORDRES) {
  //-----
  if (szRx == "true") digitalWrite(ledPin, LOW);
  if (szRx == "false") digitalWrite(ledPin, HIGH);
  if (szRx == "2L") digitalWrite(ledPin, LOW);
  if (szRx == "2H") digitalWrite(ledPin, HIGH);
  if (szRx == "12L") digitalWrite(ledBlue, LOW);
  if (szRx == "12H") digitalWrite(ledBlue, HIGH);
  if (szRx == "13L") digitalWrite(ledGreen, LOW);
  if (szRx == "13H") digitalWrite(ledGreen, HIGH);
  if (szRx == "15L") digitalWrite(ledRed, LOW);
  if (szRx == "15H") digitalWrite(ledRed, HIGH);
  //-----

  if (szRx == "A") {
    int a = analogRead(A0);
    char sz[99];
    sprintf(sz, "%d", a);
    client.publish(TEMA_PUBLICA_ESTAT_LDR, sz);
  }
}
```

- Un cop això tornem al NODE-RED
 - Ens interessa el node INPUT de MQTT on farà de publicador en el Dashboard i en el Debug



Visualitzem per debg el valor LDR de la plaqueta (0-1024) on indica l'intensitat de llum

The image shows the Node-RED interface. On the left, the flow diagram is visible, with the MQTT input node and the 'msg.payload' node highlighted with a red box. On the right, the 'debug' console shows a list of messages received from the MQTT node. Each message contains the LDR sensor value as a string.

Timestamp	Node ID	Message
9/12/2019, 17:36:32	node: ea245164.33d89	/arnau/ldr : msg.payload : string[3] "441"
9/12/2019, 17:36:43	node: ea245164.33d89	/arnau/ldr : msg.payload : string[3] "297"
9/12/2019, 17:36:44	node: ea245164.33d89	/arnau/ldr : msg.payload : string[3] "288"
9/12/2019, 17:36:44	node: ea245164.33d89	/arnau/ldr : msg.payload : string[3] "222"
9/12/2019, 17:36:45	node: ea245164.33d89	/arnau/ldr : msg.payload : string[3] "387"

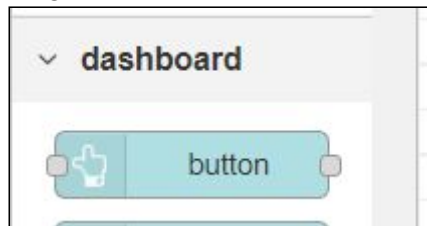
Nom i Cognoms

Arnau Subirós Puigarnau

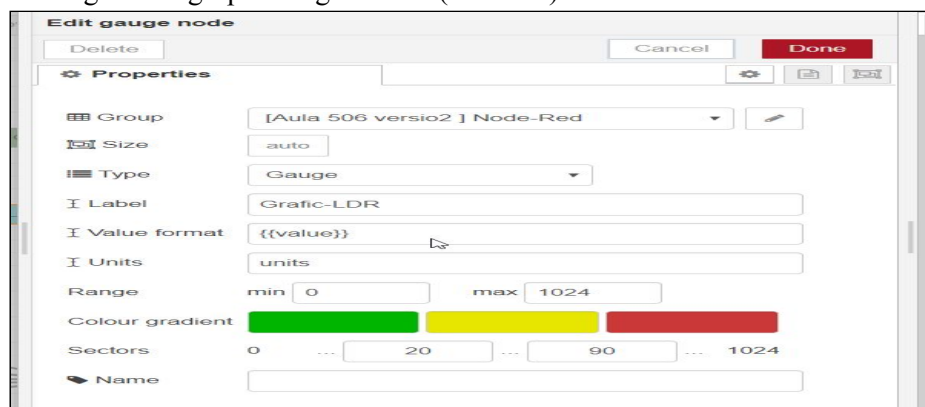
Data

18-12-2019

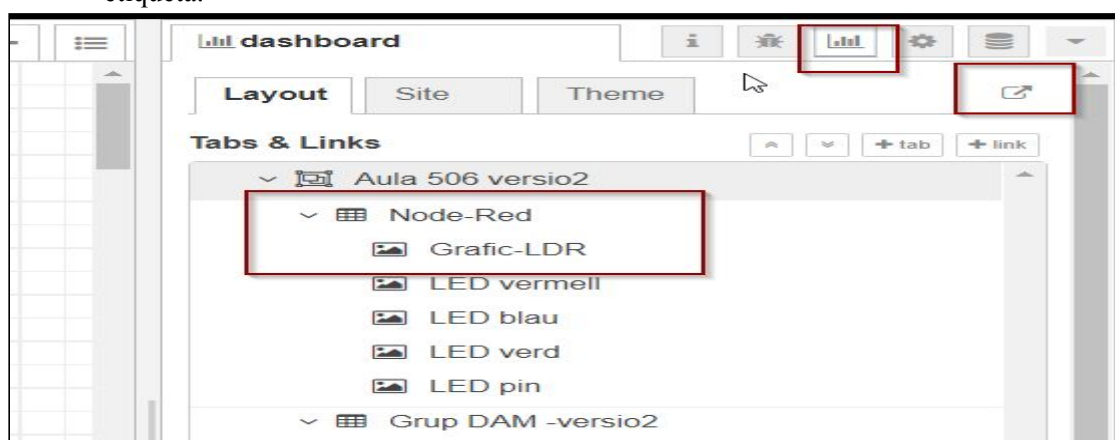
- Afegim el node de Dashboard “Button” que li direm ’etiqueta Grafic-LDR



On afegirem el grup el rang de LDR (0 a 1024)



- Seleccionem Dashboard en lloc de Debug on s’indica el Grup creat i la seva corresponent etiqueta.



Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

Ens interessa un OUTPUT MQTT on volem subscriptor en el Dashboard

#define TEMA_PUBLICA_ESTAT_LDR "/arnau/ldr"

Ens interessa afegir l'etiqueta "switch (del Dashboard) on l'únic que modificarem sera el payload (mirar codi arduino)

```
WiFiClient espClient;
PubSubClient client(espClient);

const byte ledPin = 2, ledRed = 15, ledGreen = 12, ledBlue = 13;
const byte button = EXTERNAL_BUTTON;

void callback(char* topic, byte* payload, unsigned int length) {
    String szRx = "", szTema(topic);
```

Edit switch node

Delete Cancel Done

Properties

Group [Aula 506 versio2] Node-Red

Size auto

Label LED blau

Tooltip optional tooltip

Icon Default

Pass through msg if payload matches new state: ☒

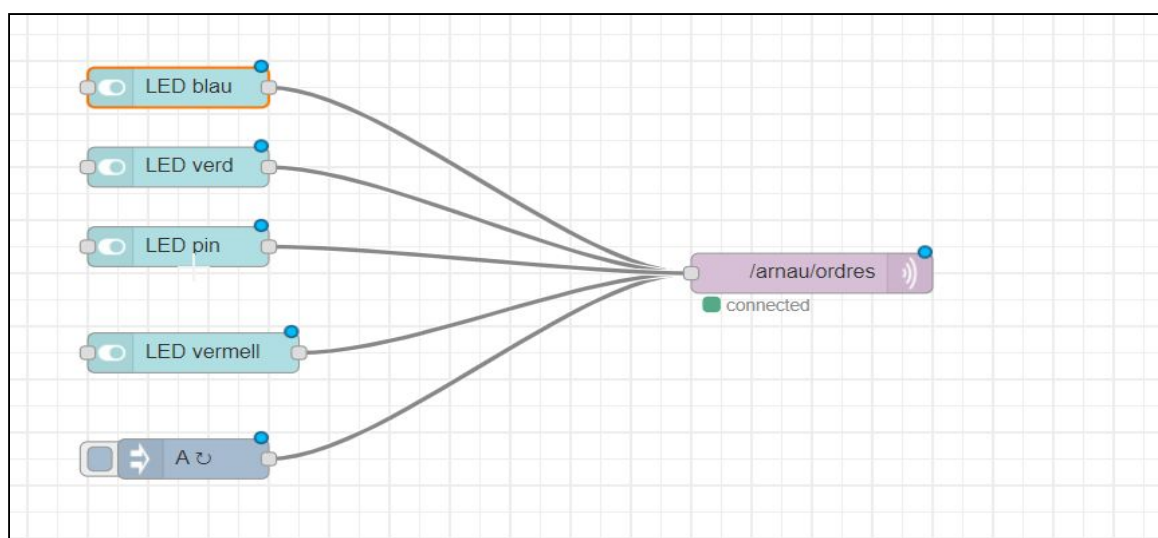
When clicked, send:

On Payload 12H

Off Payload 12L

Topic

Name



Nom i Cognoms**Data**

Arnau Subirós Puigarnau

18-12-2019

NOTA: com que vull visualitzar el Dashboard de Node- Red hauré de modificar la configuració de l'arxiu .ino referent a la connexio wifi (i de pas afegire el meu servidor mqtt

La meva idea era posa el nom complet (rasp-asp.ddns.net) que es confirma que tinc comunicacio, pero al hora de introduir-ho al codi no es connecta

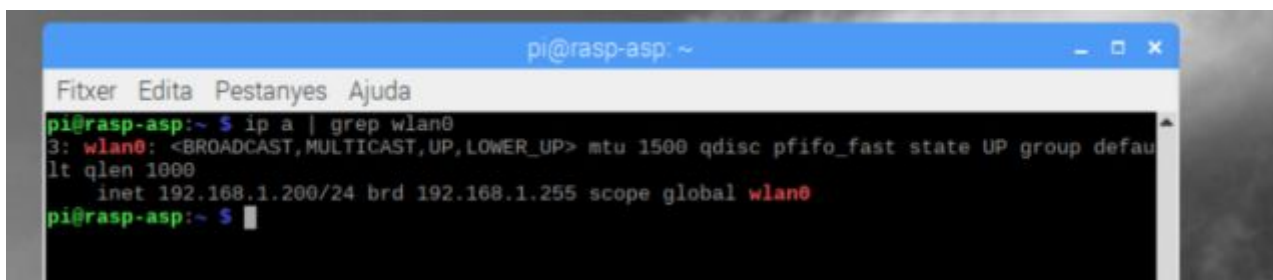
 Indicador d'ordres

