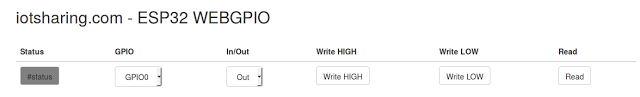
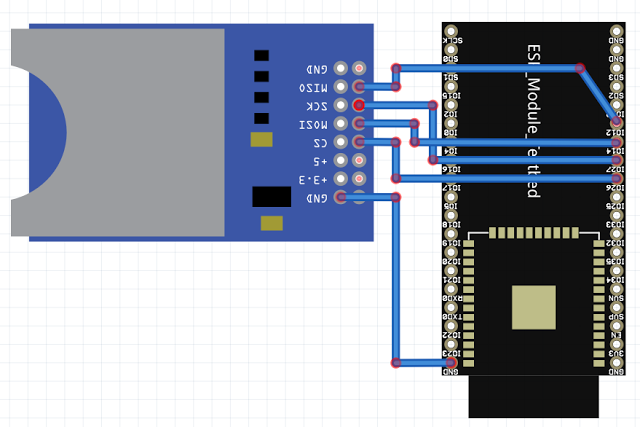
# **[Demo 17: Arduino ESP32/ESP8266 WebGPIO - control GPIO from web](http://www.iotsharing.com/2017/06/arduino-esp32-webgpio-control-gpio-from-web.html)**

**1. Introduction**  
In this tutorial, I will show you how to make an application like Raspberry WebGPIO.  
The GUI of Web look like below:

[](https://3.bp.blogspot.com/-I7u8Te7MMBc/WTFyyHBSS8I/AAAAAAAAD_g/C0Ggc2ghi50R5KHTzYq1goahmNrJg3B_QCLcB/s1600/webgpio1.png)

**Figure: ESP32 WebGPIO interface**

- From this GUI you can select which GPIO, direction (Input/Output), the value (HIGH/LOW) need to be written to GPIO in output mode or read the value of GPIO in input mode. The status or read value will be showed in Status column.  
- I will create 2 version of this demo:  
+ Version 1: without using sdcard to store html code.  
+ Version 2: Using sdcard to store html code.   
- In order to make this demo, I will reuse 2 previous demos:  
[Demo 7: How to use Arduino ESP32 to store data to sdcard](http://www.iotsharing.com/2017/05/how-to-use-arduino-esp32-to-store-data-to-sdcard.html" \t "http://www.iotsharing.com/2017/06/_blank)  
[Demo 12: How to turn the Arduino ESP32 into a Web Server](http://www.iotsharing.com/2017/05/how-to-turn-esp32-into-web-server.html" \t "http://www.iotsharing.com/2017/06/_blank)  
**2. Hardware**  
We connect ESP32 to microSD module like below:

[](https://3.bp.blogspot.com/-zYdaT6b1p1g/WTF6o284m9I/AAAAAAAAD_s/yGkSYConFTUco_C7gRjcDk3GjScKOQnVgCPcB/s1600/esp32sdcard.png)

**Figure: ESP32 connect microSD module**

Here we connect:

[ESP32 IO26 – CS MICROSD]  
[ESP32 IO14 – MOSI MICROSD]  
[ESP32 IO12 – MISO MICROSD]  
[ESP32 IO27 – SCK MICROSD]

**3. Software**  
**I created 2 versions: with and without sdcard**  
**3.1 Without sdcard**  
To test it from web browser go to http://ip\_address\_of\_esp32

