



Name: Shashank Bagda	Roll Number: 92100133020
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Task: Create wireless connection using Arduino Uno and ON/OFF LED using the same.

Components: ESP8266, LEDs, Resistors, Bread board, Jumper wires.

About the Project:

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

In order to setup your Arduino IDE to work with your ESP8266, you need to follow the following steps:

1. Connect your ESP8266-01 Module to PC.
2. Open your Arduino IDE.
3. Go to File -> Preferences.
4. Add this link to Additional Board Manager.
5. Go to Tools -> Board Manager.
6. Find ESP8266 board set and activate it.

The ESP8266 Wi-Fi module specifications or features are given below.

- It is a powerful Wi-Fi module available in a compact size at a very low price.
- It is based on the L106 RISC 32-bit microprocessor core and runs at 80 MHz
- It requires only 3.3 Volts power supply
- The current consumption is 100 m Amps
- The maximum Input/Output (I/O) voltage is 3.6 Volts.
- It consumes 100 mA current



- The maximum Input/Output source current is 12 mA
- The frequency of built-in low power 32-bit MCU is 80 MHz
- The size of flash memory is 513 kb
- It is used as either an access point or station or both
- It supports less than 10 microAmps deep sleep
- It supports serial communication to be compatible with several developmental platforms such as Arduino
- It is programmed using either AT commands, Arduino IDE, or Lua script
- It is a 2.4 GHz Wi-Fi module and supports WPA/WPA2, WEP authentication, and open networks.
- It uses two serial communication protocols like I2C (Inter-Integrated Circuit) and SPI (Serial Peripheral Interface).
- It provides 10-bit analog to digital conversion
- The type of modulation is PWM (Pulse Width Modulation)
- UART is enabled on dedicated pins and for only transmission, it can be enabled on GPIO2.
- It is an IEEE 802.11 b/g/n Wi-Fi module with LNA, power amplifier, balun, integrated TR switch, and matching networks.
- GPIO pins – 17
- Memory Size of instruction RAM – 32 KB
- The memory size of instruction cache RAM – 32 KB
- Size of User-data RAM- 80 KB
- Size of ETS systems-data RAM – 16 KB

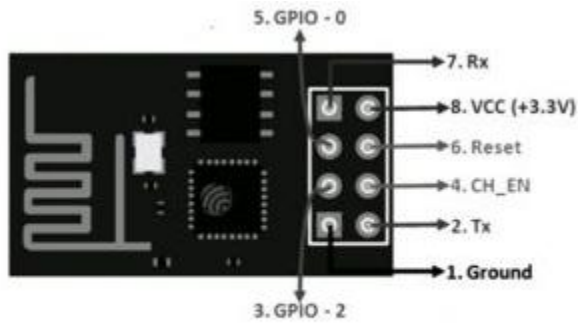
An ESP8266-12E module, for example, consumes an average of 70.5 mA when it is fully on (that is, when its WiFi modem and microcontroller are both on) even when the transceiver is inactive (neither receiving nor transmitting).

How to connect ESP8266 to android phone:

1. On your Android Mobile open SETTINGS & switch ON WI FI.
2. Surrounding Access Points will be listed automatically.
3. Open the preferred WIFI access point & connect to it by providing the Password.