```
C:\Users\arnau>ping rasp-asp.ddns.net

Haciendo ping a rasp-asp.ddns.net [79.158.191.62] con 32 bytes de datos:
Respuesta desde 79.158.191.62: bytes=32 tiempo<1m TTL=64
Respuesta desde 79.158.191.62: bytes=32 tiempo<1m TTL=64
Respuesta desde 79.158.191.62: bytes=32 tiempo<1m TTL=64

Estadísticas de ping para 79.158.191.62:
    Paquetes: enviados = 3, recibidos = 3, perdidos = 0
    (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
    Mínimo = 0ms, Máximo = 0ms, Media = 0ms
```

Accedim remotament a la raspberry i l'hi introduim la IP estàtica en lloc del nom complet



```
pi@rasp-asp: ~
Fitxer Edita Pestanyes Ajuda
pi@rasp-asp:~ $ ip a | grep wlan0
3: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group defau
lt qlen 1000
    inet 192.168.1.200/24 brd 192.168.1.255 scope global wlan0
pi@rasp-asp:~ $
```

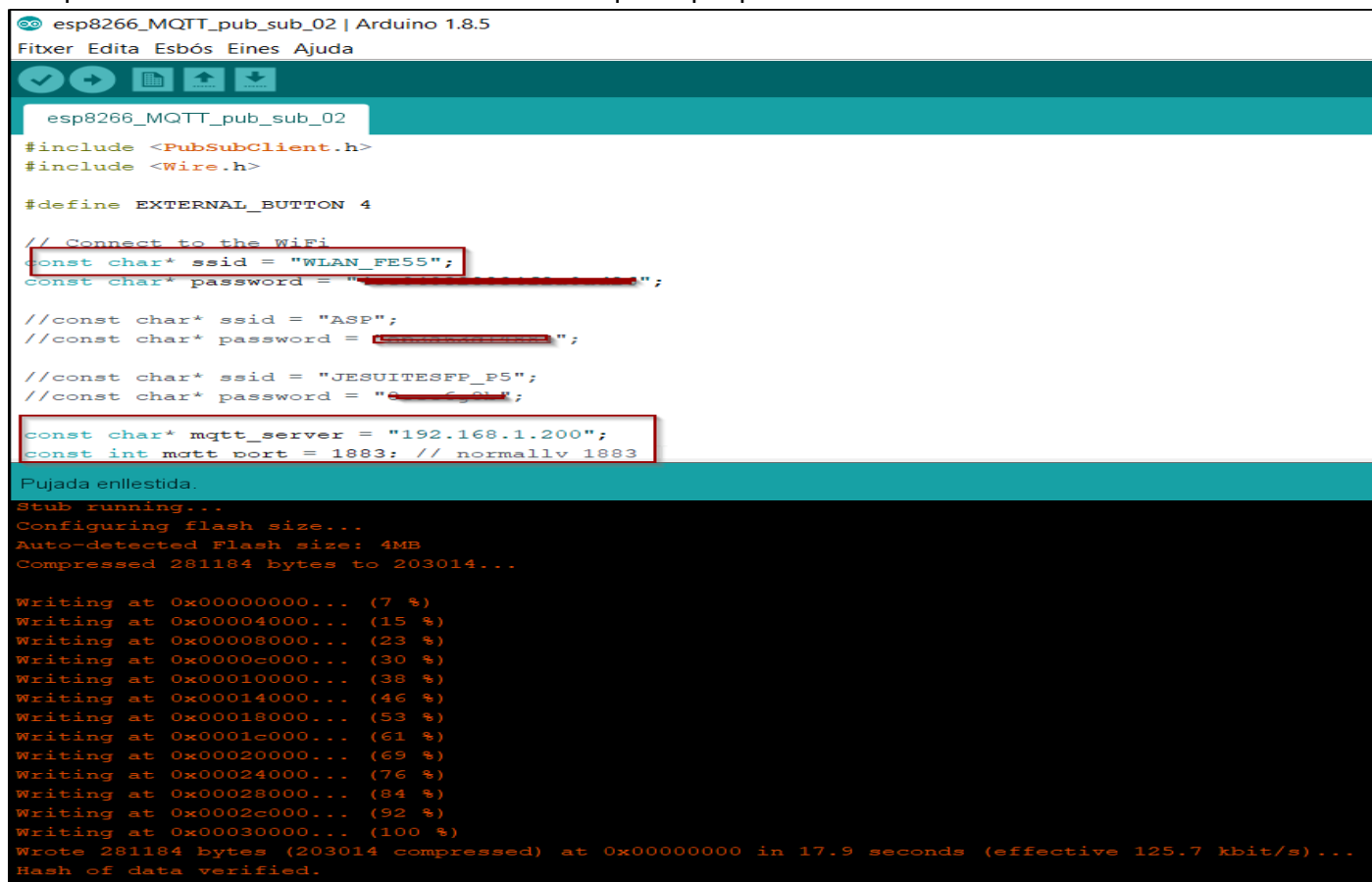

Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

Compilem el codi en l'Arduino IDE i confirmem que la plaqueta està connectada a la WIFI i MQTT



```
esp8266_MQTT_pub_sub_02 | Arduino 1.8.5
Fitxer Edita Esbós Eines Ajuda

esp8266_MQTT_pub_sub_02
#include <PubSubClient.h>
#include <Wire.h>

#define EXTERNAL_BUTTON 4

// Connect to the WiFi
const char* ssid = "WLAN_FE55";
const char* password = "XXXXXXXXXXXX";

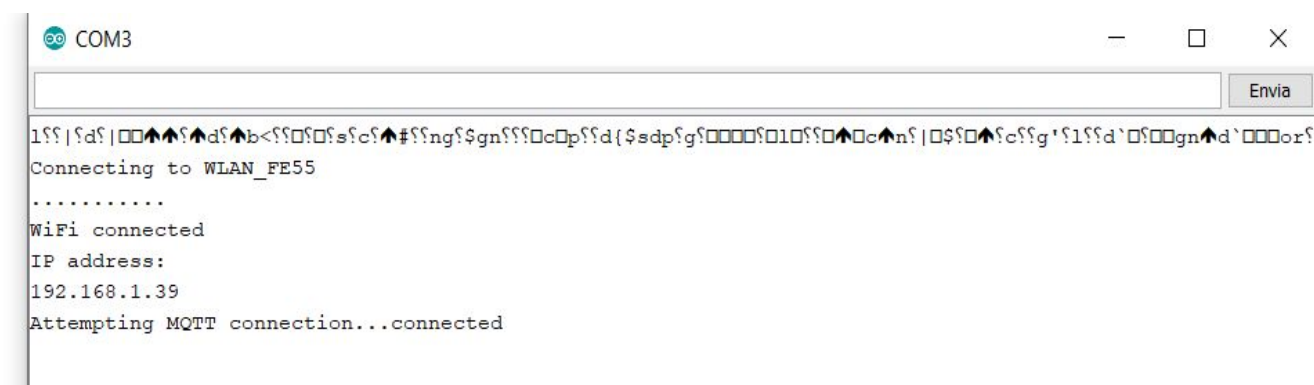
//const char* ssid = "ASP";
//const char* password = "XXXXXXXXXXXX";

//const char* ssid = "JESUITESFP_P5";
//const char* password = "XXXXXXXXXXXX";

const char* mqtt_server = "192.168.1.200";
const int mqtt_port = 1883; // normally 1883

Pujada enllestida.
Stub running...
Configuring flash size...
Auto-detected Flash size: 4MB
Compressed 281184 bytes to 203014...

Writing at 0x00000000... (7 %)
Writing at 0x00004000... (15 %)
Writing at 0x00008000... (23 %)
Writing at 0x0000c000... (30 %)
Writing at 0x00010000... (38 %)
Writing at 0x00014000... (46 %)
Writing at 0x00018000... (53 %)
Writing at 0x0001c000... (61 %)
Writing at 0x00020000... (69 %)
Writing at 0x00024000... (76 %)
Writing at 0x00028000... (84 %)
Writing at 0x0002c000... (92 %)
Writing at 0x00030000... (100 %)
Wrote 281184 bytes (203014 compressed) at 0x00000000 in 17.9 seconds (effective 125.7 kbit/s)...
Hash of data verified.
```