|  |
| --- |
| #include <WiFiClient.h>  #include <ESP32WebServer.h>  #include <WiFi.h>  /\* thay doi ssid va password \*/  const char\* ssid = "dd-wrt";  const char\* password = "0000000000";  ESP32WebServer server(80);  /\* day la phan code giao dien, dung jquery va boostrap \*/  char res[3000] =  "<!DOCTYPE html>\n\  <html>\n\  <head>\n\  <meta name='viewport' content='width=device-width, initial-scale=1'>\n\  <link rel='stylesheet' href='https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css'>\n\  <script src='https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.min.js'></script>\n\  <script src='https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js'></script>\n\  </head>\n\  <body>\n\  \n\  <div class='container'>\n\  <h2>iotsharing.com - ESP32 WEBGPIO</h2>\n\  </br> \n\  <table class='table'>\n\  <thead>\n\  <tr>\n\  <th>Status</th>\n\  <th>GPIO</th>\n\  <th>In/Out</th>\n\  <th>Write HIGH</th>\n\  <th>Write LOW</th>\n\  <th>Read</th>\n\  </tr>\n\  </thead>\n\  <tbody>\n\  <tr>\n\  <td> \n\  <button class='btn btn-default dropdown-toggle' type='status' id='status' >#status</button>\n\  </td>\n\  <td> \n\  <select id = 'gpio' class='btn btn-default dropdown-toggle'>\n\  <option>GPIO0</option>\n\  <option>GPIO2</option>\n\  <option>GPIO4</option>\n\  </select>\n\  </td>\n\  <td> \n\  <select id = 'dir' class='btn btn-default dropdown-toggle'>\n\  <option>Out</option>\n\  <option>In</option>\n\  </select>\n\  </td>\n\  <td> \n\  <button class='btn btn-default dropdown-toggle' type='button' id='write1' >Write HIGH</button>\n\  </td>\n\  <td> \n\  <button class='btn btn-default dropdown-toggle' type='button' id='write0' >Write LOW</button>\n\  </td>\n\  <td> \n\  <button class='btn btn-default dropdown-toggle' type='button' id='read' >Read</button>\n\  </td>\n\  </tr>\n\  </tbody>\n\  </table> \n\  </div>\n\  <script>\n\  function ml(gpio, dir, value) {\n\  var io = gpio.replace('GPIO', '');\n\  var d = (dir == 'In') ? 'i' : 'o';\n\  if(value != null){\n\  var v = (value == 'Write LOW') ? '0' : '1';\n\  return (io+d+v); \n\  } else {\n\  return (io+d); \n\  }\n\  }\n\  $(function() {\n\  $('#status').css('background','grey');\n\  $('#write1').on('click', function (e) {\n\  var dir = $('#dir').val();\n\  $('#status').css('background','red');\n\  $('#status').html('#status');\n\  if(dir == 'In'){\n\  alert('direction is In');\n\  } else {\n\  var gpio = $('#gpio').val();\n\  var value = $('#write1').text();\n\  $.get('/req?out=' + ml(gpio, dir, value), function(d, s){\n\  $('#status').css('background','green');\n\  $('#status').html(s);\n\  }); \n\  }\n\  })\n\  $('#write0').on('click', function (e) {\n\  var dir = $('#dir').val();\n\  $('#status').css('background','red');\n\  $('#status').html('#status');\n\  if(dir == 'In'){\n\  alert('direction is In');\n\  } else {\n\  var gpio = $('#gpio').val();\n\  var value = $('#write0').text();\n\  $.get('/req?out=' + ml(gpio, dir, value), function(d, s){\n\  $('#status').css('background','green');\n\  $('#status').html(s);\n\  }); \n\  }\n\  })\n\  $('#read').on('click', function (e) {\n\  var dir = $('#dir').val();\n\  $('#status').css('background','red');\n\  $('#status').html('#value');\n\  if(dir == 'Out'){\n\  alert('direction is Out');\n\  } else {\n\  var gpio = $('#gpio').val();\n\  $.get('/req?in=' + ml(gpio, dir, null), function(d, s){\n\  if(s == 'success'){\n\  $('#status').css('background','yellow');\n\  $('#status').html(d);\n\  }else{\n\  $('#status').html(s);\n\  } \n\  }); \n\  }\n\  })\n\  });\n\  </script>\n\  </body>\n\  </html>";  void handleRoot() {  server.send(200, "text/html", res);  }  /\* ham nay de xu lu yeu cau cua nguoi dung  req?out=0o1 -> user request GPIO0 output gia tri HIGH  req?in=0i -> user request GPIO0 input \*/  void handleGPIO() {  Serial.println("got request");  if(server.args() > 0){  String req = server.argName(0);  if(req == "out"){  server.send(200, "text/plain", "OK");  /\* parse req \*/  String param = server.arg(0);  int p = param.indexOf('o');  int pin = param.substring(0,p).toInt();  int value = param.substring(p+1).toInt();  /\* cai dat pin va ghi gia tri \*/  pinMode(pin, OUTPUT);  digitalWrite(pin, value);  }else if(req == "in"){  String param = server.arg(0);  /\* parse req \*/  int p = param.indexOf('i');  int pin = param.substring(0,p).toInt();  /\* cai dat pin va doc input \*/  pinMode(pin, INPUT);  int value = digitalRead(pin);  char str[3] = {0,0,0};  sprintf(str, "%d", value);  /\* respond cho nguoi dung \*/  server.send(200, "text/plain", str);  }  }  }  /\* cannot handle request so return 404 \*/  void handleNotFound(){  String message = "File Not Found\n\n\n\n";  server.send(404, "text/plain", message);  }  void setup(void){  Serial.begin(115200);  WiFi.begin(ssid, password);  Serial.println("");  /\*cho wifi ket not \*/  while (WiFi.status() != WL\_CONNECTED) {  delay(500);  Serial.print(".");  }  Serial.println("");  Serial.print("Connected to ");  Serial.println(ssid);  Serial.print("IP address: ");  Serial.println(WiFi.localIP());  /\* nhung ham nay se duoc goi khi co user request va respond \*/  server.on("/", handleRoot);  /\* this callback handle GPIO request and respond\*/  server.on("/req", handleGPIO);  server.onNotFound(handleNotFound);  server.begin();  Serial.println("HTTP server started");  }  void loop(void){  server.handleClient();  } |

