ESP

Why using ESP?

- To connect MCU to Internet.
- To connect to server.

IOT

- Send anything anytime anywhere.

what is ESP?

- Microcontroller: Wi-fi + UART (Buad-rate 115200) -> Node MCU =ESP32 + ESP12
- To talk we need AT commands:
- Putty \n: Enter \r: Ctrl+j
- All Comands sent as string "ASCII representation". 1883
- Type of connections:
  - TCP: The Data will be sure sent.
  - UDP: Fire and Forget.
  - SSH: TCP + Encryption

AT commands:

Command	Usage	Example	Re
AT	Test the module connectivity	AT\r\n	OI
ATE0	Close the echo	ATE0\r\n	OI
ATE1	open the Echo again	ATE1\r\n	OI
AT+RST	Reset the configuration	AT+RST\r\n	-

Command	Usage	Example	Re
AT+CWMODE=1	Configure The ESP as station	AT+CWMODE=1\r\n	OI
AT+CWJAP_CUR="Wi-Fi Name","Wi-Fi pass"	Connect to Wi-Fi	AT+CWJAP_CUR="ElYazeed","YmW11022#"\r\n	W Cc W IP
AT+CWQAP	Disconnect from wifi	AT+CWQAP\r\n	W DI
AT+CIPSTART="Mode","IP or DNS",PortNum	Connect to server	AT+CIPSTART="TCP","69.197.143.14",80\r\n	CC
AT+CIPSEND= # of data to be sent	Send Data to server	AT+CIPSEND=42\r\n	OI
Send Any Kind of Data to server	The Data to be sent to the server	GET http://badr.freevar.com/status.txt\r\n	RE By OI

- IPD,Num:Data
  - IPD,: refer to receive Data.
  - NUM: number of Data received.
  - Data : The Data Received.
- Synchronous and Asynchronous Functions:
  - Synchronous Function: Function start and never end until End its job.
  - Asynchronous Function: Initiate and notify after ending the job.
- Functions Needed:

```
/*USART*/
void USART_Init(void)
{
    BaudRate=115200;
    /*one stop Bit No parity check Asynchronous*/
}

void USART_SendChar(u8 Data)
{
```

```
    /*Send Data*/
}
void USART_SendString(u8* Data)
{
    u8 Counter
    while(Data[Counter]!='\0')
    {
        USART_SendChar(Data[Counter]);
    }
}

void USART_SendBuffer(u8* Data, u8* DataLength)
{
    for(u8 i=0; i<DataLength; i++)
    {
        USART_SendChar(Data[i]);
    }
}

u8 USART_ReceiveChar(void)
{
    /*Receive Dat*/
}
void USART_ReceiveBuffer(u8* Data, u8 DataLength)
{
    for(u8 i=0; i<DataLength; i++)
    {
        Data[i] = USART_ReceiveChar();
    }
}
```

```
/*ESP*/
void Esp_ConvertNumToStr(u16 Copy_Number, char* Copy_String)
{
    u8 Local_Length = 0;
    u8 Local_Counter=0;
    u16 Local_Rest=Copy_Number;
    while(Local_Rest !=0)
    {
        Local_Length++;
        Local_Rest/=10;
    }
    for(Local_Counter=0;Local_Counter<Local_Length;Local_Counter++)
    {
        Local_Rest=Copy_Number%10;
        Copy_Number/=10;
        Copy_String[Local_Length-Local_Counter-1]=Local_Rest+'0';
    }
```

```
    Copy_String[Local_Length]='\0';
}


void ESP_Init(void)
{
    /*Initialize USART*/
    USART_Init();
    /*Close The Echo*/
    USART_SendString("ATE0\r\n");
    _delay_ms(500);
    /*Set the mode as station*/
    USART_SendString("AT+CWMODE=1\r\n");
}

void ESP_ConnectWifi(u8* Username, u8* Password)
{
    /*Disconnect From any old wifi*/
    USART_SendString("AT+CWQAP\r\n);
    _delay_ms(500);
    /*AT+CWJAP_CUR="Wi-Fi Name","Wi-Fi pass"*/
    USART_SendString("AT+CWJAP_CUR=");
    USART_SendChar('"');
    USART_SendString(Username);
    USART_SendChar('"');
    USART_SendChar(',');
    USART_SendChar('"');
    USART_SendString(Password);
    USART_SendChar('"');
    USART_SendString("\r\n")
    _delay_ms(2000);
}

void ESP_ConnectServer(u8* Mode,u8* DNS, u8* PortNum)
{
    /*ESP_ConnectServer("TCP","Koko.com","100");*/
    USART_SendString("AT+CIPSTART=");
    USART_SendChar('"');
    USART_SendString(Mode);
    USART_SendChar('"');
    USART_SendChar(',');
    USART_SendChar('"');
    USART_SendString(DNS);
    USART_SendChar('"');
    USART_SendChar(',');
    USART_SendString(PortNum);
    USART_SendString("\r\n")
    _delay_ms(1000);
}
```

```
void ESP_SendData(u8* Data, u8 DataLen)
{
    u8 Datastr[4]={0};
    USART_SendString("AT+CIPSEND=");
    Esp_ConvertNumToStr((DataLen+2),Datastr);
    USART_SendString(Datastr);
    USART_SendString("\r\n");
    _delay_ms(250);
    USART_SendBuffer(Data,DataLen);
    USART_SendString("\r\n");
}
```

Mahmoud Badr Thanks ..