```
COM3

1??|?d?|??^?^d?^b<?s?s?c?^#?ng?sgn???cOp??d{$sdp?g?0000?010?0?0c^n?|0$?0^c?g'?1??d`0?0gn^d`000or?
Connecting to WLAN_FE55
.....
WiFi connected
IP address:
192.168.1.39
Attempting MQTT connection...connected
```

Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

I al NODE-RED haurem d'afegir aquest broker mqtt(local) tan al publicador com el subscriptor

Edit mqtt in node

Delete Cancel Done

Properties

Server 192.168.1.200:1883

Topic /arnau/ldr

QoS 2

Output auto-detect (string or buffer)

Name Name

Edit mqtt out node

Delete Cancel Done

Properties

Server 192.168.1.200:1883

Topic /arnau/ordres

QoS Retain

Name Name

Nom i Cognoms

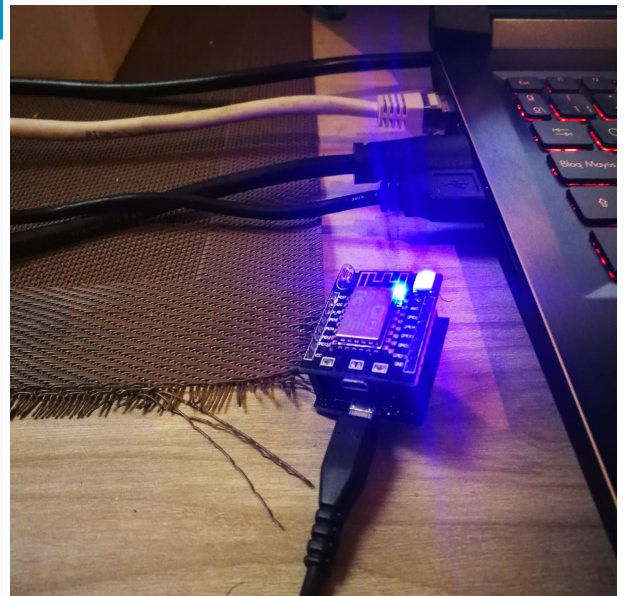
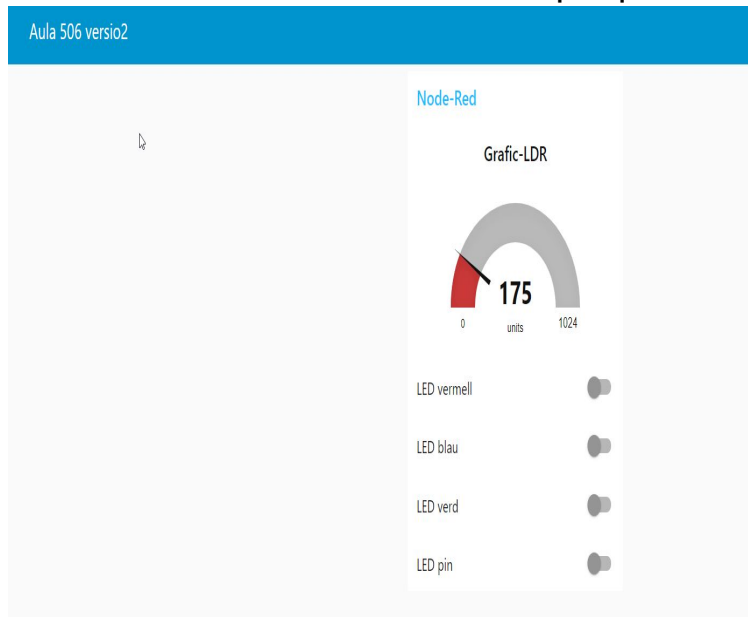
Arnau Subirós Puigarnau

Data

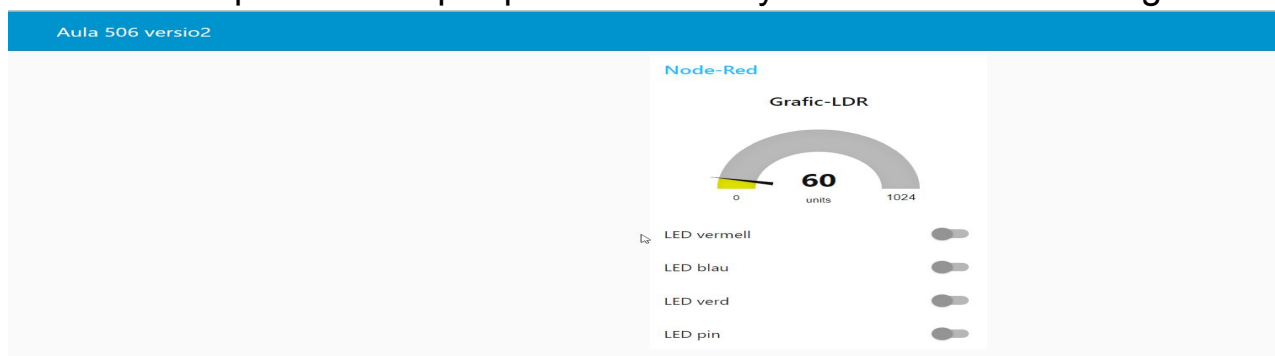
18-12-2019

Visualització del DASHBOARD NODE-RED

M'indica l'intensitat de LDR de la plaqueta



Posteriorment poso la mà perquè detecti menys llum i m'ho indica al gràfic



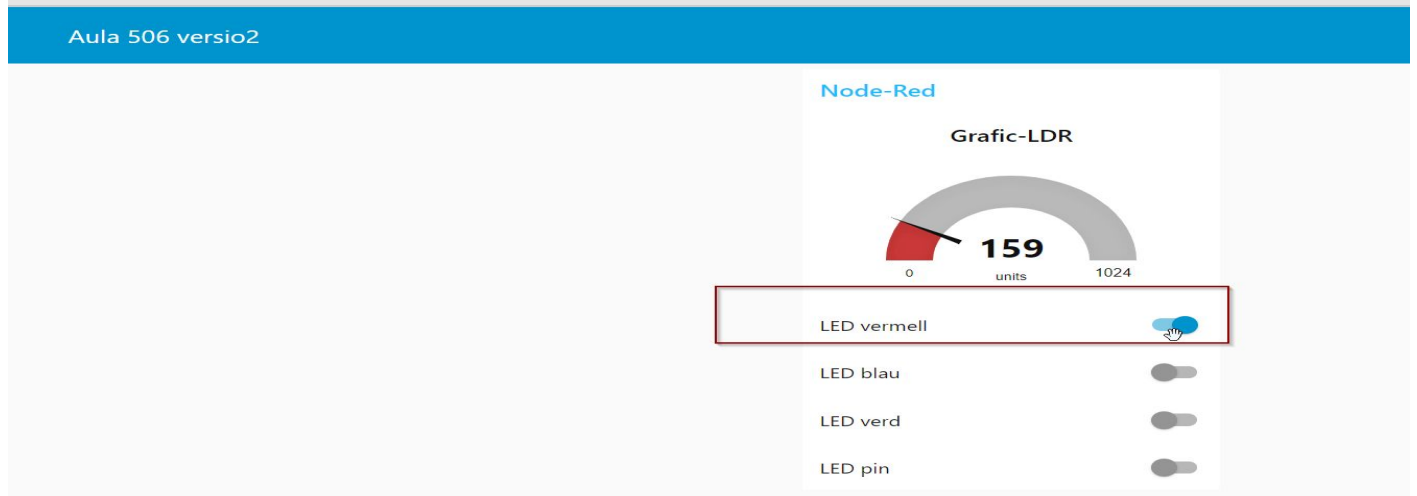
Nom i Cognoms

Arnau Subirós Puigarnau

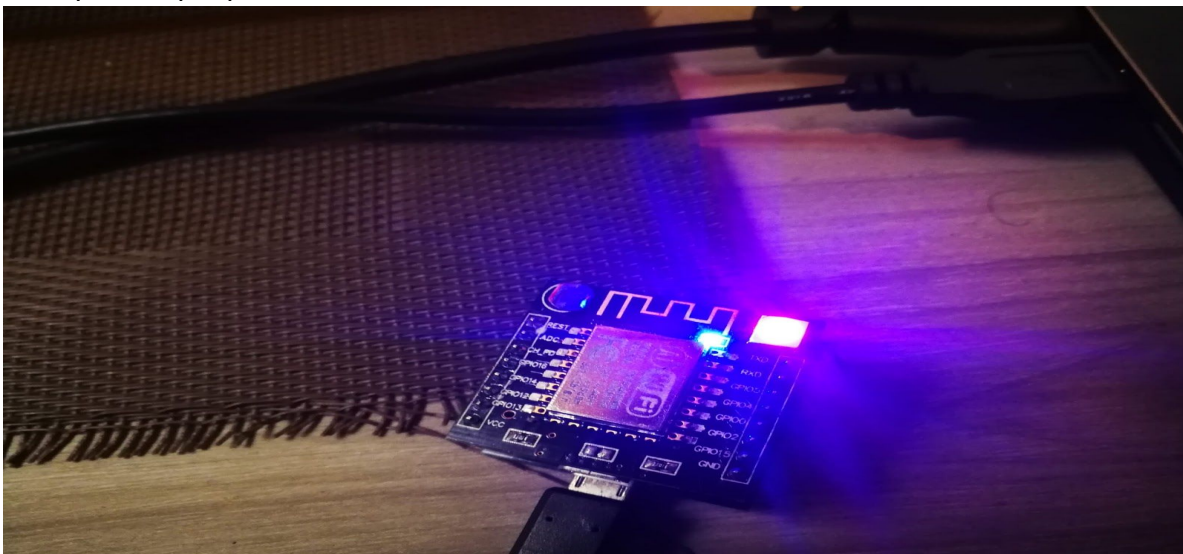
Data

18-12-2019

Despres seleccionem l'interruptor del LED vermell



Verifiquem la plaqueta , el LED vermell està encès



Nom i Cognoms

Arnau Subirós Puigarnau

Data

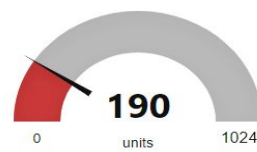
18-12-2019

Despres seleccionem l'interruptor del LED verd

Aula 506 versio2

Node-Red

Grafic-LDR



LED vermell



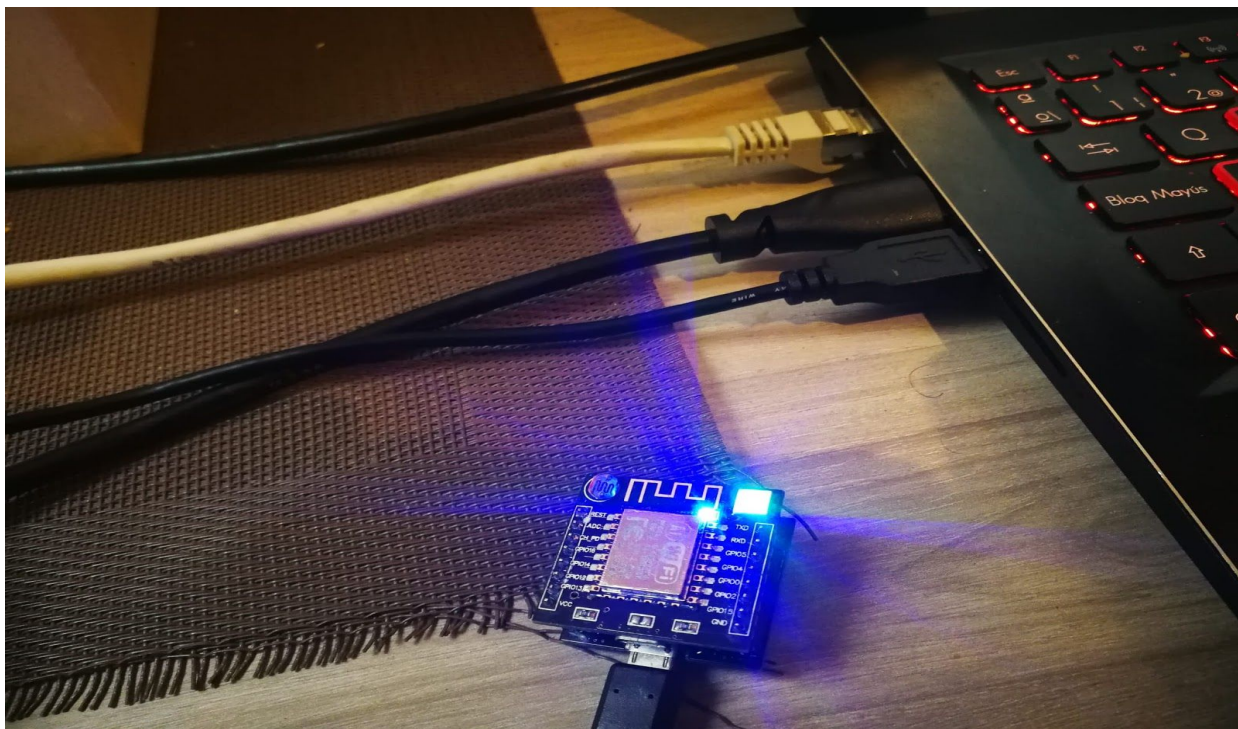
LED blau



LED verd



LED pin



Nom i Cognoms

Arnau Subirós Puigarnau

Data

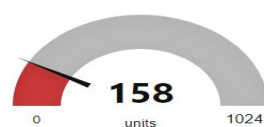
18-12-2019

Com última prova seleccionem per apagar el LED

Aula 506 versio2

Node-Red

Gratic-LDR



LED vermell



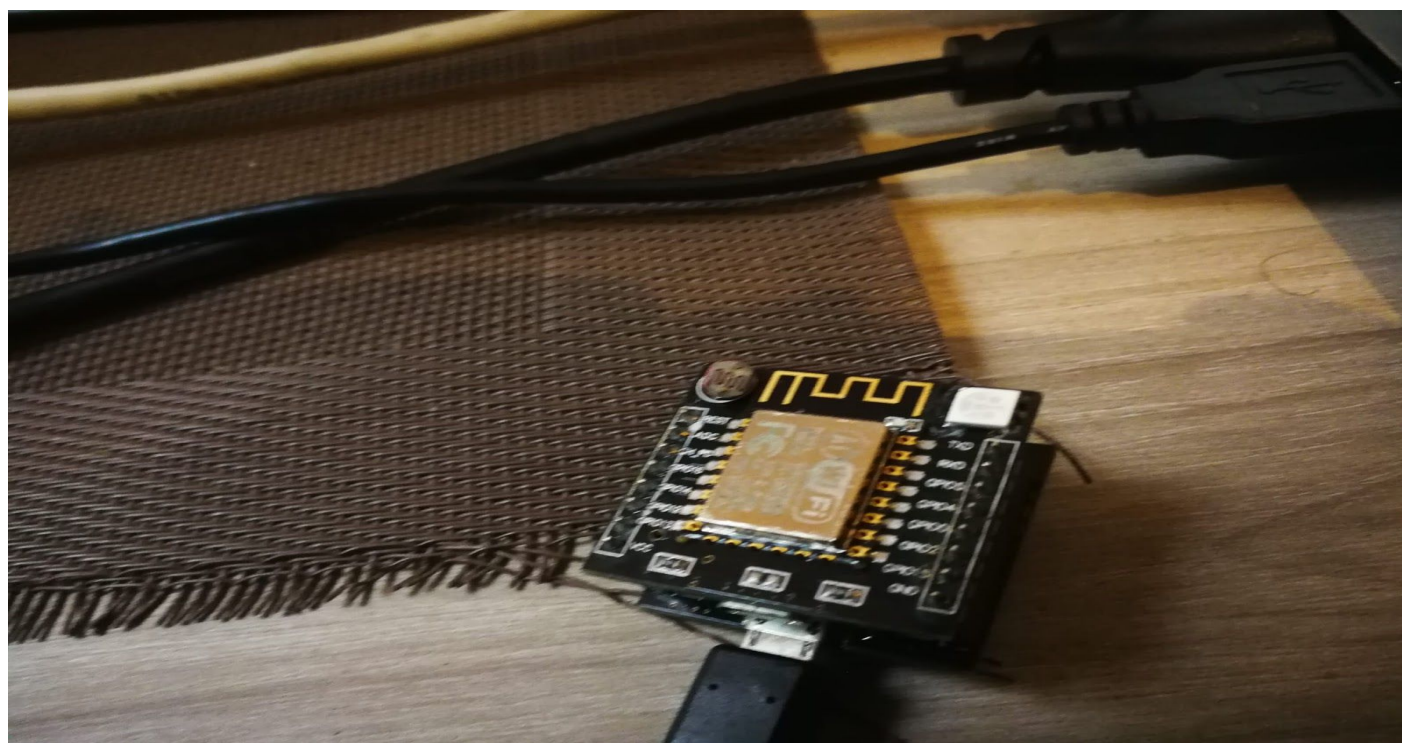
LED blau



LED verd



LED pin



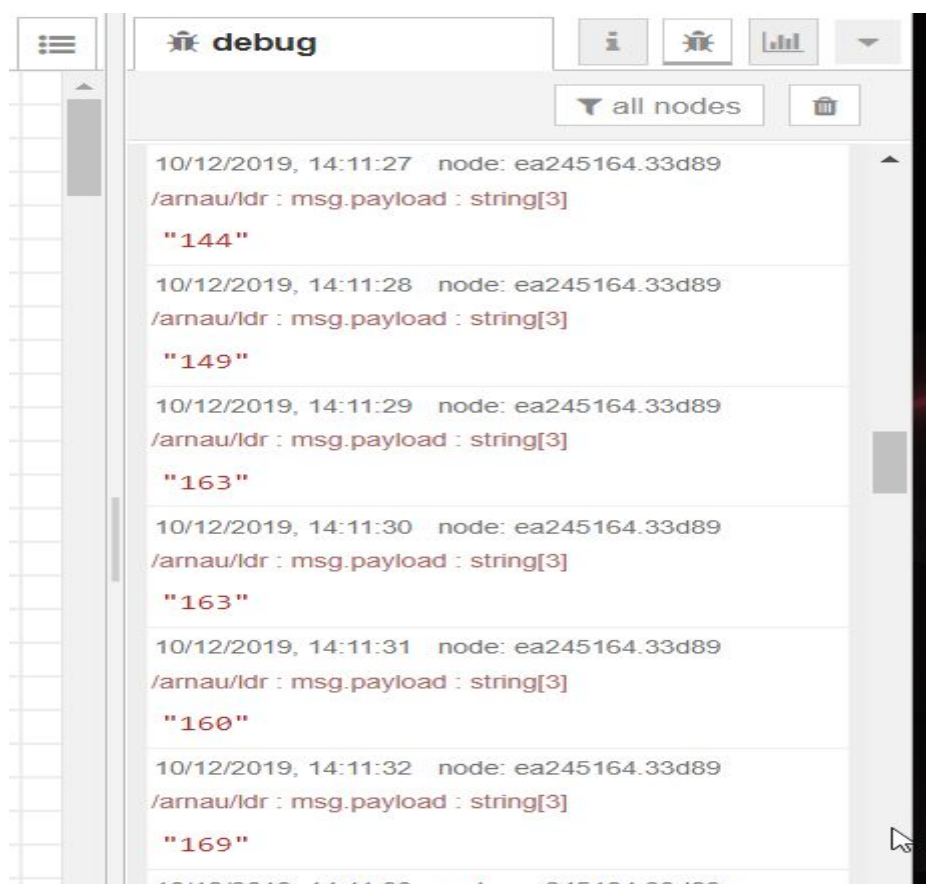
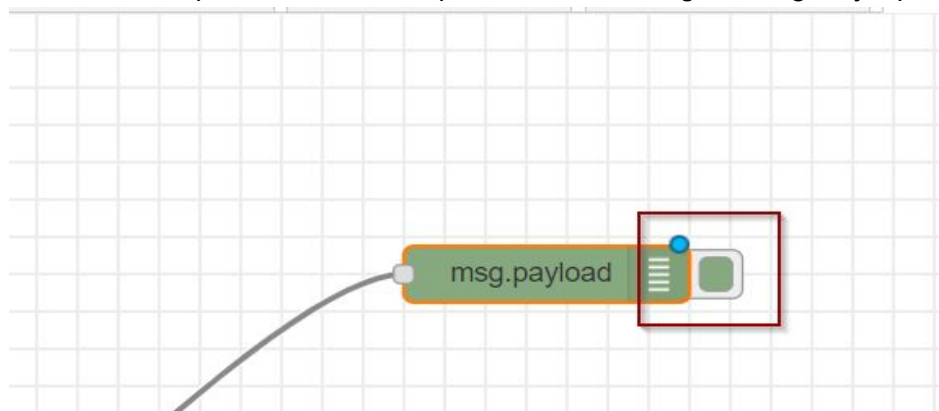
Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

Però tenim un problema no ens apareix res a “Debug Messages” ja que no s’ha activat.

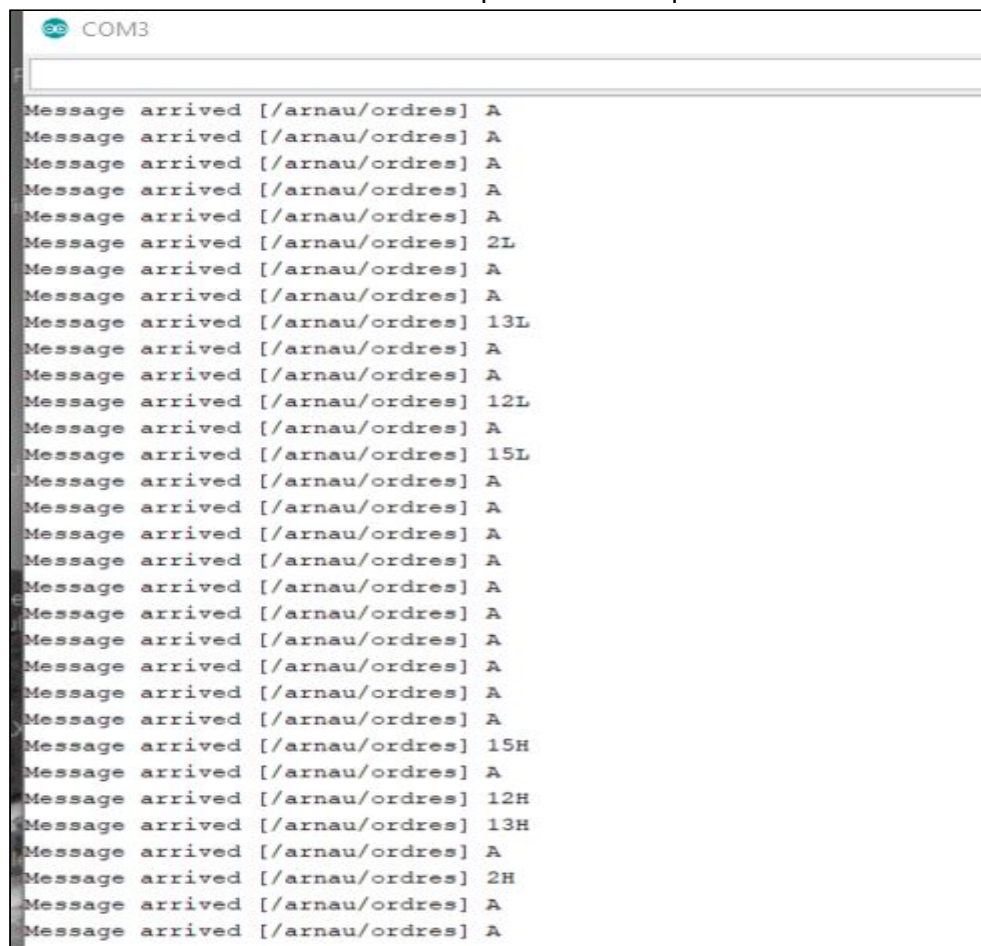


Nom i Cognoms**Data**

Arnau Subirós Puigarnau

18-12-2019

Revisem la consola del Arduino IDE per confirmar que tenim comunicació bidireccional



