FPGA TECH SOLUTION

SOLUTION AHEAD

Wi-Fi Trainer Peripheral Control

Wi-Fi Trainer User Manual

Download all Source code from following link

https://github.com/fpgatechsolution/Spartan6-starter-kit

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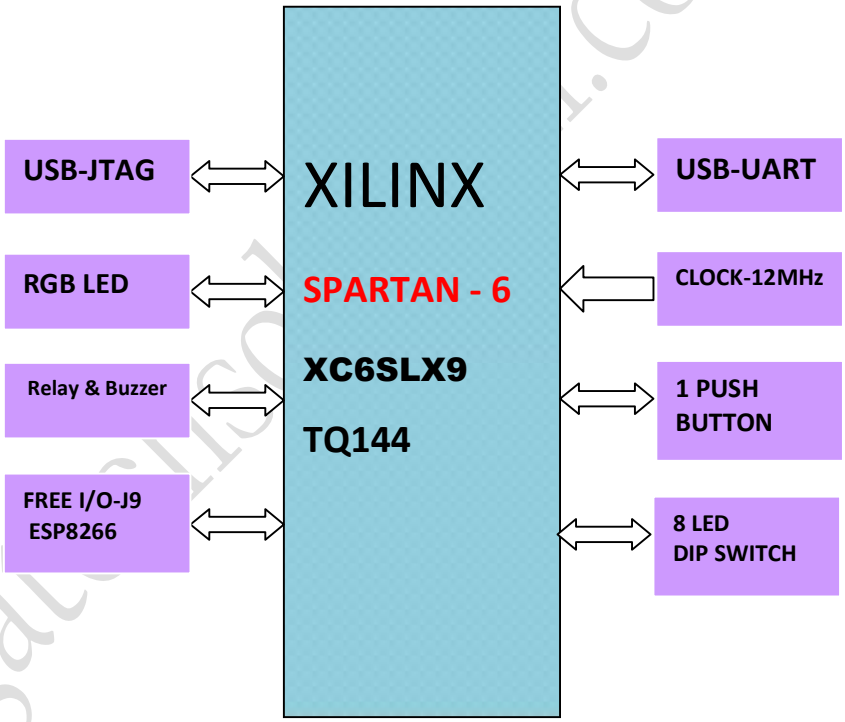
Introduction

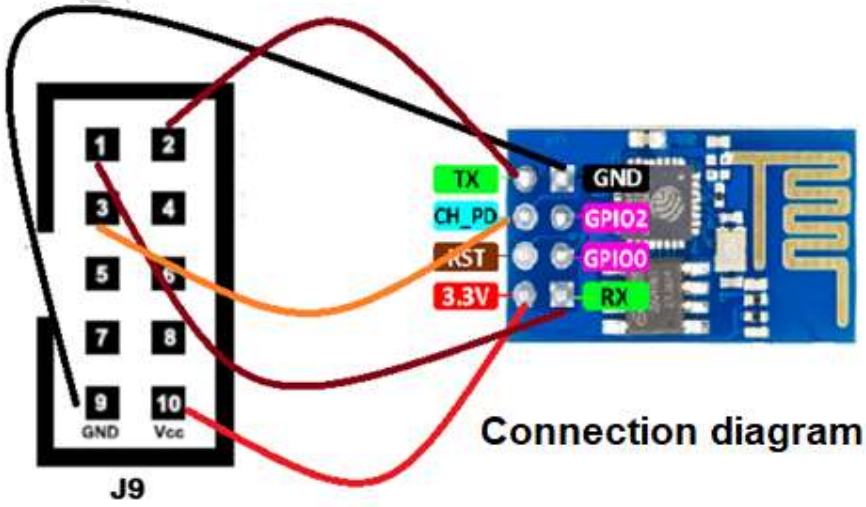
With this manual let's understand how to interface ESP8266 module with spartan6-starter-kit and control multiple peripheral with all source code.

Key components used:

- XC6SLX9_TQ144
- OSCILLATOR – 12MHz
- On board USB JTAG
- USB to serial
- Relay & Buzzer
- 8 LED
- 1 PUSH BUTTONS
- Free I/O J9
- RGB Led



For connection of esp8266 with FPGA board see following figure



Connection diagram

AT Commands required for web server

1) **Ensure AT commands are received correctly (the AT seems not to be case sensitive but the rest of any command is case sensitive):**

   Command : AT
   Response : OK

2) **Enable the module to act as both a "Station" and an "Access Point"**

   Command : AT+CWMODE=1
   Response : OK

3) **List surrounding WiFi networks.**
   Command : AT+CWLAP
   Repsonse : You should get a response like:
   +CWLAP:(3,"Cherry",-25,"e0:2c:b2:c6:91:ab",6,40)
   +CWLAP:(3,"FPGATECHSOLUTION",-37,"62:f0:34:72:6f:6e",11,123,0)