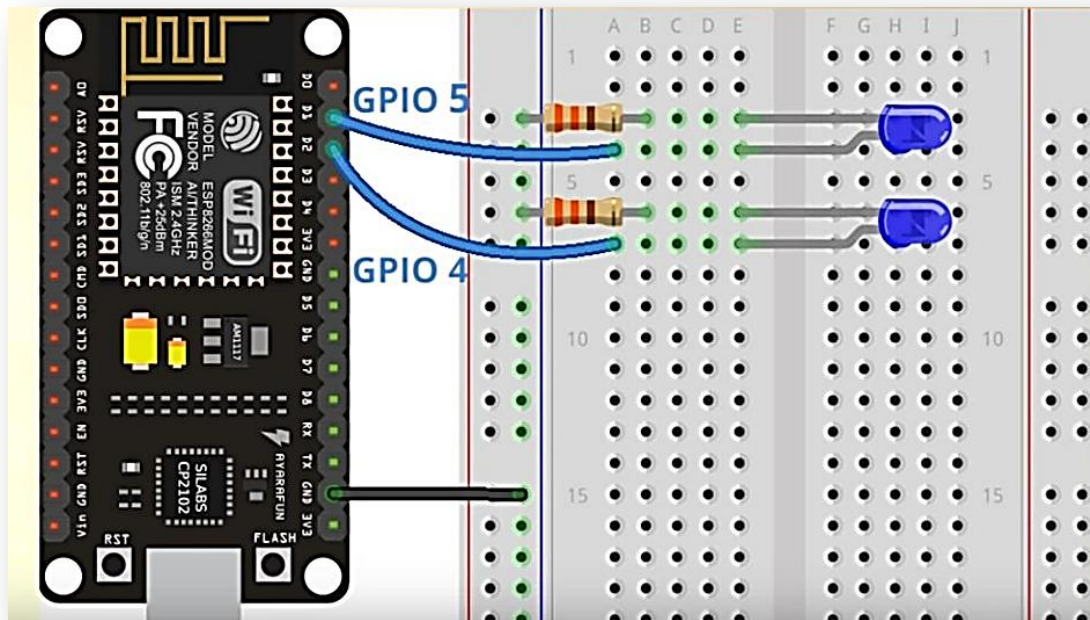
The ESP8266 Wi-Fi module pin configuration/pin diagram is shown in the figure below.