```
COM3
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 2L
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 13L
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 12L
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 15L
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 15H
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 12H
Message arrived [/arnau/ordres] 13H
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] 2H
Message arrived [/arnau/ordres] A
Message arrived [/arnau/ordres] A
```

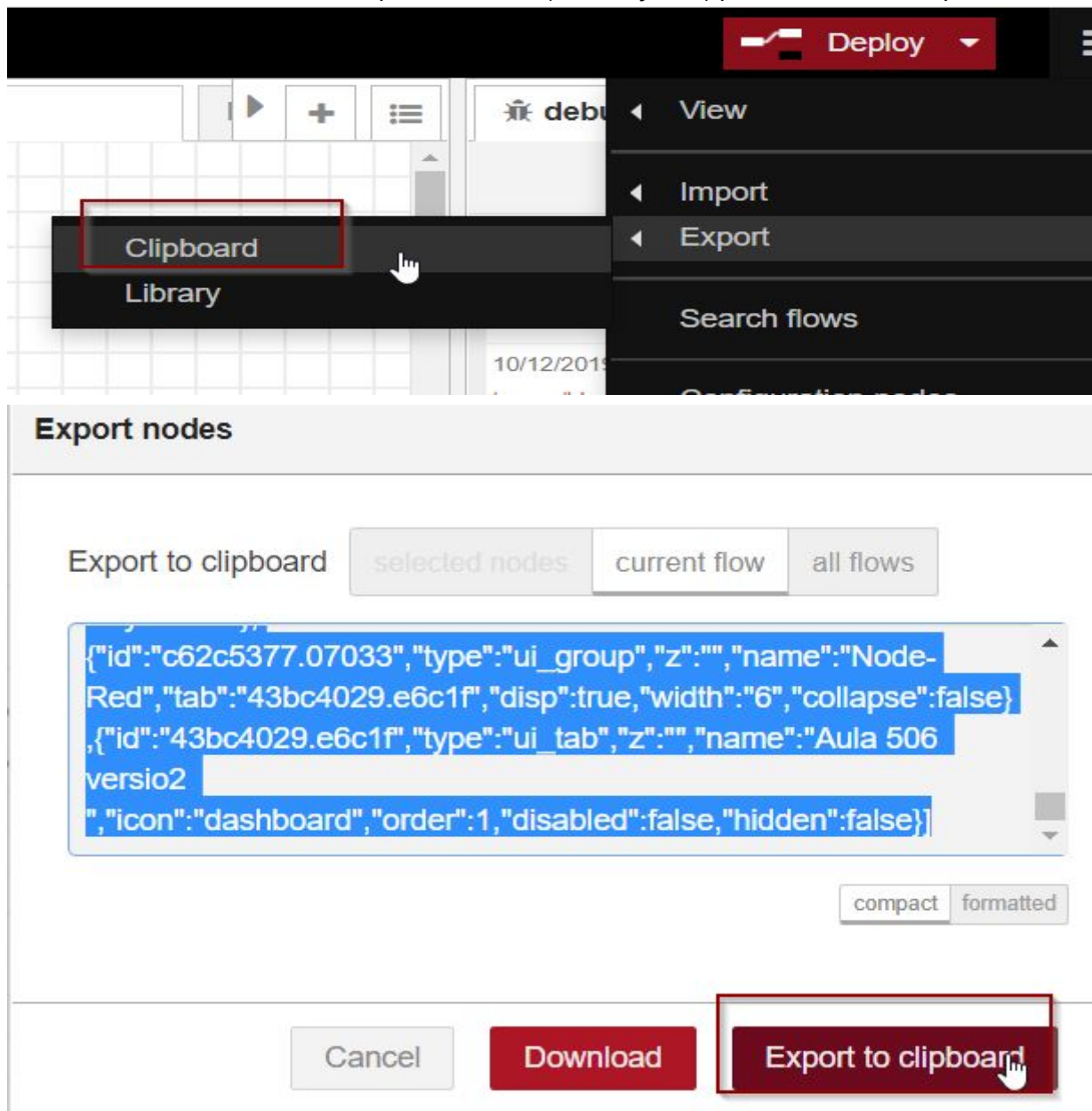
Nom i Cognoms

Arnau Subirós Puigarnau

Data

18-12-2019

Per evitar “sustos” hauriem d’exportar el fluxe (format json) per tenir una backup del fluxe.



The screenshot shows the Node-RED interface. A red box highlights the 'Clipboard' option in the 'Export' menu. Below, the 'Export nodes' dialog is open, showing the 'Export to clipboard' section. The 'selected nodes' tab is active, and the JSON output is displayed in a text area. The 'Export to clipboard' button is highlighted with a red box.

Export nodes

Export to clipboard ☐ selected nodes ☐ current flow ☐ all flows

