**NodeMCU Smart Lamp project**

By Farnood Rashidzadeh

**Introduction**

In this project an RGB LED light is connected to a NodeMCU with an ESP-12 processor. The processor’s firmware is based on Lua Script: however, Arduino is used for programming the board in this project. The Lamps can be controlled through a webpage available in the network. This page is created and manipulated using the Arduino, and the NodeMCU Board.

A circuit board with wires connected to it

Description automatically generated

**The Board:**

The NodeMCU is an open-source board and an ESP82266 Wi-Fi chip, which makes it an excellent tool for this project. The specifications of the board can be found in the next sections.

**NodeMCU(ESP82266)** **Specifications:**

The materials used in this project, including the software and hardware, are described below.

**A diagram of a circuit board

Description automatically generated**

* Useful System Specifications:
  + Operating Voltage: 3.3V(3.0 ~ 3.6V) - Temperature:-40 - 85°C
  + CPU Tensilica L106: RAM 50KB(Available) - Flash: 8 Mbit
  + System: 802.11 b/g/n (Frequency range: 2.4 GHz ~ 2.5 GHz(2400 M ~ 2483.5M))
  + IntegratedTensilica L106 ultra-low power 32-bit micro MCU, with 16-bit RSIC. The CPU clock speed is 80MHz (maximum value of 160MHz).
  + WIFI 2.4 GHz (supports WPA/WPA2)
  + Supports UART、I2C、GPIO、PWM、SDIO、SPI、ADC、PWM、IR
  + Integrated 10-bit high-precision ADC
  + Supports TCP、UDP、HTTP、FTP
  + Integrated TR switch, balun, LNA, Power amplifier and matching network
  + Integrated PLL, Regulator and power source management components, +20 dBm output power in
  + 802.11b mode
  + Average working current 80mA, <Deep sleep current < 20uA, Power down leakage current < 5uA
  + The rich interface on the processor: SDIO 2.0, SPI, UARTl
  + Wake up, build the connection and transmit packets in < 2ms
  + Standby power consumption < 1.0mW (DTIM3)Support AT remote upgrades and cloud OTA upgrade support Station / SoftAP / SoftAP+Station operation modesUltra-Small 20.2mm \* 17.6mm \* 3.05mm
* MCU Pins (Hysiri, 2016):
  + IO[0,4,5,9,10,16] - GPIO[0,4,5,9,10,16] Respectively
  + IO2: GPIO2; UART1\_TXD
  + IO12: GPIO12; HSPI\_MIS0 MIDO; HSPICS; UART0\_RTS
  + IO13: GPIO13; HSPI\_MOSI; UART0\_RTS
  + IO14: GPIO14; HSPI\_CLK
  + EN: Enable (Chip enable pin, cannot be floating, Active High), GPIO14; HSPI\_CLK
  + IO15: GPIO15; MTDO; HSPICS; UART\_RTS
  + TXD: UART0\_TXD; transmit end in UART download, floating(internal pull-up) or pull-up; GPIO1
  + VCC: 3.3 V power supply (VDD) (recommended: power supply max current be 500mA or above); GPIO2
  + RXD: GPIO3 - UART0\_RXD, receive end in UART download; GPIO3
  + MOSI: MOSI | SCLK: CLK | GND: ground
  + RST: Reset module
  + TOUT: Tests the power supply voltage of VDD3P3 and the input power voltage of TOUT. These two functions cannot be used at the same time.
  + CS0: chip Selection | MISO: MISO