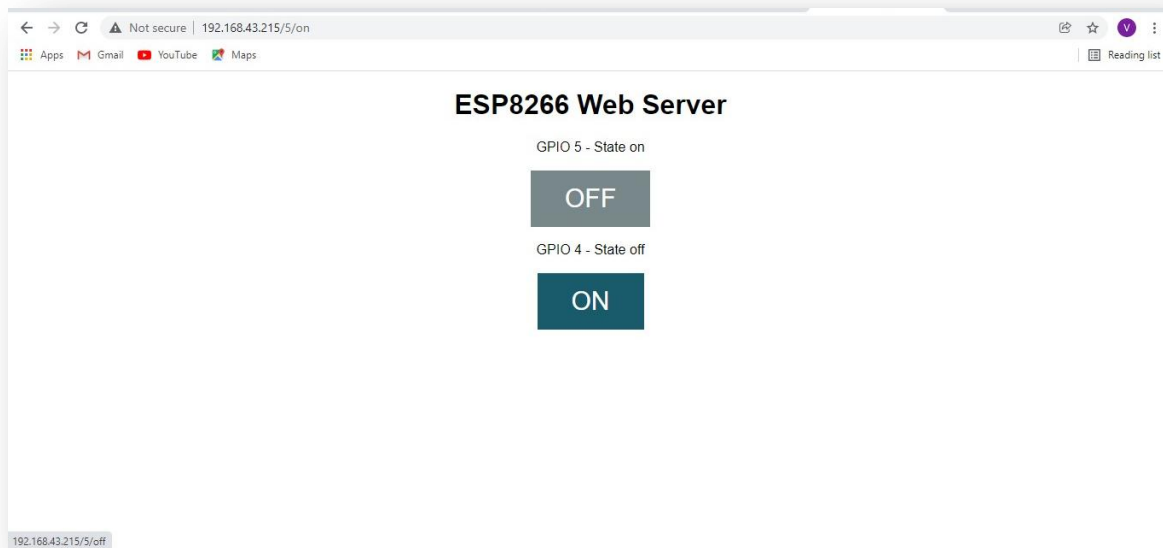
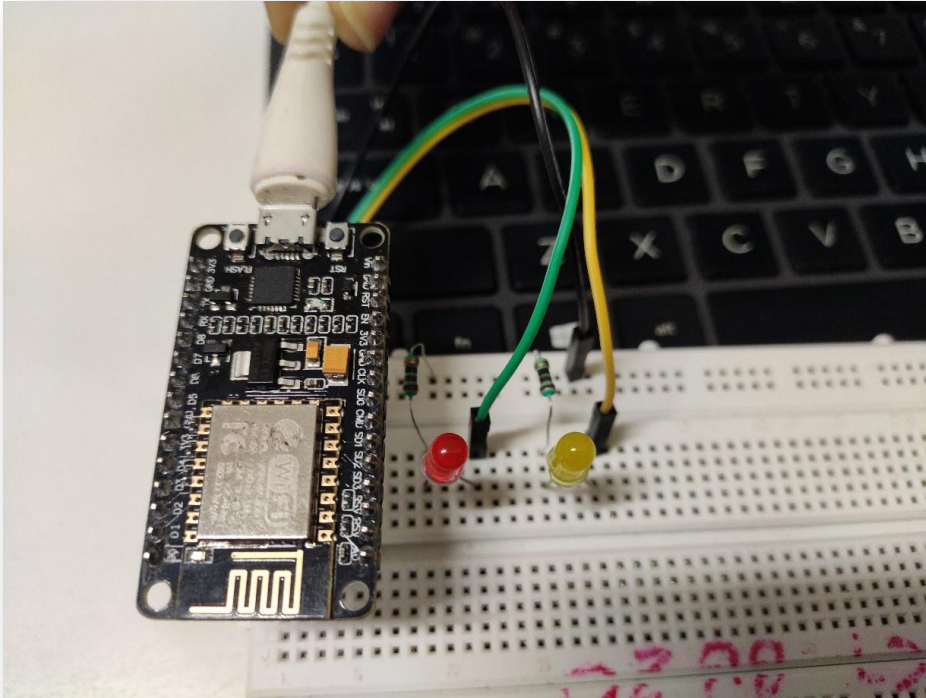
Pin Configuration of ESP8266