```
{
  "id": "c62c5377.07033",
  "type": "ui_group",
  "z": "",
  "name": "Node-Red",
  "tab": "43bc4029.e6c1f",
  "disp": true,
  "width": "6",
  "collapse": false
}, {
  "id": "43bc4029.e6c1f",
  "type": "ui_tab",
  "z": "",
  "name": "Aula 506",
  "version": 2,
  "icon": "dashboard",
  "order": 1,
  "disabled": false,
  "hidden": false
}
```

Nom i Cognoms

Data

Arnau Subirós Puigarnau

18-12-2019

Utilitzem un compilador de Jason perquè ens canvie el format

```

233   compatmode : true,
234   "keepalive": "60",
235   "cleansession": true,
236   "birthTopic": "",
237   "birthQos": "0",
238   "birthPayload": "",
239   "closeTopic": "",
240   "closeQos": "0",
241   "closePayload": "",
242   "willTopic": "",
243   "willQos": "0",
244   "willPayload": ""
245 },
246 {
247   "id": "c62c5377.07033",
248   "type": "ui_group",
249   "z": "",
250   "name": "Node-Red",
251   "tab": "43bc4029.e6c1f",
252   "disp": true,
253   "width": "6",
254   "collapse": false
255 },
256 {
257   "id": "43bc4029.e6c1f",
258   "type": "ui_tab",
259   "z": "",
260   "name": "Aula 506 versio2 ",
261   "icon": "dashboard",
262   "order": 1,
263   "disabled": false,
264   "hidden": false
  
```

Seguidament obrim un editor de text, on enganxem la copia del codi guardant amb extensio . json

