



# COMPUTER NETWORK PROJECT

## IOT SMARTHOME

Some solutions to control the device via WiFi

# Contents

Introduction \_\_\_\_\_ **Error! Bookmark not defined.**

Devices \_\_\_\_\_ **Error! Bookmark not defined.**

Application \_\_\_\_\_ 4

Implementation \_\_\_\_\_ 8

References \_\_\_\_\_ 21

# I. INTRODUCTION

The world nowadays getting more and more modern with many new kind of technology that can help and increase our life so that many smart device appear. Our group want to give a new solution to control our home appliances that seems very interesting.

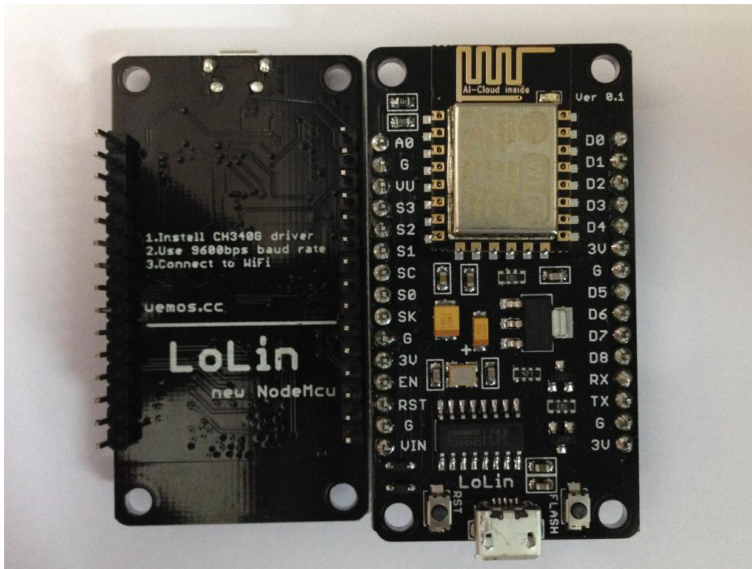
By using the ESP8266 Node MCU with low price come with big benefits, we will show you how it can interact with some devices like led to control your device via Wifi Connection.

Group member

Tran Duy Bao – ITITIU15076

## II. DEVICES

### 1. ESP8266 NodeMCU using CH340 microcontroller

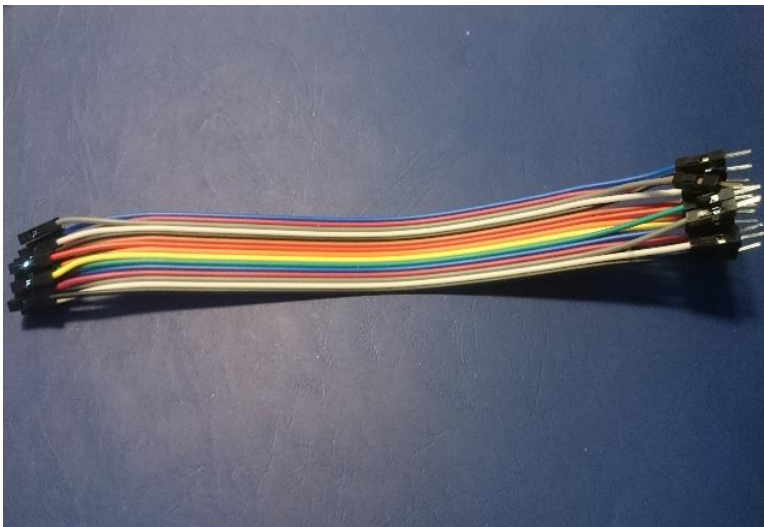
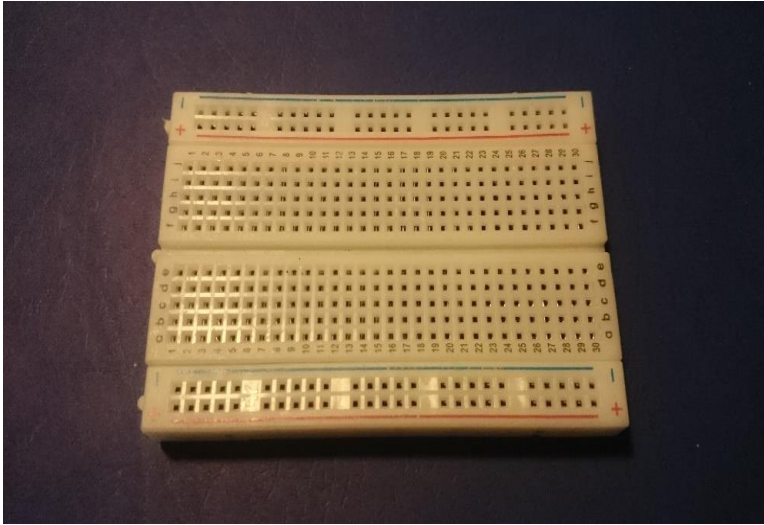


- In some cases, your PC doesn't have driver to interface with the CH340 microcontroller, download the file in the link below to install driver : <https://sparks.gogo.co.nz/ch340.html>