4) **Join a suitable WiFi access point:**
   Command: AT+CWJAP="<access_point_name>","<password>"

   Response:

   WIFI CONNECTED
   WIFI GOT IP

   For example, with the above list of access points you might use:
   AT+CWJAP= "FPGATECHSOLUTION","FPGATECH"

5) **Check if the module has been allocated a IP address**

   Command : AT+CIFSR

   Response :You should get your current IP address in response like below
   +CIFSR:STAIP,"192.168.43.212"
   +CIFSR:STAMAC,"2c:3a:e8:0e:f1:87"

   Note: STAIP is important for us as we are using the same address from the remote location to access the ESP8266. Please note down the STAIP.

6) **You can enable the module to accept TCP connections (i.e. act as a server) in the following manner. Enable multiple connections by sending command.**

   Command : AT+CIPMUX=1
   Response : OK

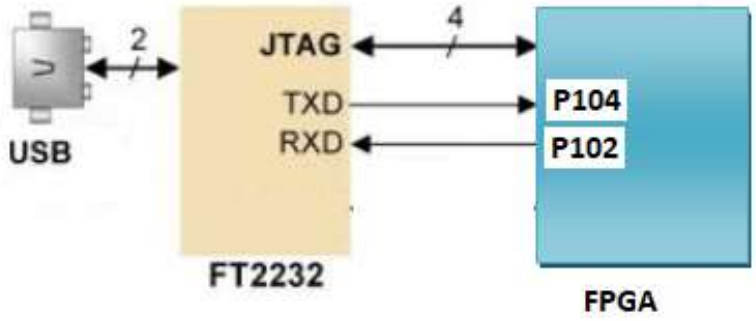
7) **Set the module to listen (first parameter, mode is set to 1) for a connection on a specific port (in this case 80)**

   Command : AT+CIPSERVER=1,80
   Response : OK

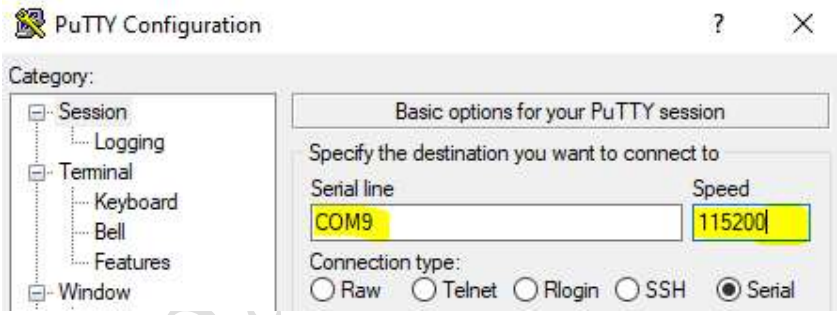
8) **ESP8266 is ready to accept the connection, Now open peripheral control.html in chrome, that will looks like as fallowing**

   With this we can control general purpose LED, Relay, Buzzer & RGB LED on board

The **SPARTAN6 STARTER KIT** board have USB interface using device FT2232HL from FTDI. This act as USB to UART converter so that Communication with FPGA can accomplished by USB port.



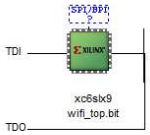
Now connect USB cable to [spartan6-starter-kit] and open UART terminal with 115200 baud rate



On this serial terminal we can see AT commands sent to ESP8266 and also response for those AT commands

Program wifi_top.bit file in [spartan6-starter-kit] then all things will done automatically

Detail source code can be download from [here].



Serial terminal output we can see AT commands sent to ESP8266 and also response for those AT commands

```
ready

AT
OK

AT+CWMODE=1
OK

WIFI DISCONNECT

AT+CWLAP
+CWLAP:(0,"BAdG-Z29kc2dpZnRhYmhpamVldA",-88,"dc:e8:38:06:d0:0a",6,103,0)
+CWLAP:(3,"FPGATECHSOLUTION",-55,"a6:9f:2e:2d:e7:46",11,115,0)
OK

AT+CWJAP="FPGATECHSOLUTION","FPGATECH"
WIFI CONNECTED
WIFI GOT IP
OK

AT+CIFSR
+CIFSR:STAIP,"192.168.43.212"
+CIFSR:STAMAC,"2c:3a:e8:0e:f1:87"

OK

AT+CIPMUX=1
OK

AT+CIPSERVER=1,80
OK

0,CONNECT

+IPD,0,293:GET /?PIN=011 HTTP/1.1
Host: 192.168.43.212
Connection: keep-alive
Accept: */*
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/80.0.3987.163 Safari/537.36
Origin: null
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9

AT+CIPCLOSE=0
0,CLOSED

OK
```