```

163   "height": 0,
164   "passthru": true,
165   "decouple": false,
166   "topic": "",
167   "style": "",
168   "onvalue": "2H",
169   "onvalueType": "str",
170   "onicon": "",
171   "oncolor": "",
172   "offvalue": "2L",
173   "offvalueType": "str",
174   "officon": "",
175   "offcolor": "",
176   "x": 160,
177   "y": 600,
178   "wires": [
179     [
180       "e07012ed.876b3"
181     ]
182   ],
183   {
184     "id": "80c43ee6.02045",
185     "type": "ui_gauge",
186     "z": "590e5418.11531c",
187     "name": "",
188     "group": "c62c5377.07033",
189     "order": 4,
190     "width": 0,
191     "height": 0,
192     "gtype": "gauge",
193     "title": "Gràfic-LDR",
194     "label": "units",
  
```

nom del fitxer:

tipus de fitxer:

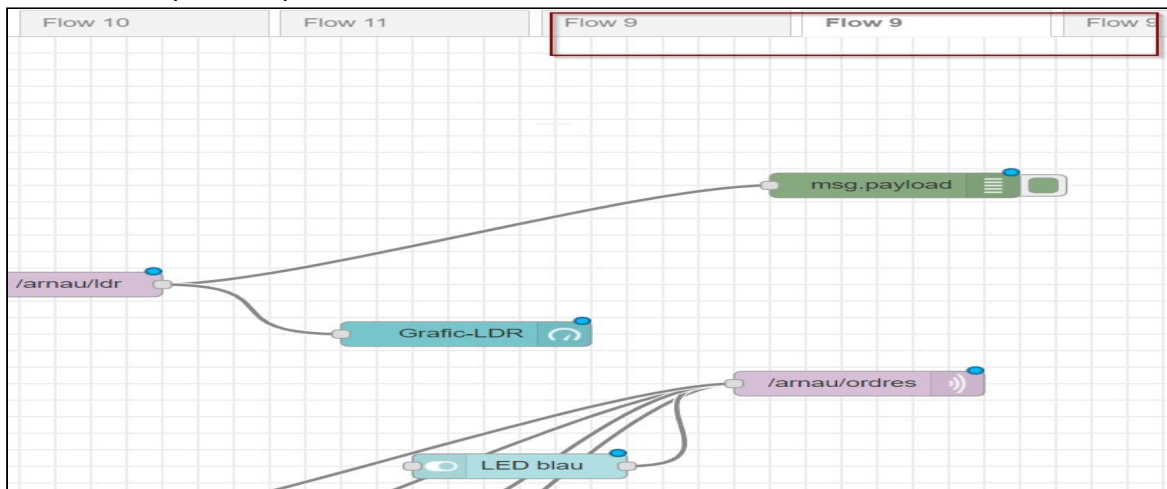
Nom i Cognoms

Arnau Subirós Puigarnau

Data

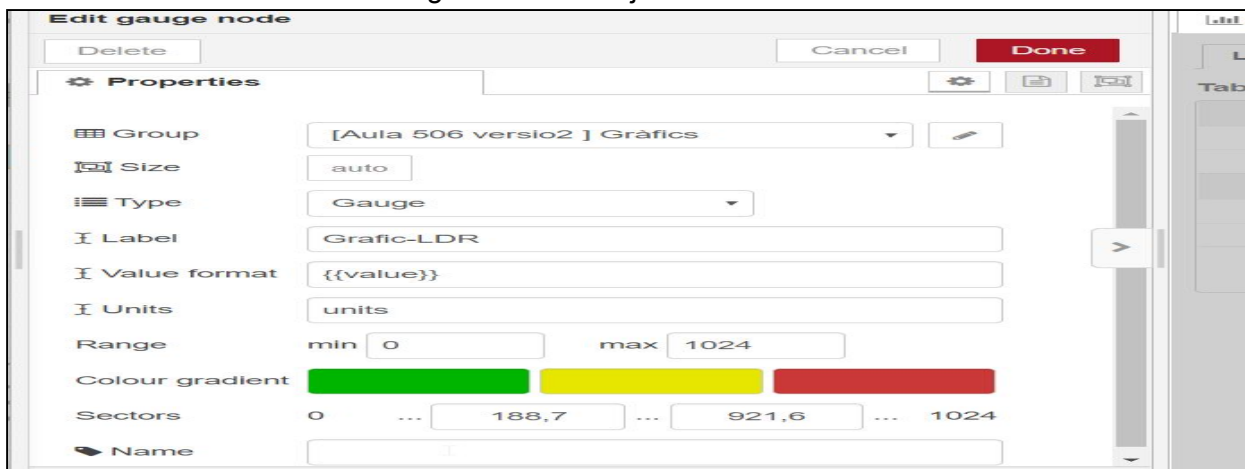
18-12-2019

I confirmem que al exportar tenim de nou el fluxe 9



AMPLIACIÓ -VERSIÓ 3

Fem una modificació perquè si l'intensitat de llum es inferior al 20% de 1024 es vegi de color verd, superior al 90% de color vermell i entremig de color taronja

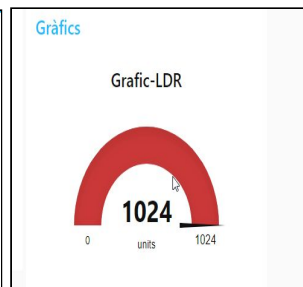
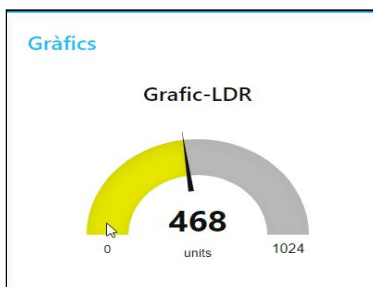
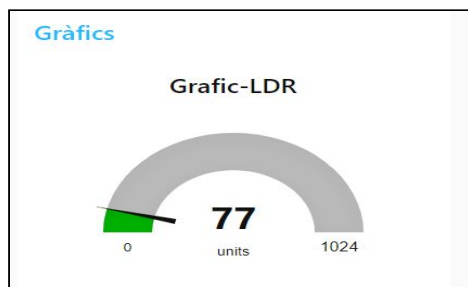


Nom i Cognoms

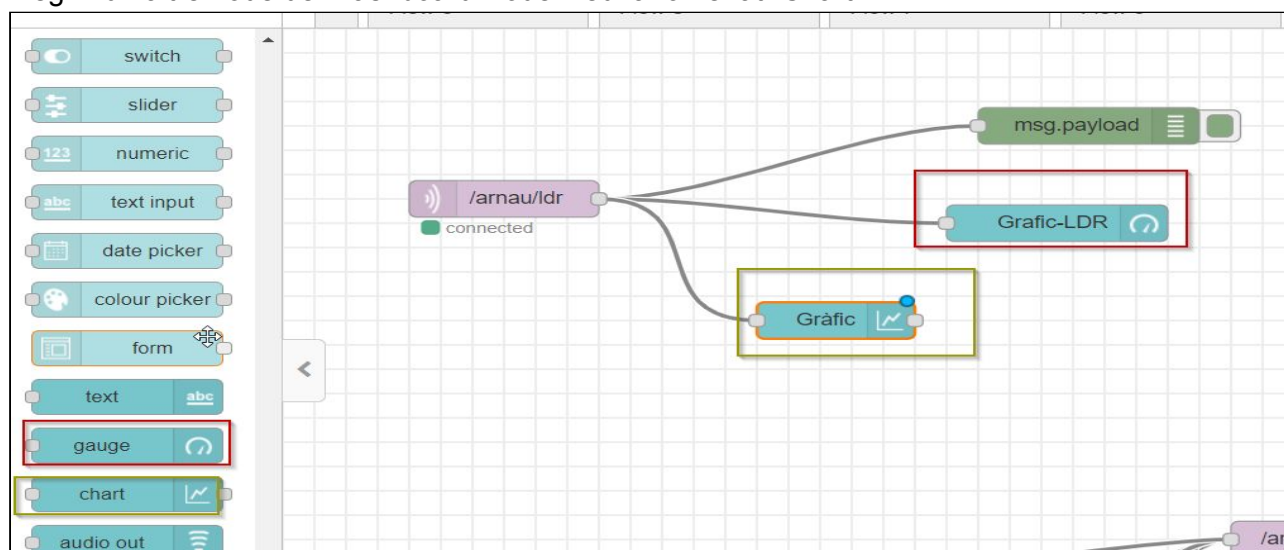
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Afegim un altre node del Dashboard Node-Red anomenat "Chart"