### 2. LED

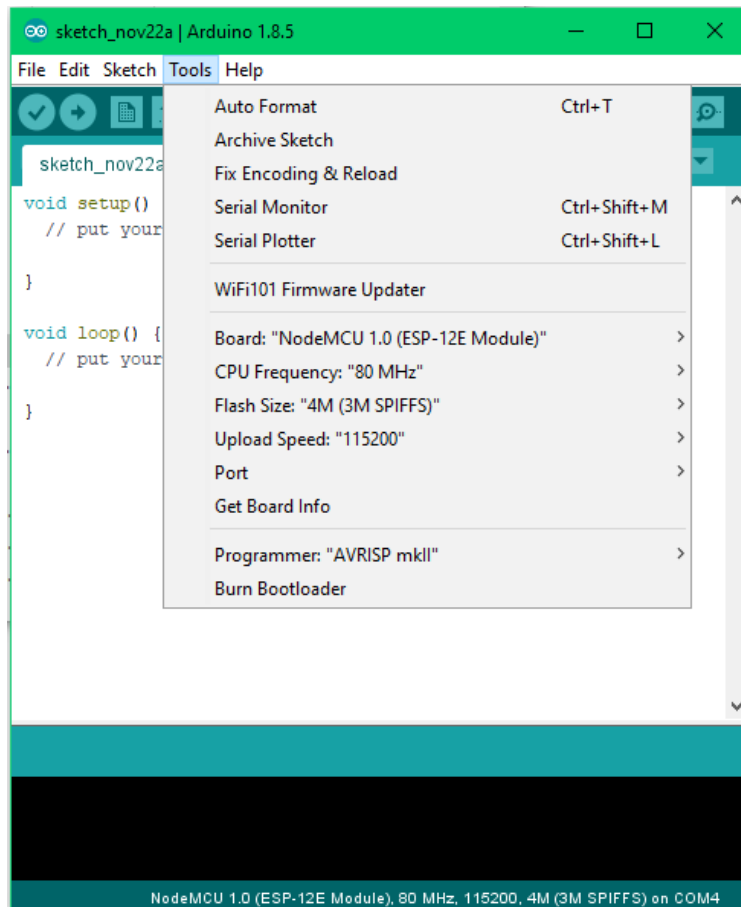


### 3. Test board , Wire



### III. APPLICATION

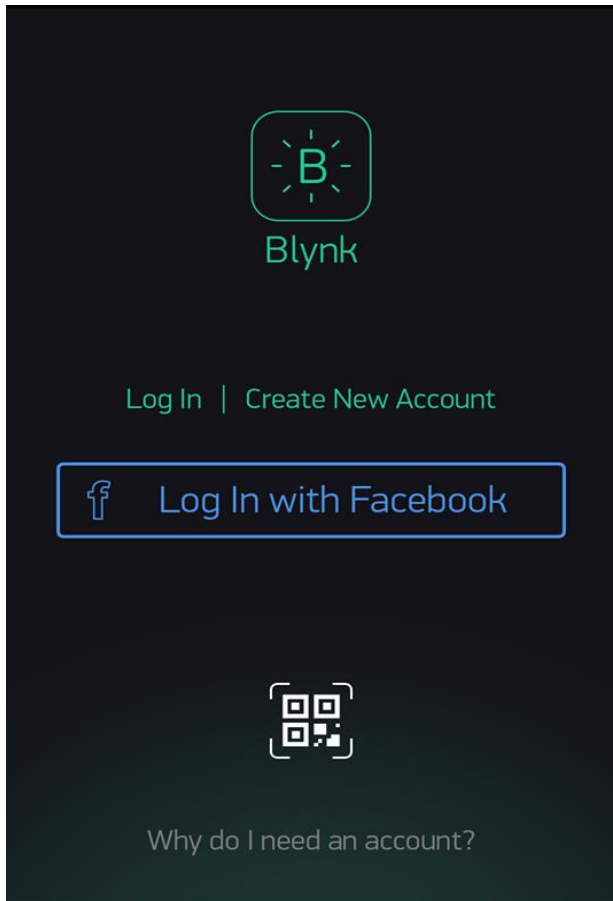
#### 1. Aduino IDE 1.8.5



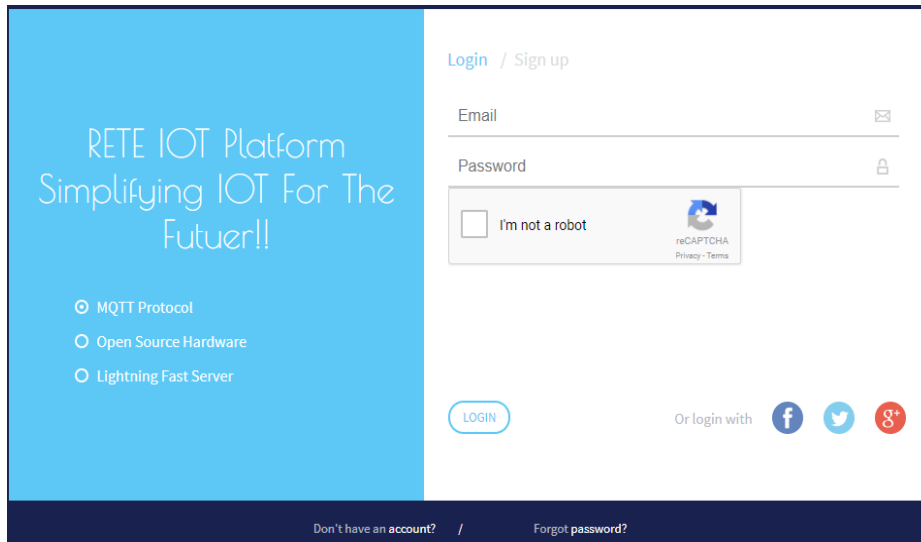
- You can use any version of Aduino IDE
- In the first use , there isn't a driver for the ESP8266 device ,this link show to install it :  
<http://www.instructables.com/id/Programming-ESP8266-ESP-12E-NodeMCU-Using-Arduino-/>

## 2. Blynk App :

- Blynk is one of the most popular mobile applications for the IOT. Works with anything: ESP8266, - Arduino, Raspberry Pi, SparkFun and others.
- In this project we use Blynk Server to control the led, you can create an account with your email and receive the Authentication token for your project
- Blynk app is available free on Android & IOS