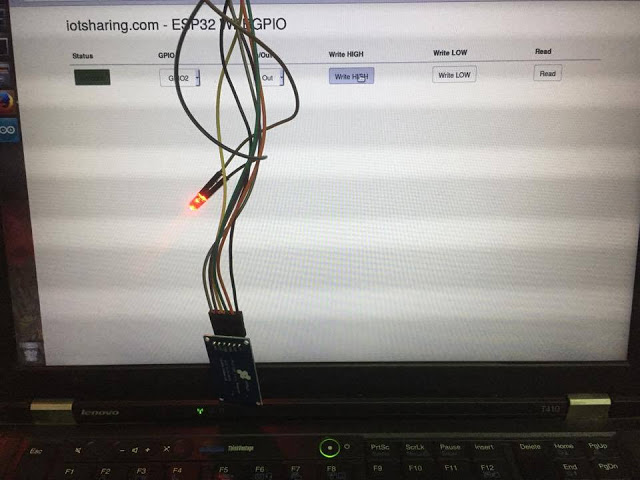
**3.2 With sdcard**

- Create a **index.html** file in memory card at **root "/"**with content:

|  |
| --- |
| <!DOCTYPE html>  <html>  <head>  <meta name="viewport" content="width=device-width, initial-scale=1">  <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css">  <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.min.js"></script>  <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"></script>  </head>  <body>    <div class="container">  <h2>iotsharing.com - ESP32 WEBGPIO</h2>  </br>  <table class="table">  <thead>  <tr>  <th>Status</th>  <th>GPIO</th>  <th>In/Out</th>  <th>Write HIGH</th>  <th>Write LOW</th>  <th>Read</th>    </tr>  </thead>  <tbody>  <tr>  <td>  <button class="btn btn-default dropdown-toggle" type="status" id="status" >#status</button>  </td>  <td>  <select id = "gpio" class="btn btn-default dropdown-toggle">  <option>GPIO0</option>  <option>GPIO2</option>  <option>GPIO4</option>  </select>  </td>  <td>  <select id = "dir" class="btn btn-default dropdown-toggle">  <option>Out</option>  <option>In</option>  </select>  </td>  <td>  <button class="btn btn-default dropdown-toggle" type="button" id="write1" >Write HIGH</button>  </td>  <td>  <button class="btn btn-default dropdown-toggle" type="button" id="write0" >Write LOW</button>  </td>  <td>  <button class="btn btn-default dropdown-toggle" type="button" id="read" >Read</button>  </td>  </tr>  </tbody>  </table>  </div>  <script>  function ml(gpio, dir, value) {  var io = gpio.replace("GPIO", "");  var d = (dir == "In") ? "i" : "o";  if(value != null){  var v = (value == "Write LOW") ? "0" : "1";  return (io+d+v);  } else {  return (io+d);  }  }  $(function() {  $("#status").css("background","grey");  $('#write1').on('click', function (e) {  var dir = $('#dir').val();  $("#status").css("background","red");  $("#status").html("#status");  if(dir == "In"){  alert("direction is In");  } else {  var gpio = $('#gpio').val();  var value = $('#write1').text();  $.get("/req?out=" + ml(gpio, dir, value), function(d, s){  $("#status").css("background","green");  $("#status").html(s);  });  }  })  $('#write0').on('click', function (e) {  var dir = $('#dir').val();  $("#status").css("background","red");  $("#status").html("#status");  if(dir == "In"){  alert("direction is In");  } else {  var gpio = $('#gpio').val();  var value = $('#write0').text();  $.get("/req?out=" + ml(gpio, dir, value), function(d, s){  $("#status").css("background","green");  $("#status").html(s);  });  }  })  $('#read').on('click', function (e) {  var dir = $('#dir').val();  $("#status").css("background","red");  $("#status").html("#value");  if(dir == "Out"){  alert("direction is Out");  } else {  var gpio = $('#gpio').val();  $.get("/req?in=" + ml(gpio, dir, null), function(d, s){  if(s == "success"){  $("#status").css("background","yellow");  $("#status").html(d);  }else{  $("#status").html(s);  }  });  }  })  });  </script>  </body>  </html> |