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Delete
Cancel
Done

Properties

Group: [Aula 506 versio2] Gràfics

Size: auto

Label: Gràfic

Type: Line chart
☒ enlarge points

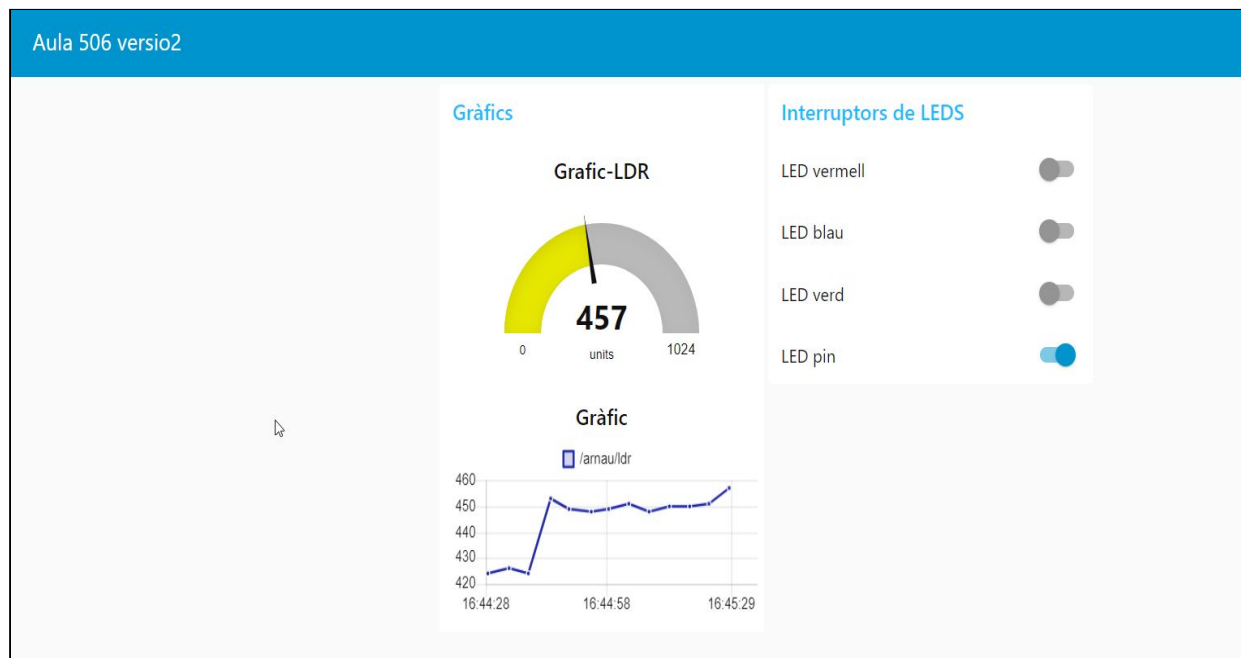
X-axis: last 1 minute: OR 100 points

X-axis Label: HH:mm:ss

Y-axis: min max

Legend: Show Interpolate: linear

Series Colours:



Nom i Cognoms

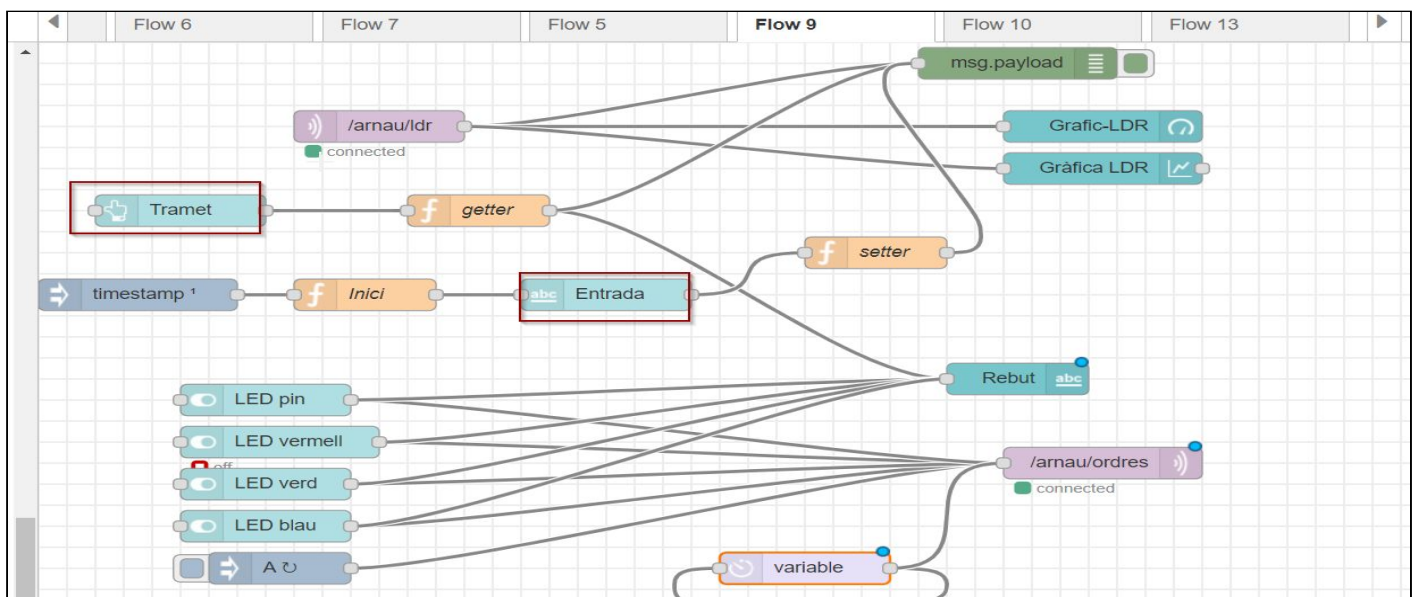
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En el Dashboard s'ha creat un altre Grup "Altres" on ens mostrarà quan apremem un LED concret , el seu valor.

- S'ha creat una funció perquè al premer Tramet deixem de visualitzar el valor específic del LED (12H,12L...)
- **MOLT DE COMPTE, s'ha de vigilar no crear un bucle infinit (i tinguem problemes amb el Node -Red, hauriem de fer una còpia dels fluxes abans evitar problemes)**
-

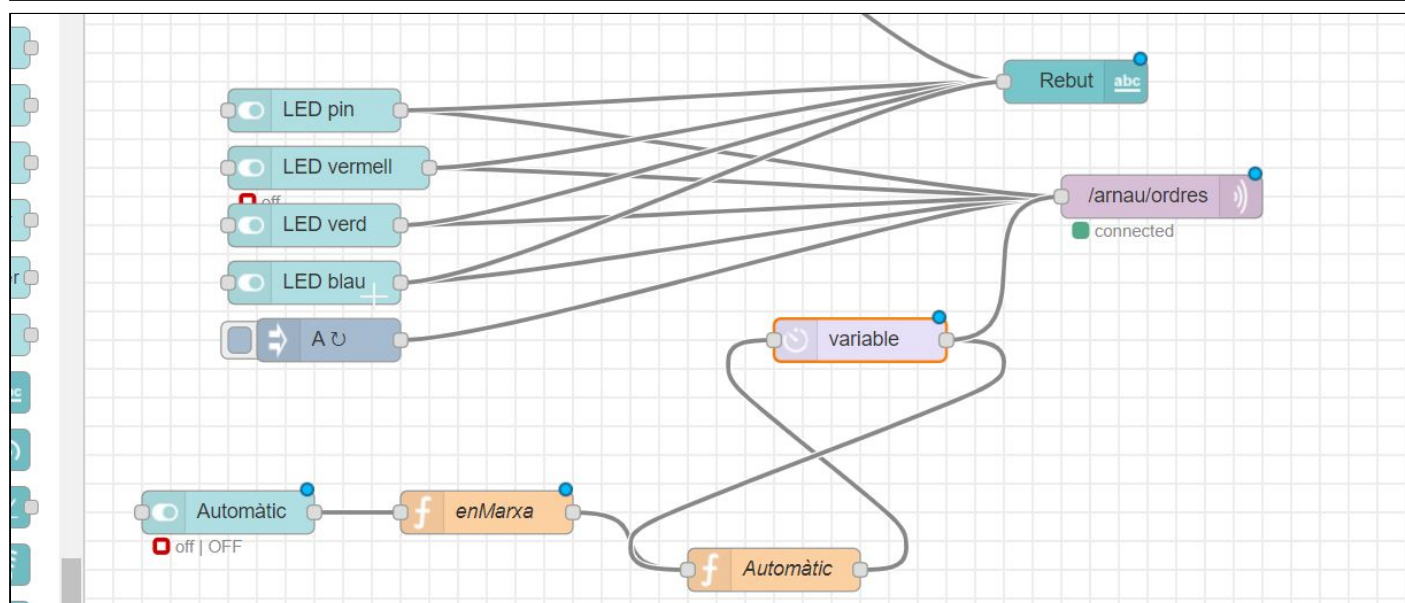
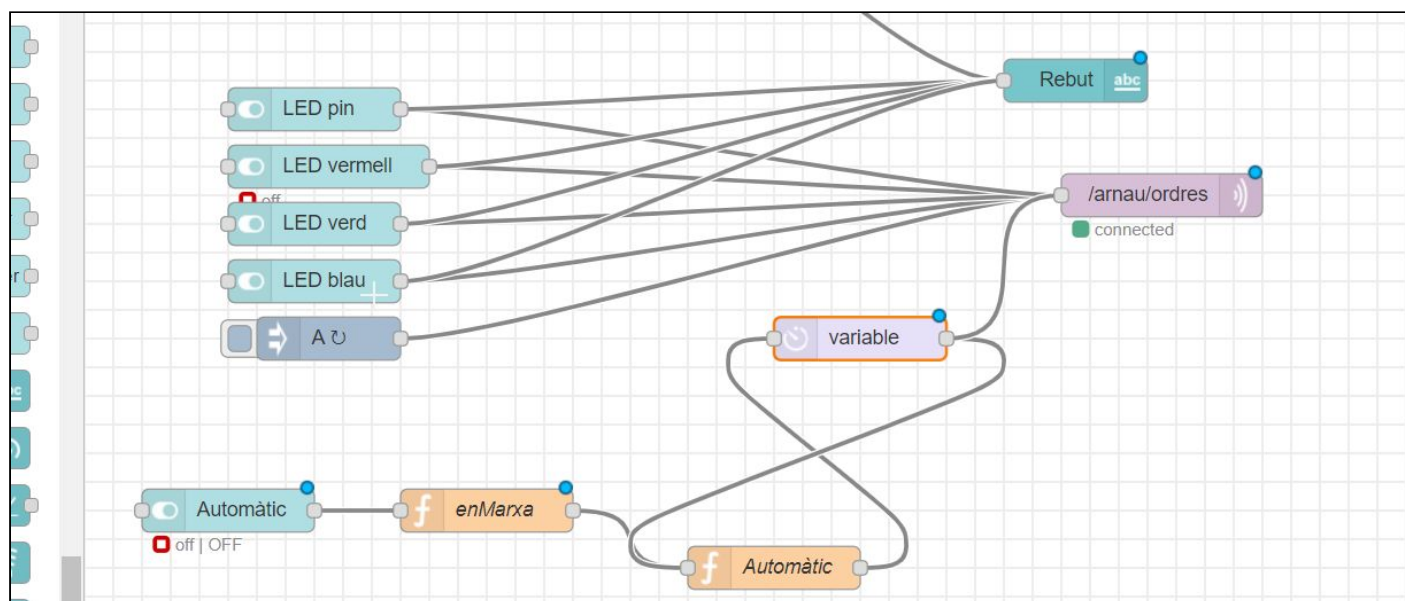


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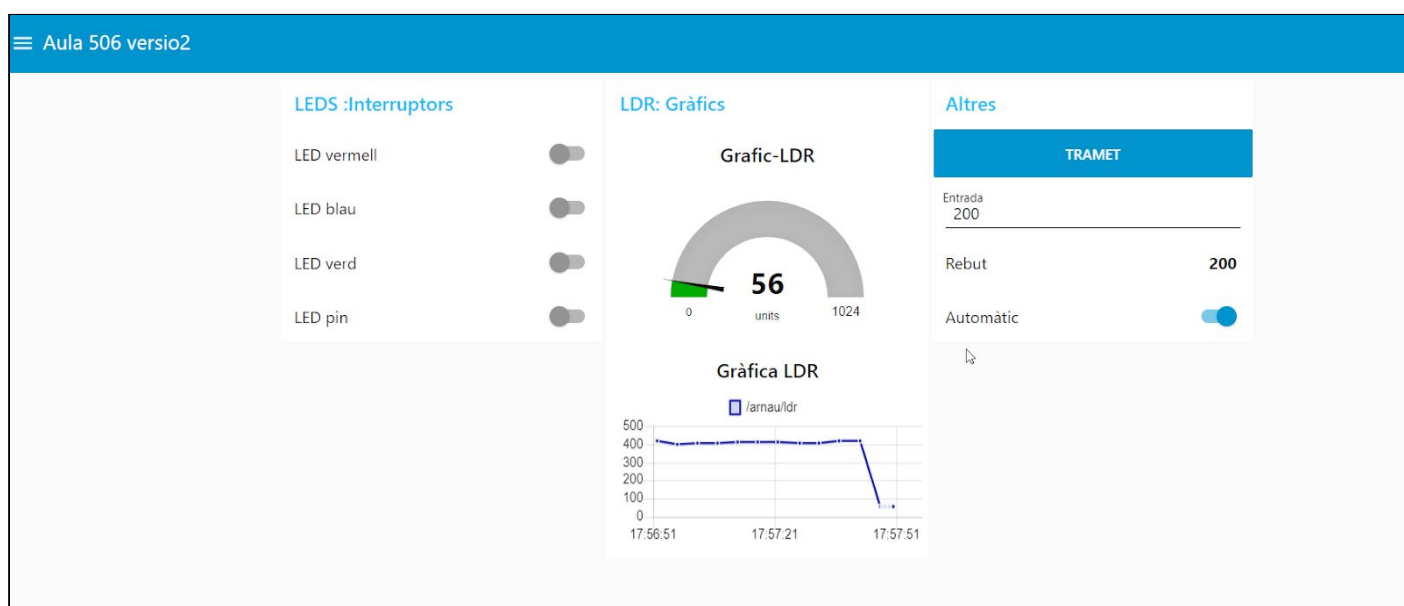
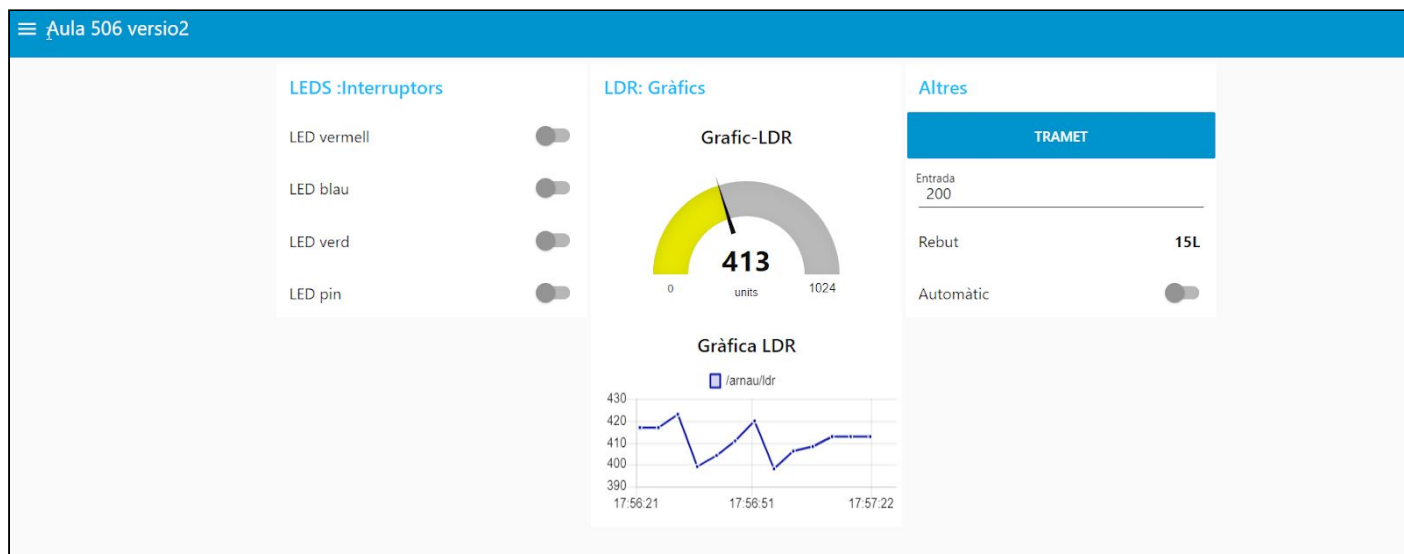


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MODIFICACIO 17/12/2019 -INACABAT (per revisar)

- Se intenta que es visualizi en el Dashboard un “led” verd si apremem el GPIO4 i en cas contrari “led” vermell
- Se intenta desde el MQTT Dashboard APP del mobil”



Pero no m'ha sortit

Edit function node

Delete Cancel Done

Properties

Name: Funcio_GPIO4

Function