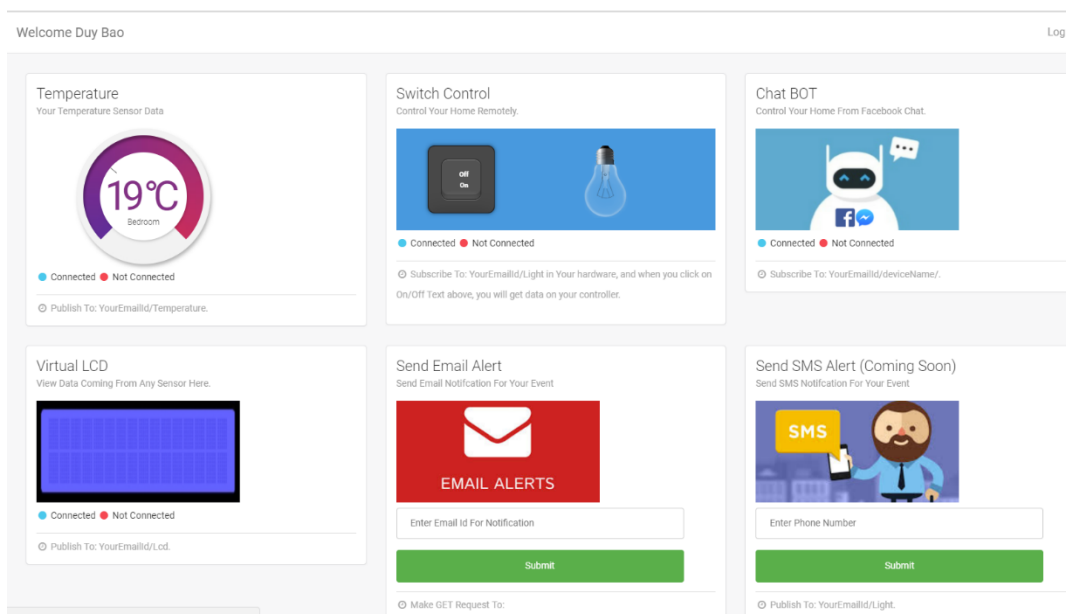


3. RetelIoT Platform website : <http://io.reteiot.com/user/login>
  - RetelIoT is a platform which provides MQTT protocol
  - RetelIoT also works well with many Development Kit. It contains many function via API such as : display , manage chatbox, send email , send sms, ....
  - You can create an account and use the API : <http://io.reteiot.com/api/user/facebookchat/your-email>



The image shows the login and sign-up page of the RetelIoT Platform. On the left, a blue banner reads "RETE IOT Platform Simplifying IOT For The Futuer!!" (note the typo 'Futuer!!'). Below this, three features are listed: MQTT Protocol, Open Source Hardware, and Lightning Fast Server. On the right, there is a login form with fields for "Email" and "Password", a reCAPTCHA checkbox labeled "I'm not a robot", and a "LOGIN" button. Below the login button, there are links for "Don't have an account?" and "Forgot password?". At the bottom right, there are social media login options for Facebook, Twitter, and Google+.

- After register and login , this is the main UI of the dashboard



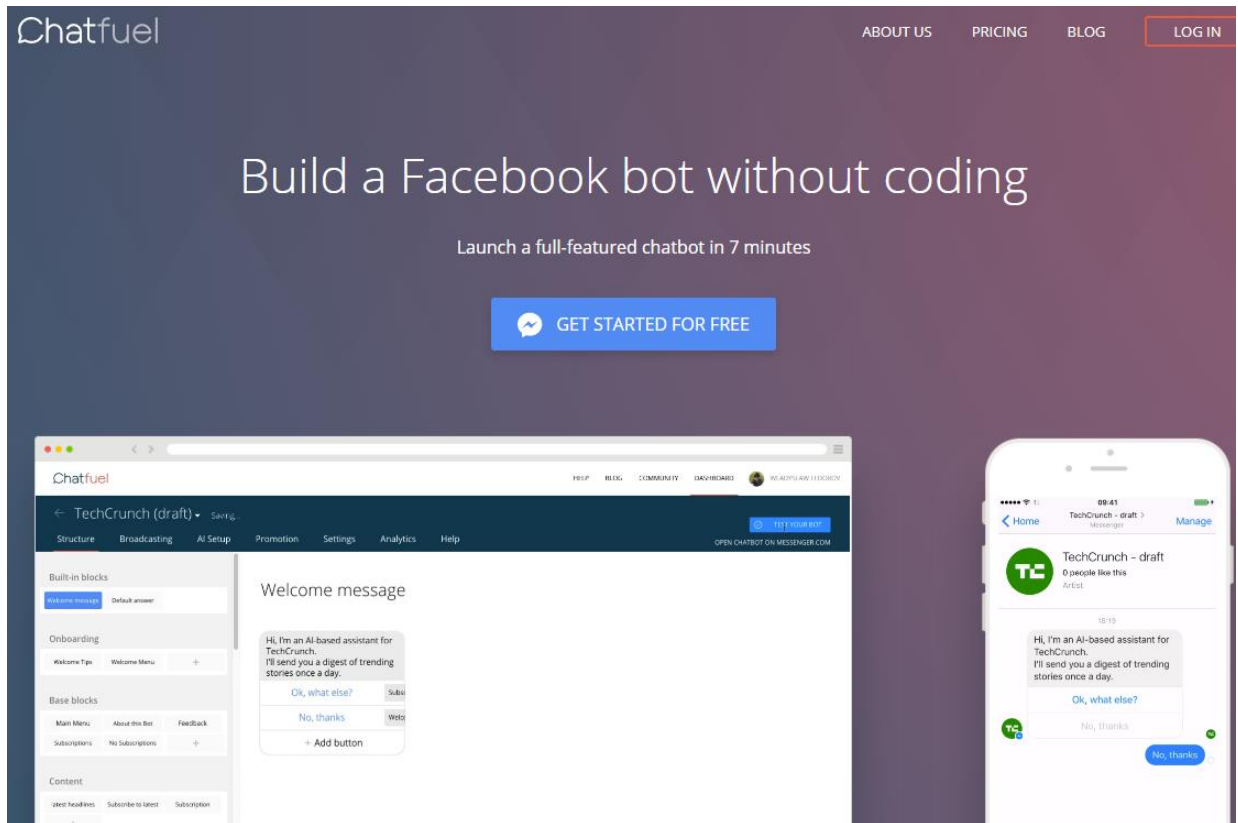
The image shows the main UI of the dashboard after login. The dashboard is titled "Welcome Duy Bao" and has a "Log" button in the top right corner. It features six main widgets arranged in a 2x3 grid:

- Temperature:** Displays "Your Temperature Sensor Data" with a circular gauge showing 19°C for the "Bedroom". It includes "Connected" and "Not Connected" status indicators and a "Publish To: YourEmailId/Temperature." link.
- Switch Control:** Titled "Control Your Home Remotely", it shows a switch and a light bulb icon. It includes status indicators and a "Subscribe To: YourEmailId/Light in Your hardware, and when you click on On/Off Text above, you will get data on your controller." link.
- Chat BOT:** Titled "Control Your Home From Facebook Chat", it shows a robot icon. It includes status indicators and a "Subscribe To: YourEmailId/deviceName/." link.
- Virtual LCD:** Titled "View Data Coming From Any Sensor Here", it shows a virtual LCD screen. It includes status indicators and a "Publish To: YourEmailId/Lcd." link.
- Send Email Alert:** Titled "Send Email Notification For Your Event", it shows an envelope icon and "EMAIL ALERTS". It includes a form to "Enter Email Id For Notification" and a "Submit" button. Below the button is a "Make GET Request To:" link.
- Send SMS Alert (Coming Soon):** Titled "Send SMS Notification For Your Event", it shows a man holding a phone and an "SMS" icon. It includes a form to "Enter Phone Number" and a "Submit" button. Below the button is a "Publish To: YourEmailId/Light." link.



