

# ESP WiFi Relay Module

## Technical Details for the truly Hard-core:

- ESP-01 module with base board
  - Programmed with Arduino IDE and standard ESP8266 headers
  - Writes `{0xA0, 0x01, 0x00, 0xA1}` for off, `{0xA0, 0x01, 0x01, 0xA2}` for on, via serial terminal
- Relay base board
  - Controlled by a “STC15F104W” chip.
  - <http://www.stcmicro.com/datasheet/STC15F100-en.pdf>
  - very similar to 8051 architecture
  - use sdcc and stcgal in linux to compile and program the device.
  - Relay pin on P3\_2.

## Source code for ESP-01 Chip (using Arduino IDE):

```
#include <ESP8266WiFi.h>
#include <ESP8266WebServer.h>
#include <DNSServer.h>

ESP8266WebServer server(80);
DNSServer dns;
IPAddress apIP(192, 168, 1, 1);

const byte cmdOFF[] = {0xA0, 0x01, 0x00, 0xA1};
const byte cmdON[] = {0xA0, 0x01, 0x01, 0xA2};

void setup()
{
  pinMode(0, OUTPUT);
  Serial.begin(9600);
  WiFi.mode(WIFI_AP);
  dns.setTTL(300);
  dns.setErrorReplyCode(DNSReplyCode::ServerFailure);
  dns.start(53, "relay.net", apIP);
  Serial.println();

  Serial.println("Duinotech WiFi Relay");
  Serial.println("Setting up Soft-AP..");

  WiFi.softAPConfig(apIP, apIP, IPAddress(255, 255, 255, 0));
  if (WiFi.softAP("Duinotech WiFi Relay"))
  {
    Serial.println("Success!");
    Serial.println("-----");
    Serial.println("Connect to the WiFi network called");
    Serial.println("\tDuinotech WiFi Relay");
    Serial.println("and navigate to relay.net");
  }
}
```

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```

else
{
  Serial.println("Failed! Resetting...");
  //hang, and causes a reset;
  for (;;)
  ;
}

server.on("/", sendIndex);
server.on("/open", openRelay);
server.on("/close", closeRelay);
server.onNotFound(sendNotFound);
server.begin();
}

void loop()
{
  dns.processNextRequest();
  server.handleClient();
}

void sendIndex()
{
  server.send(200, "text/html", "<head><meta name=viewport"
                                "content='width=device-width,initial-scale=1'></head>"
                                "<h2> Duinotech WiFi Relay </h2>"
                                "<h5> Think Possible. </h5>"
                                "<hr/>"
                                "<p>To open relay, click this link:</p>"
                                "<a href='/open' target='_blank'>Open Relay</a>"
                                "<p>To close relay, click this link:</p>"
                                "<a href='/close' target='_blank'>Close Relay</a>");
}

void openRelay()
{
  Serial.write(cmdON, 4);
  server.send(200, "text/plain", "sent off command");
}

void closeRelay()
{
  Serial.write(cmdOFF,4);
  server.send(200, "text/plain", "sent on command");
}

void sendNotFound()
{
  server.send(404, "text/plain", "404: Not Found");
}

```

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## Source code for STCI5FIO4W Chip (using sdcc 89):

```

/*
   To compile this code under linux run:
   sdcc -mmcs51 --iram-size 128 --xram-size 0 --code-size 4096 \
--nooverlay --noinduction --verbose --debug -V --std-sdcc89 \
--model-small "relay.c"
   To upload code into
   stcgal -p /dev/ttyUSB1 -b 1200 -D -t 11059 relay.ihx -P <chip id>
*/

#include <8051.h>

#define relay_pin P3_2

__sfr __at(0x8E) AUXR;
__sfr __at(0xB1) P3M1;
__sfr __at(0xB2) P3M0;

#define RXB P3_0
#define TXB P3_1
#define BAUD 0xFE80

typedef __bit BOOL;
typedef unsigned char BYTE;
typedef unsigned int WORD;
BYTE TBUF, RBUF;
BYTE TDAT, RDAT;
BYTE TCNT, RCNT;
BYTE TBIT, RBIT;
BOOL TING, RING;
BOOL TEND, REND;
BYTE t, r;
BYTE buf[16];

BYTE step;
BYTE chr;
BYTE mode;
BOOL OK;
BOOL ANSWER;
BYTE answer_data;
int i;

void uart_send(char chr);
void uart_init();

void main()
{
    char a[] = { 'U', 'P' };

    P3M1=0;
    P3M0=4;

```

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```

relay_pin = 0;

step = 0;
mode = 0;
OK = 0;

uart_init();

for (i = 0; a[i] != 0; i++)
    uart_send(a[i]);

while (1) {
    if (REND) {
        REND = 0;
        chr = RBUF;
        switch (step) {
            case 0:
                if (chr == 0xA0)
                    step++;
                break;
            case 1:
                if (chr == 0x01)
                    step++;
                else
                    step = 0;
                break;
            case 2:
                if (chr == 0x01 || chr == 0x00) {
                    step++;
                    mode = chr;
                } else {
                    step = 0;
                }
                break;
            case 3:
                if (chr == 0xA2 && mode == 0x01) {
                    relay_pin = 1;
                    OK = 1;
                }
                else {if (chr == 0xA1 && mode == 0) {
                    relay_pin = 0;
                    OK = 1;
                }
                }
                step = 0;
                break;
        }
    }
}

if (OK) {
    OK = 0;
}

```

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```

        uart_send(relay_pin);
    }
}

void tm0(void) __interrupt 1 __using 1
{
    if (RING) {
        if (--RCNT == 0) {
            RCNT = 3;
            if (--RBIT == 0) {
                RBUF = RDAT;
                RING = 0;
                REND = 1;
            } else {
                RDAT >>= 1;
                if (RXB) RDAT |= 0x80;
            }
        }
    } else if (!RXB) {
        RING = 1;
        RCNT = 4;
        RBIT = 9;
    }
    if (--TCNT == 0) {
        TCNT = 3;
        if (TING) {
            if (TBIT == 0) {
                TXB = 0;
                TDAT = TBUF;
                TBIT = 9;
            } else {
                TDAT >>= 1;
                if (--TBIT == 0) {
                    TXB = 1;
                    TING = 0;
                    TEND = 1;
                } else {
                    TXB = CY;
                }
            }
        }
    }
}

void uart_send(char chr)
{
    while (!TEND) ;
    TEND = 0;
    TBUF = chr;
    TING = 1;
}

```

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```
}
```

```
void uart_init()
{
  SCON = 0x50;
  EA = 0;
  PT0 = 0;
  ET0 = 0;
  TR0 = 0;
  TMOD = 0x00;
  AUXR = 0x80;
  TL0 = BAUD;
  TH0 = BAUD >> 8;
  TR0 = 1;
  ET0 = 1;
  PT0 = 1;
  EA = 1;

  TING = 0;
  RING = 0;
  TEND = 1;
  REND = 0;
  TCNT = 0;
  RCNT = 0;
}
```

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