Schematic:



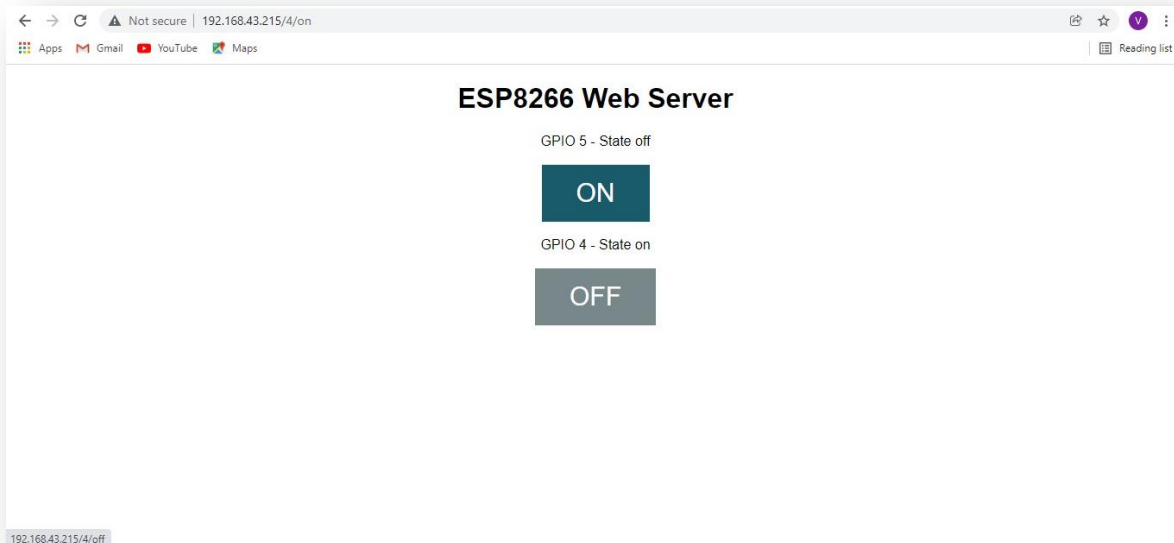
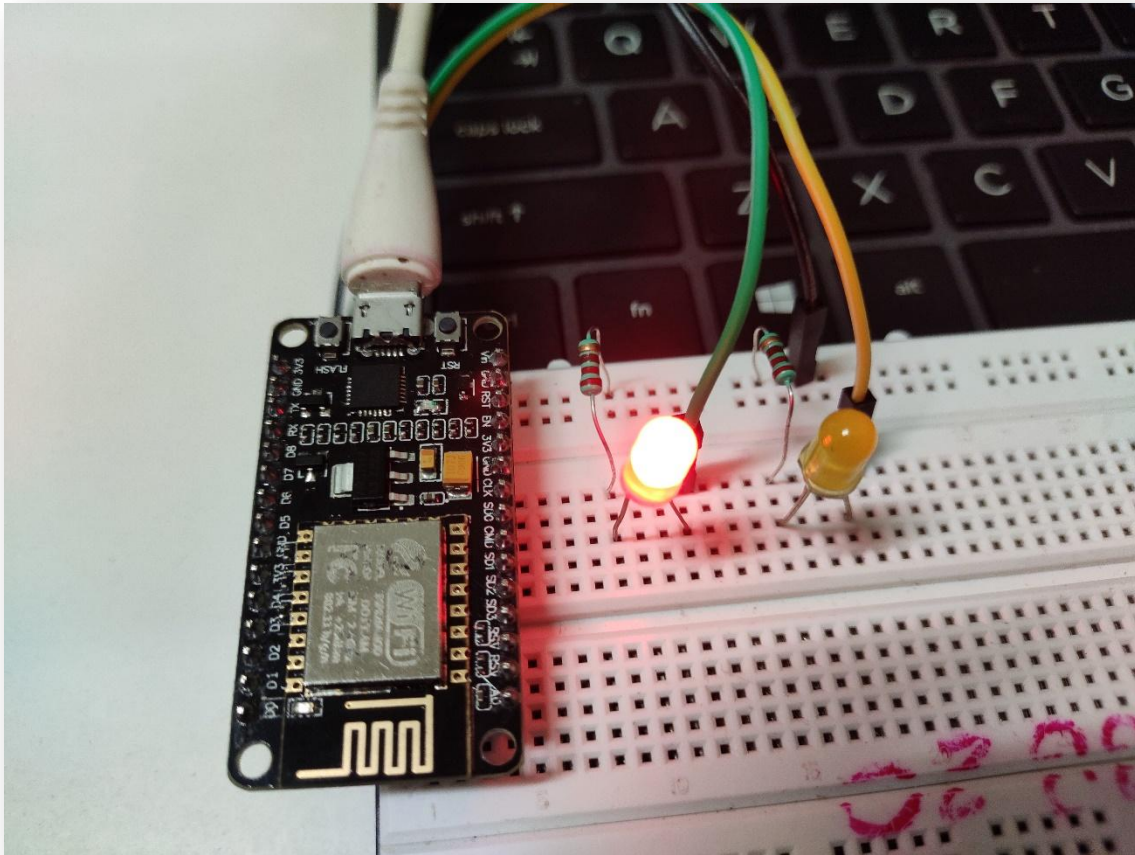


Output:

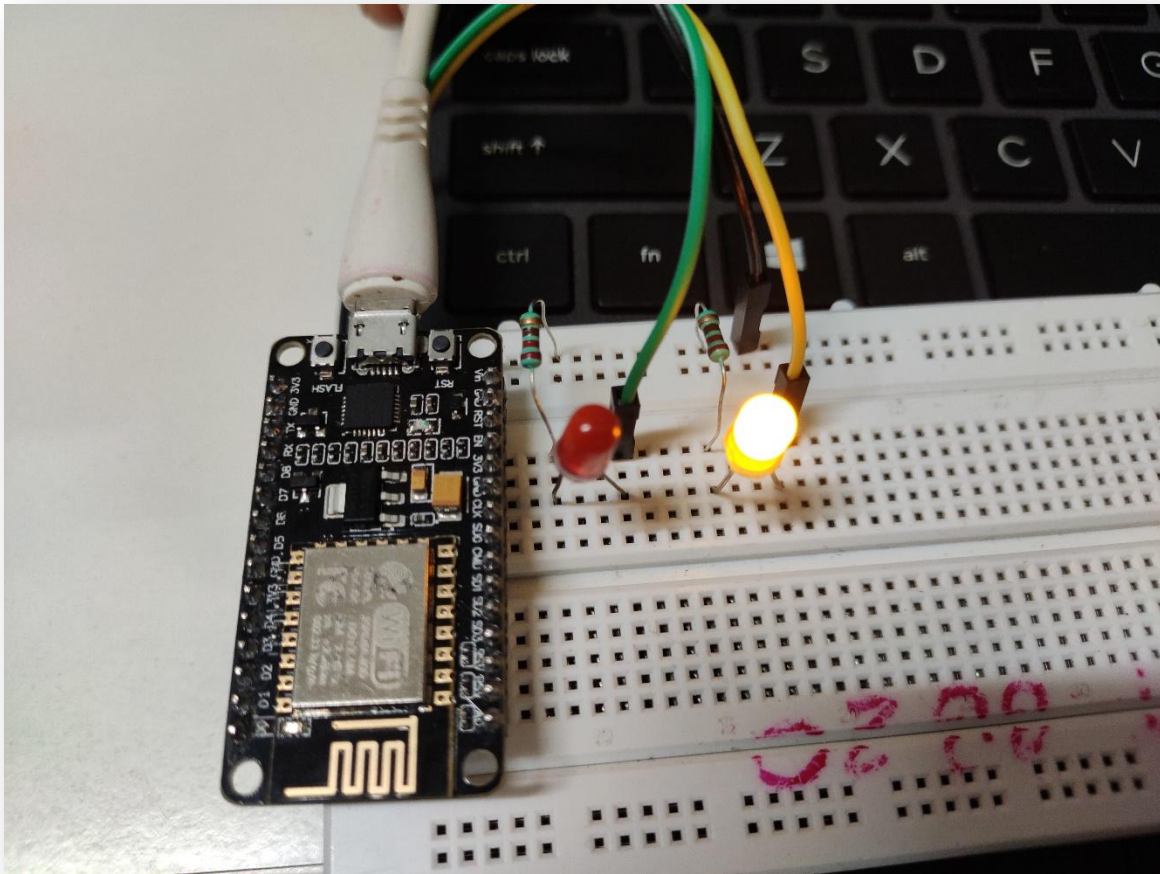




By pressing the on button the led connected to GPIO 5 will turn on,



By pressing the second button the led connected to GPIO 4 turn the second led on,



Code:

Download link for the code :

<https://docs.google.com/document/d/1XpmcbsSw42hXQ3JlbrPpDJH5EkXxkHd5p-C7I6OQwgs/edit?usp=sharing>.

Application:

The applications of the ESP8266 Wi-Fi module are

- Access points portals
- IoT projects
- Wireless data logging
- Used in learning the networking fundamentals
- Sockets and smart bulbs
- Smart home automation systems



Conclusion:

A wireless network allows devices to stay connected to the network but roam untethered to any wires. A wired network uses cables to connect devices, such as laptop or desktop computers, to the Internet or another network.