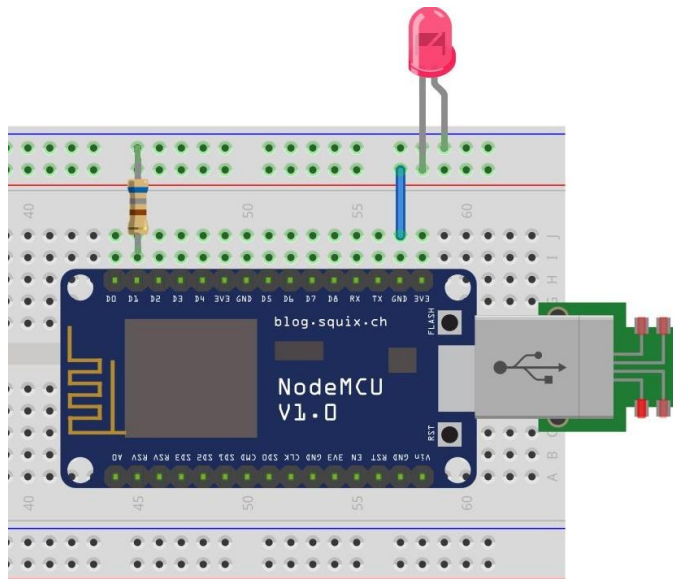
4. Chatfuel : <https://chatfuel.com/>

- This site use to create a automatically chatbot via your Facebook messenger
- Chatfuel is a website where you can create an AI bot for your Facebook page.
- You can login directly with your facebook account.

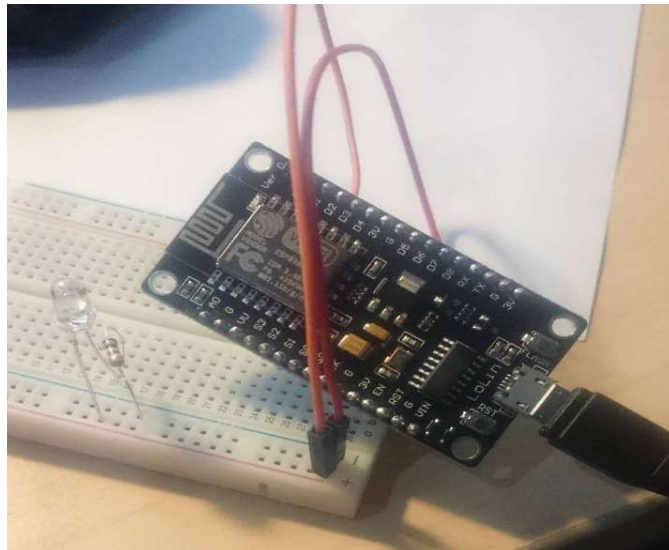


## IV. IMPLEMENTATION

- SETUP THE DEVICES
  - You can use any Digital Pin on the Kit to connect to the LED
  - In this example, output D1 (GPIO5) is use to connect to LED Anode



The real view :



## 1. Control the led by Web Server.

On Arduino IDE : Verify and upload the code with your wifi ssid and password

```
#include <ESP8266WiFi.h>
// WiFi Configuration
const char* ssid = "your wifi name";
const char* password = "12121212";
// Create Server
WiFiServer server(80);
int output_pin = 5; // (GPIO5 = output D1)
void setup() {
  Serial.begin(115200);
  delay(10);
  // GPIO5
  pinMode(output_pin, OUTPUT);
  digitalWrite(output_pin, 0);
  // WiFi Connection
  Serial.print("Connecting to ");
  Serial.println(ssid);

  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi Connected");

  // Start server
  server.begin();
  Serial.println("Start Server");

  // IP print
  Serial.println(WiFi.localIP());
}
```

```
// Check Client Connection
WiFiClient client = server.available();
if (!client) {
  return;
}

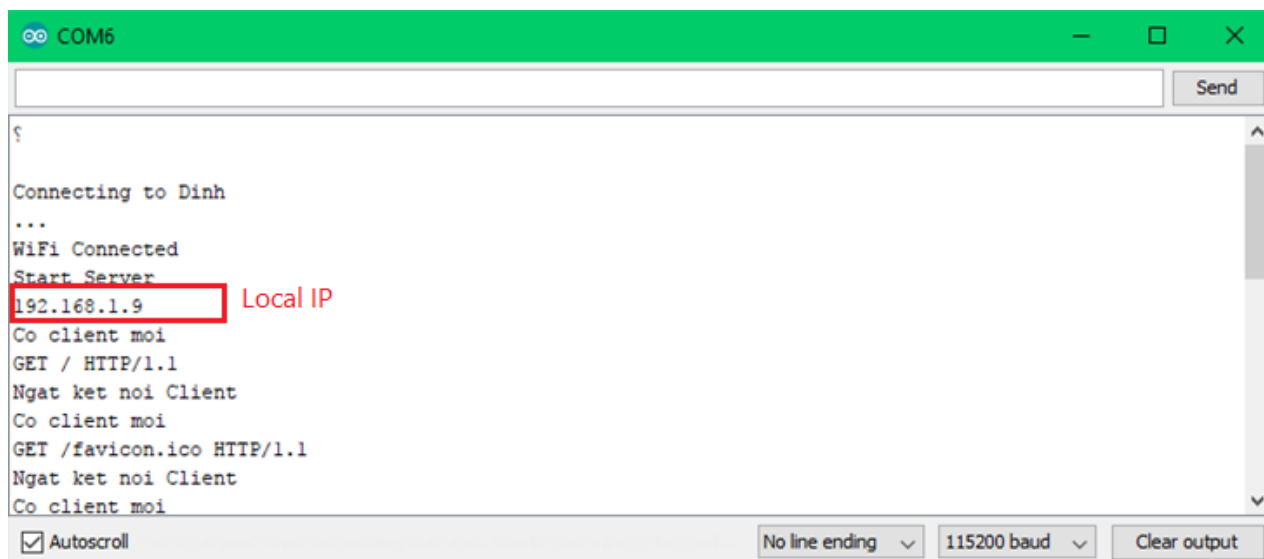
// Client send data
Serial.println("Co client moi");
while(!client.available()){
  delay(1);
}

// Read client data
String req = client.readStringUntil('\r');
Serial.println(req);
client.flush();
```