- Here we use boostrap and jquery library. Bootstrap for creating GUI and jquery to handle user click action and create GET request to ESP32 web server.  
- Create an Arduino project , save as esp32webgpio with code:

|  |
| --- |
| #include <WiFiClient.h>  #include <ESP32WebServer.h>  #include <WiFi.h>  #include <ESPmDNS.h>  #include <SPI.h>  #include <mySD.h>  const char\* ssid = "dd-wrt";  const char\* password = "0000000000";  ESP32WebServer server(80);  void handleRoot() {  /\* we load the chart.html from microSD \*/  File myFile = SD.open("INDEX~1.HTM");  if (myFile) {  /\* respond the content of file to client by calling streamFile()\*/  size\_t sent = server.streamFile(myFile, "text/html");  /\* close the file \*/  myFile.close();  } else {  Serial.println("error opening test.txt");  }  }  /\* this callback is to handle user request  req?out=0o1 -> user request GPIO0 output value HIGH  req?in=0i -> user request GPIO0 input \*/  void handleGPIO() {    if(server.args() > 0){  String req = server.argName(0);  if(req == "out"){  server.send(200, "text/plain", "OK");  /\* this code is to parse req \*/  String param = server.arg(0);  int p = param.indexOf('o');  int pin = param.substring(0,p).toInt();  int value = param.substring(p+1).toInt();  /\* set pin and output value \*/  pinMode(pin, OUTPUT);  digitalWrite(pin, value);    }else if(req == "in"){  String param = server.arg(0);  /\* this code is to parse req \*/  int p = param.indexOf('i');  int pin = param.substring(0,p).toInt();  /\*set pin and read input \*/  pinMode(pin, INPUT);  int value = digitalRead(pin);  char str[3] = {0,0,0};  sprintf(str, "%d", value);  /\* respond the read value \*/  server.send(200, "text/plain", str);  }  }  }  /\* cannot handle request so return 404 \*/  void handleNotFound(){  String message = "File Not Found\n\n";  server.send(404, "text/plain", message);  }  void setup(void){  Serial.begin(115200);  WiFi.begin(ssid, password);  Serial.println("");  // Wait for connection  while (WiFi.status() != WL\_CONNECTED) {  delay(500);  Serial.print(".");  }  Serial.println("");  Serial.print("Connected to ");  Serial.println(ssid);  Serial.print("IP address: ");  Serial.println(WiFi.localIP());  if (MDNS.begin("esp32")) {  Serial.println("MDNS responder started");  }  /\* register the callbacks to process client request \*/  /\* root request we will read the memory card to get  the content of chrt.html and respond that content to client \*/  server.on("/", handleRoot);  /\* this callback handle GPIO request and respond\*/  server.on("/req", handleGPIO);  server.onNotFound(handleNotFound);  server.begin();  Serial.println("HTTP server started");  Serial.print("Initializing SD card...");  /\* initialize microSD \*/  if (!SD.begin(26, 14, 12, 27)) {  Serial.println("initialization failed!");  return;  }  Serial.println("initialization done.");  }  void loop(void){  server.handleClient();  } |

**4.Result**[](https://3.bp.blogspot.com/-v4mO5AOLwVY/WTGGce7ZyHI/AAAAAAAAD_8/BfK0BcXxB689HxinBSCHLZB6oo5cnLOzwCLcB/s1600/esp32webgpio2.jpg)