```

1 msg.color = (msg.payload === "1")?"lime":"red";
2 return msg;
3

```

```

define TEMA_PUBLICA_ESTAT_BOTO "arnau/boto"
define TEMA_PUBLICA_ESTAT_LDR "/arnau/ldr"
define TEMA_SUBSCRIPCIO_ORDRES "/arnau/ordres"

```

```

void loop() {
  boolean bButtonState = !digitalRead(EXTERNAL_BUTTON);
  static boolean bLastButtonState = bButtonState;

  if (!client.connected()) {
    reconnect();
  }

  if (bButtonState != bLastButtonState) {
    bLastButtonState = bButtonState;
    delay(50);
    if (bButtonState)
      client.publish(TEMA_PUBLICA_ESTAT_BOTO, "1");
    else
      client.publish(TEMA_PUBLICA_ESTAT_BOTO, "0");
  }
  client.loop();
}

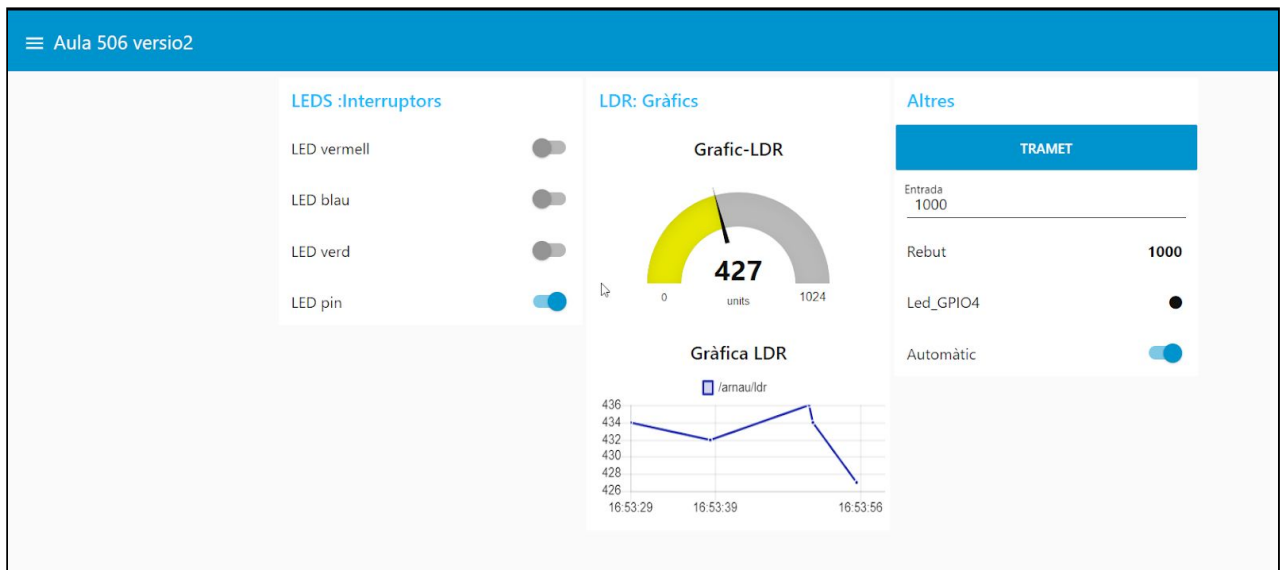
```

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Torno a revisar, em donava error perque al codi de Arduino m'havia deixat "/"

```
esp8266_MQTT_pub_sub_02_versio4
//const char* ssid = "WLAN_FE55";
//const char* password = "4ec040328834f2a0ad26";

const char* ssid = "ASP";
const char* password = "eb2a63d14881";

//const char* ssid = "JESUITESFP_P5";
//const char* password = "8ecc6g8b";

//const char* mqtt_server = "192.168.1.200";
//const int mqtt_port = 1883; // normally 1883

const char* mqtt_server = "test.mosquitto.org";
const int mqtt_port = 1883; // normally 1883
//const char* mqtt_server = "test.mosquitto.org";
//const int mqtt_port = 1883; // normally 1883

#define TEMA_PUBLICA_ESTAT_BOTO "/arnau/boto"
#define TEMA_PUBLICA_ESTAT_LDR "/arnau/ldr"
#define TEMA_SUBSCRIPCIO_ORDRES "/arnau/ordres"

WiFiClient espClient;
PubSubClient client(espClient);

const byte ledPin = 2, ledRed = 15, ledGreen = 12, ledBlue = 13;
const byte button = EXTERNAL_BUTTON;

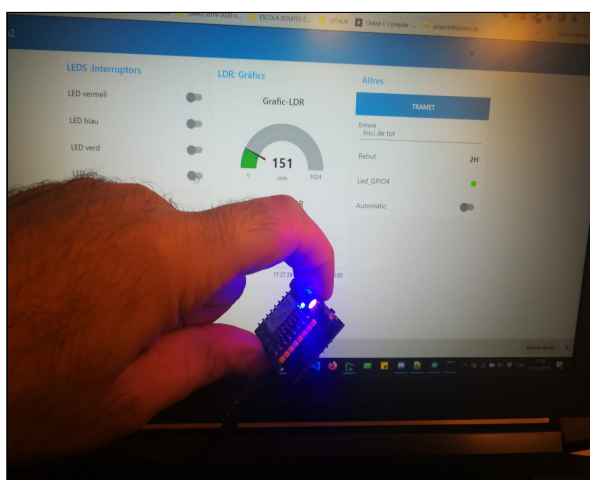
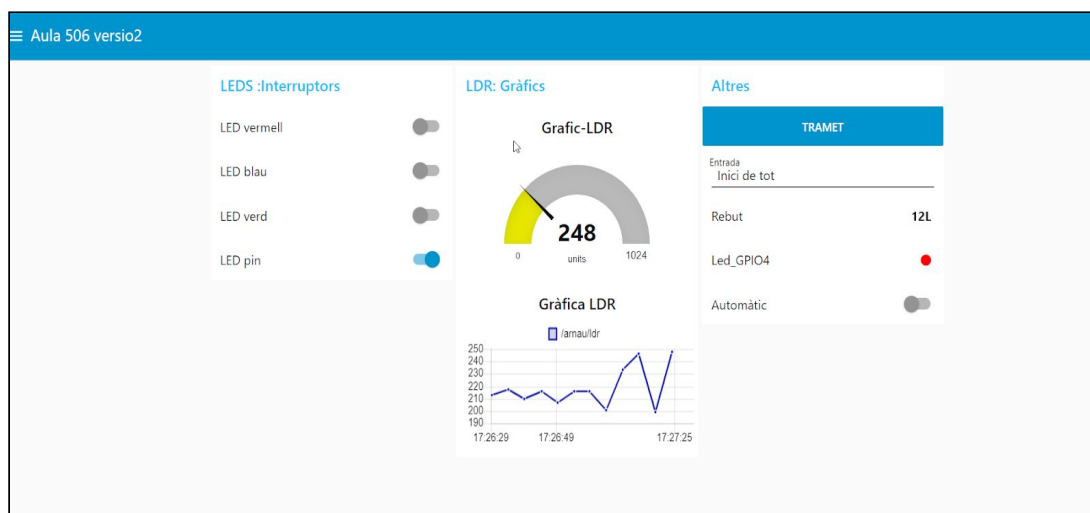
void callback(char* topic, byte* payload, unsigned int length) {
  String s = "";
  s = TEMA(topic);
}
```


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18-12-2019