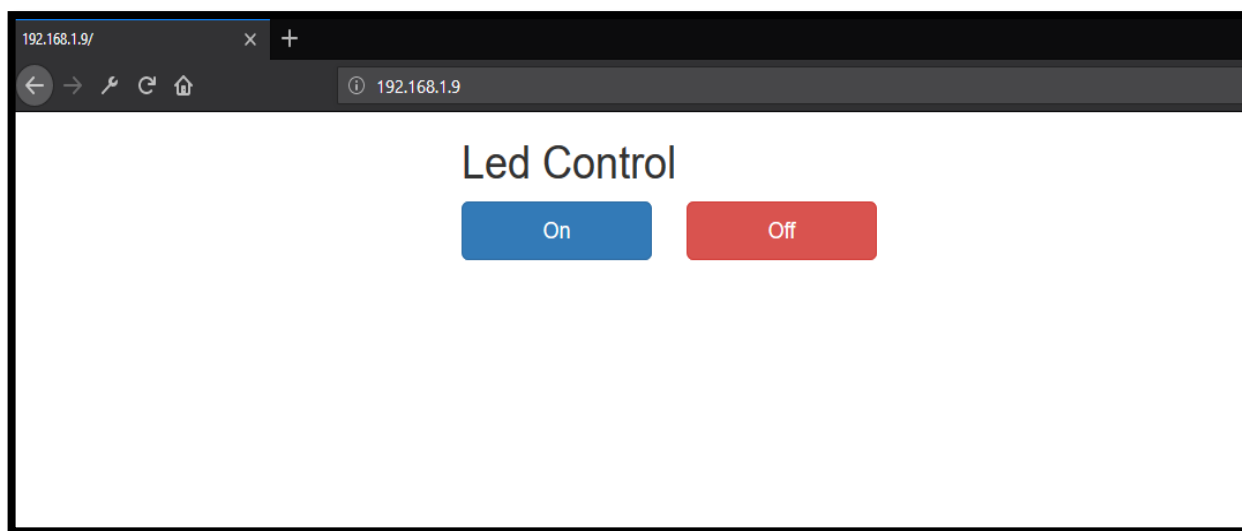
```
// Prepare HTML page to response
String s = "HTTP/1.1 200 OK\r\nContent-Type: text/html\r\n\r\n";
s += "<head>";
s += "<meta name=\"viewport\" content=\"width=device-width, initial-scale=1\">";
s += "<script src=\"https://code.jquery.com/jquery-2.1.3.min.js\"></script>";
s += "<link rel=\"stylesheet\" href=\"https://maxcdn.bootstrapcdn.com/bootstrap/3.3.4/css/bootstrap.min.css\">";
s += "</head>";
s += "<div class=\"container\">";
s += "<h1>Led Control</h1>";
s += "<div class=\"row\">";
s += "<div class=\"col-md-2\"><input class=\"btn btn-block btn-lg btn-primary\"";
type=\"button\" value=\"On\" onclick=\"on()\"></div>";
s += "<div class=\"col-md-2\"><input class=\"btn btn-block btn-lg btn-danger\"";
type=\"button\" value=\"Off\" onclick=\"off()\"></div>";
s += "</div></div>";
s += "<script>function on() {$.get(\"/on\");}</script>";
s += "<script>function off() {$.get(\"/off\");}</script>";

// Send information to client
client.print(s);
delay(1);
Serial.println("Client Disconnection");
}
```

Here is the result on serial monitor :



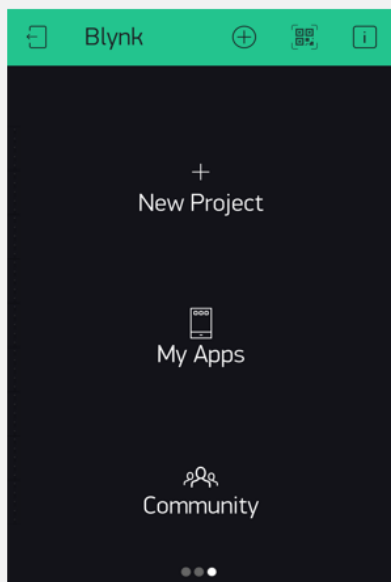
Go to 192.168.1.xx on the browser , the page is displayed with button to control the led



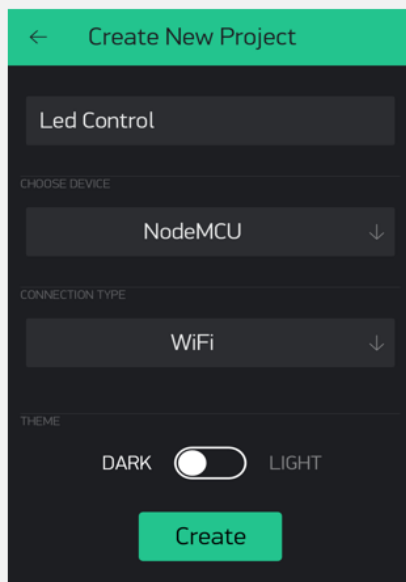
## 2. Control the led via Blynk api

- On Blynk App :

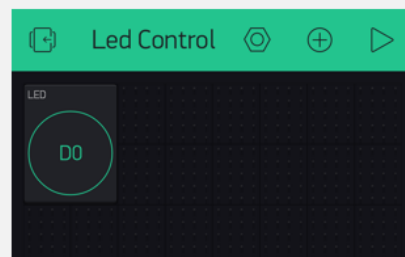
- Add a New Project



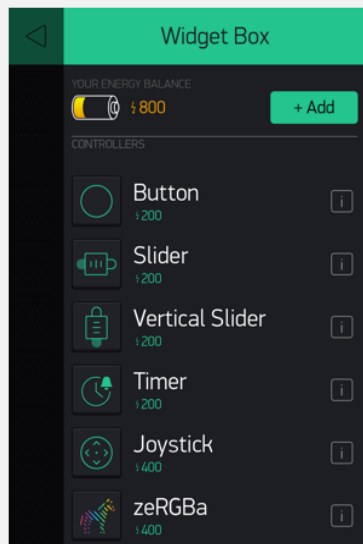
- Set the name, choose device is NodeMCU and connection is WiFi



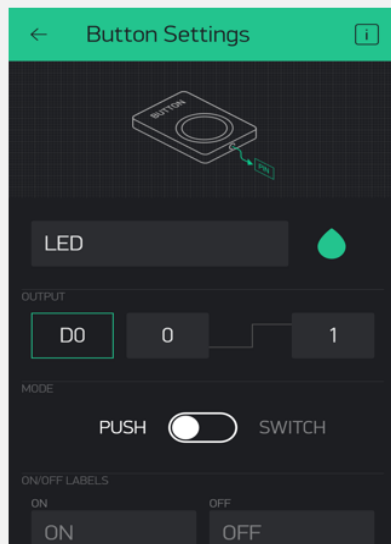
- A button is created



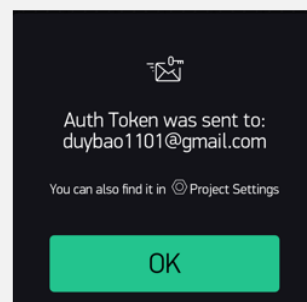
- Add a Button



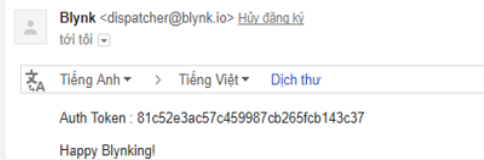
- Set the output is Digital , in the example is D0 , and the mode is Switch



- An Auth token is sent to your email

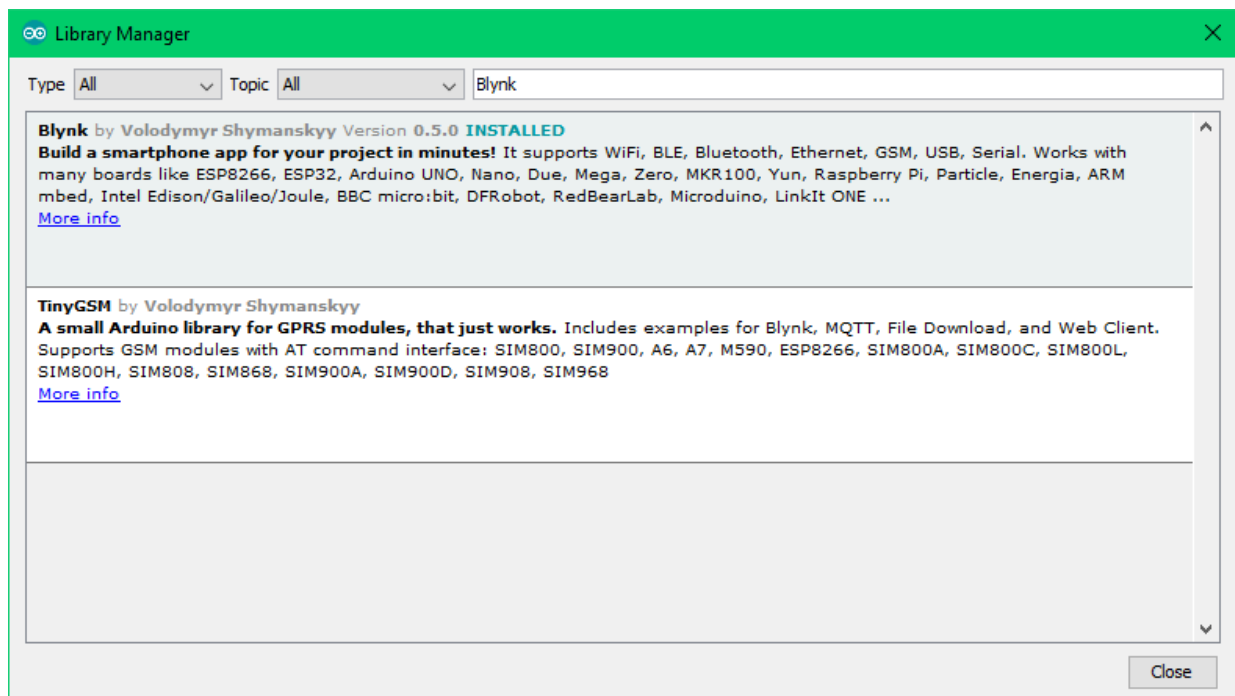


Auth Token for Led Control project and device Led Control



On Arduino IDE :

- To use Blynk API, add Blynk library on Library Manager



Here is the code to work :

```
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

//Configure the Auth Token, Wifi SSID,
Wifi Password
char auth[] = "YourAuthToken";
char ssid[] = "YourNetworkName";
char pass[] = "YourPassword";
```

```
void setup()
{
  Serial.begin(9600);
  //Connect to Blynk
  Blynk.begin(auth, ssid, pass);
}
void loop()
{
  //Run the Blynk
  Blynk.run();
}
```

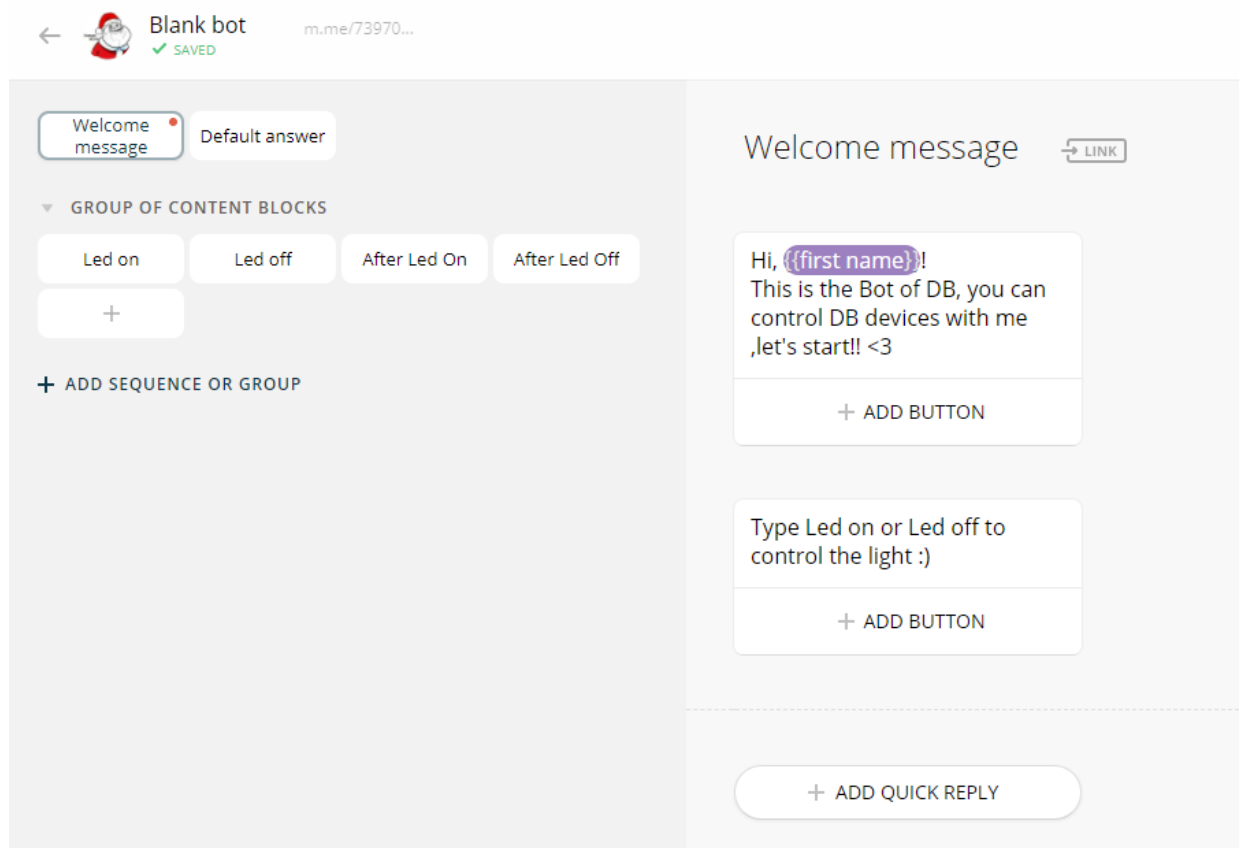
Run the code , then turn on the Blynk App to control your led



### 3. Control the led via Facebook Messenger

On Chatfuel :

- First you need to login Chatfuel with your Facebook account and set-up your Facebook Page
- Then add some Welcome Message :



- Set the block to Turn on the Led
- Type of the block is JSON API with type : GET
- Use the URL is the RetelIoT API :  
<http://io.reteiot.com/api/user/facebookchat/your-email/facebook-led/on>
- Apply same way to Turn off the Led :  
<http://io.reteiot.com/api/user/facebookchat/your-email/facebook-led/off>

- Set 2 more blocks to notify the status of the Led.

Blank bot m.me/73970... ✓ SAVED

Welcome message Default answer

GROUP OF CONTENT BLOCKS

Led on Led off After Led On After Led Off

+ ADD SEQUENCE OR GROUP

Led on LINK

**JSON API** ⓘ

Use this plugin to create various integrations with your server - generate dynamic content or send data. You can apply user attributes in either the URL or the USER ATTRIBUTES field. With POST request type, user attributes will be sent in a standard way. With GET request, they will be added to the URL as GET parameters.

TYPE URL \*

GET <http://io.reteiot.com/api/user/facebookchat/duybao1101@gmail.co>

USER ATTRIBUTES

Choose user attributes

☐ Report plugin errors in the bot

Modify default plugin phrases >

- Set the AI mode for your Facebook Bot.
- So that's all for your bot.

IF USER SAYS SOMETHING SIMILAR TO:

Led off , LED OFF , Led Off , led off

BOT REPLIES WITH BLOCK ▾ RANDOM

Led off , After Led Off Enter block name

IF USER SAYS SOMETHING SIMILAR TO:

Led on , LED ON , Led On , led on

BOT REPLIES WITH BLOCK ▾ RANDOM

Led on , After Led On Enter block name

IF USER SAYS SOMETHING SIMILAR TO:

Hi , Hello , greetings , howdy , wassup

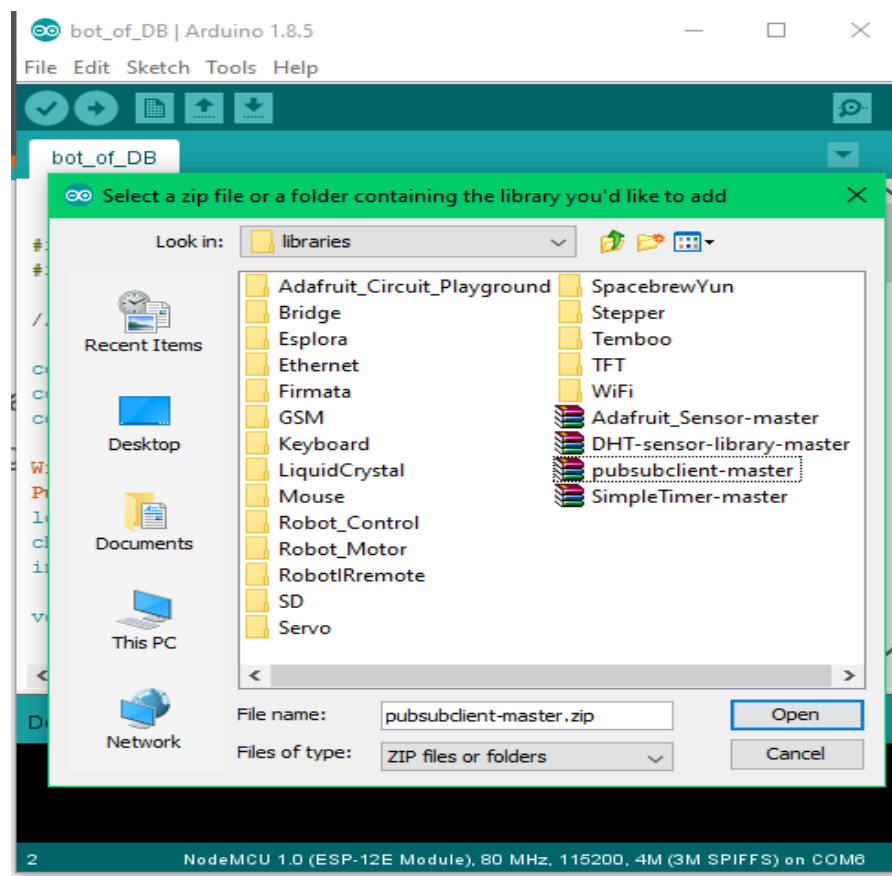
BOT REPLIES WITH BLOCK ▾ RANDOM

Welcome message Enter block name

+ ADD ANSWER

On Arduino IDE :

- To make the code work on RetelOT Platform, you have to add the RetelOT file in the Arduino IDE library download the link below then extracted to library folder of Arduino <https://github.com/knolleary/pubsubclient>



Verify and Upload the code

```
#include <ESP8266WiFi.h>
#include <PubSubClient.h>

// Update these with values suitable for your
network.

const char* ssid = "your-wifiname"; // change to your
home wifi name
const char* password = "your-password"; // change
to your home wifi password
const char* mqtt_server = "io.reteiot.com"; // MQTT
broker Name

WiFiClient espClient;
PubSubClient client(espClient);
long lastMsg = 0;
char msg[50];
int value = 0;

void setup_wifi() {

  delay(10);
  // We start by connecting to a WiFi network
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);

  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  randomSeed(micros());
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
```

```

void callback(char* topic, byte* payload, unsigned int length)
{
  Serial.print("Message arrived [");
  Serial.print(topic);
  Serial.print("] ");
  for (int i = 0; i < length; i++) {
    Serial.print((char)payload[i]);
  }
  Serial.println();
  // Switch on the LED if an 1 was received as first character
  if ((char)payload[0] == 'o' && (char)payload[1] == 'n') {
    // Here we are comparing if ON command is coming from
    server.
    digitalWrite(D1, HIGH);
  } else {
    digitalWrite(D1, LOW);
  }
}

```

```

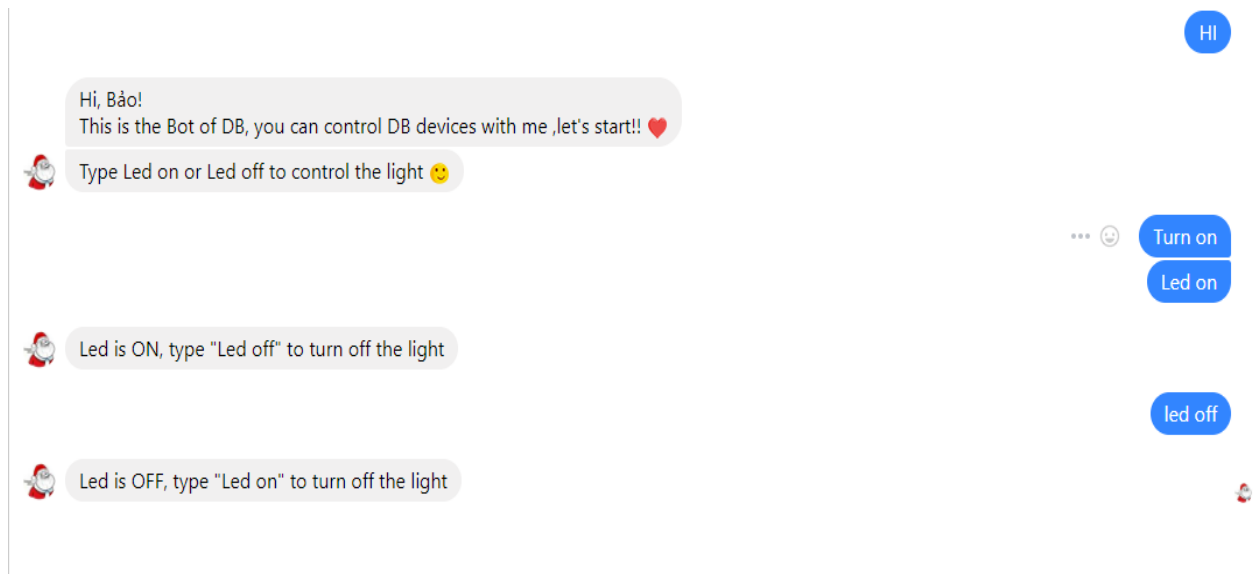
void reconnect() {
  // Loop until we're reconnected
  while (!client.connected()) {
    Serial.print("Attempting MQTT connection...");
    // Create a random client ID
    String clientId = "ESP8266Client-";
    clientId += String(random(0xffff), HEX);
    // Attempt to connect
    if (client.connect(clientId.c_str())) {
      Serial.println("connected");
      digitalWrite(BUILTIN_LED, LOW);
      client.subscribe("your-email/facebook-led");
      // change your email id , you can also change facebook-led and keep
      what ever device name here.
    } else {
      Serial.print("failed, rc=");
      Serial.print(client.state());
      Serial.println(" try again in 5 seconds");
      // Wait 5 seconds before retrying
      delay(5000); }}}

```

```
void setup() {  
  pinMode(BUILTIN_LED, OUTPUT);  
  pinMode(D1, OUTPUT);  
  Serial.begin(115200);  
  setup_wifi();  
  //Connect to MQTT Server  
  client.setServer(mqtt_server, 1883);  
  client.setCallback(callback);  
  digitalWrite(BUILTIN_LED, HIGH);  
  digitalWrite(D1, LOW);  
}
```

```
void loop() {  
  if (!client.connected()) {  
    digitalWrite(BUILTIN_LED, HIGH);  
    reconnect();  
  }  
  client.loop();  
}
```

Then chat with your bot



## V. REFERENCES

- Node MCU Datasheet : <https://nodemcu.readthedocs.io/en/master/>
- Arduino IDE download link : <https://www.arduino.cc/en/Main/Software>
- ESP8266 library for Arduino IDE guide :  
<http://www.instructables.com/id/Programming-ESP8266-ESP-12E-NodeMCU-Using-Arduino-/>
- RetelIoT Platform website : <http://io.reteiot.com/user/login>
- RetelIoT library for Adruino IDE : <https://github.com/knolleary/pubsubclient>
- ChatFuel website : <https://chatfuel.com/>
- Project code : <https://drive.google.com/drive/folders/1aKLZ-TqnPARR8P0c1UkzRM2XZZ0LAWd8?usp=sharing>