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古都土城仔綠電創能與智動養殖
之跨界整合永續淨零發展計畫

TDS Sensor水質硬度傳感器

序列埠視窗監控

目錄

TDS介紹

➢ TDS中文名「溶解性總固體值」

➢ 用於監測水的硬度(混濁度)，通常採用"PPM"(partaper million，百萬分之一)為單位，即以每一百萬克含有多少碳酸鈣之量來決定。

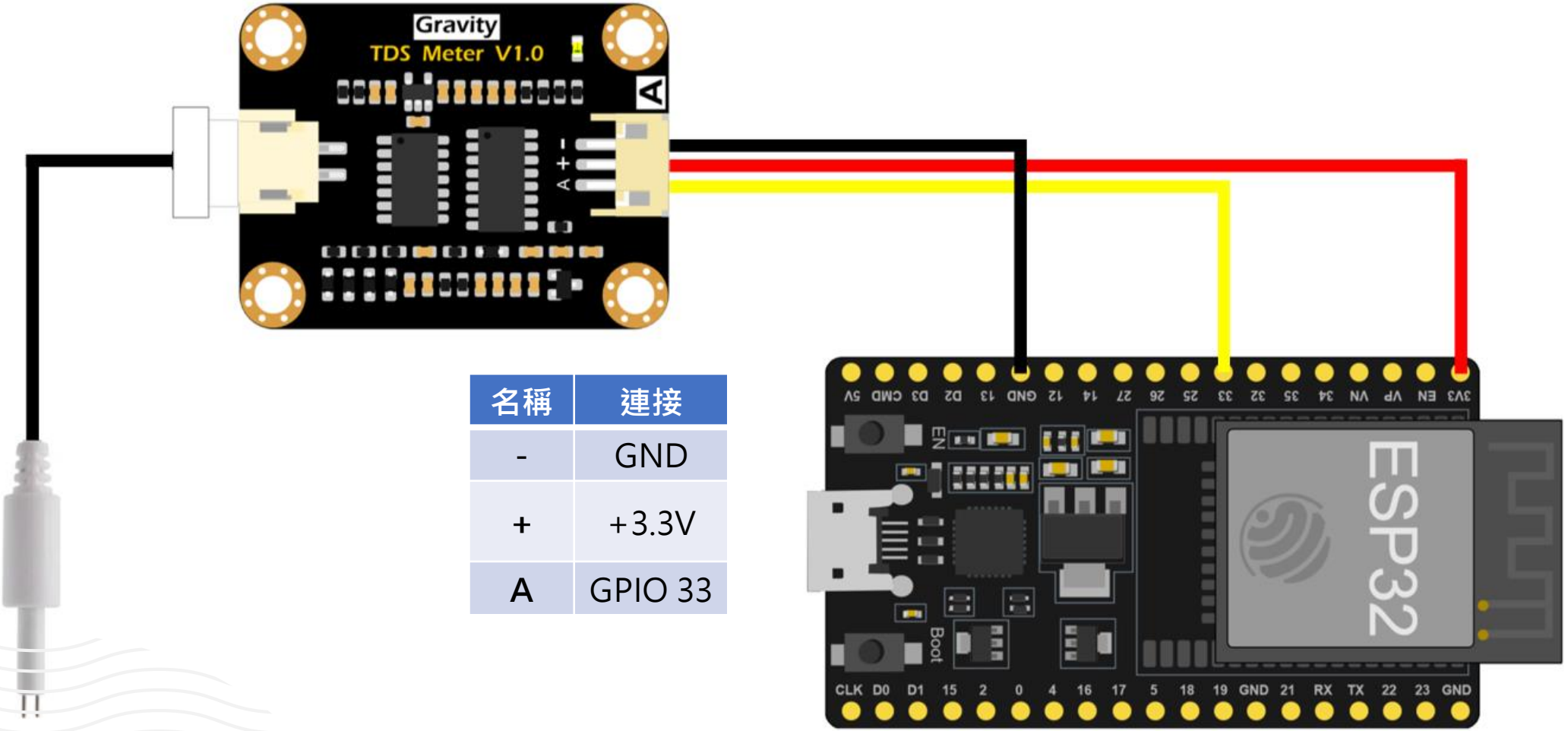
材料

ESP32

數據傳輸線 (MicroUSB)

TDS Meter及防水探頭

TDS感測器接線說明



名稱	連接
-	GND
+	+3.3V
A	GPIO 33

匯入程式

➢ 開啟「範例程式TDS Sensor.txt」

➢ 複製內容並貼上Arduino視窗中

程式撰寫步驟(1/3)

```
// Original source code: https://wiki.keyestudio.com/KS0429_keyestudio_TDS_Meter_V1.0#Test_Code
// Project details: https://RandomNerdTutorials.com/esp32-tds-water-quality-sensor/

#define TdsSensorPin 33      //TDS感測器接入腳位GPIO 33
#define VREF 3.3             // analog reference voltage(Volt) of the ADC
#define SCOUNT  30           // sum of sample point

int analogBuffer[SCOUNT];    // store the analog value in the array, read from ADC
int analogBufferTemp[SCOUNT];
int analogBufferIndex = 0;
int copyIndex = 0;

float averageVoltage = 0;
float tdsValue = 0;
float temperature = 25 ;      // 設定當前環境溫度 (計算PPM需使用溫度資訊)
```

根據當下氣溫 自行更改數字(溫度單位：攝氏)

程式撰寫步驟(2/3)

```
// median filtering algorithm
int getMedianNum(int bArray[], int iFilterLen){
  int bTab[iFilterLen];
  for (byte i = 0; i<iFilterLen; i++)
  bTab[i] = bArray[i];
  int i, j, bTemp;
  for (j = 0; j < iFilterLen - 1; j++) {
    for (i = 0; i < iFilterLen - j - 1; i++) {
      if (bTab[i] > bTab[i + 1]) {
        bTemp = bTab[i];
        bTab[i] = bTab[i + 1];
        bTab[i + 1] = bTemp;
      }
    }
  }
  if ((iFilterLen & 1) > 0){
    bTemp = bTab[(iFilterLen - 1) / 2];
  }
  else {
    bTemp = (bTab[iFilterLen / 2] + bTab[iFilterLen / 2 - 1]) / 2;
  }
  return bTemp;
}

void setup(){
  Serial.begin(115200);
  pinMode(TdsSensorPin,INPUT);
}
```

```
void loop(){
  static unsigned long analogSampleTimepoint = millis();
  if(millis()-analogSampleTimepoint > 40U){     //every 40 milliseconds,read the analog value from the ADC
    analogSampleTimepoint = millis();
    analogBuffer[analogBufferIndex] = analogRead(TdsSensorPin);    //read the analog value and store into the buffer
    analogBufferIndex++;
    if(analogBufferIndex == SCOUNT){
      analogBufferIndex = 0;
    }
  }

  static unsigned long printTimepoint = millis();
  if(millis()-printTimepoint > 800U){
    printTimepoint = millis();
    for(copyIndex=0; copyIndex<SCOUNT; copyIndex++){
      analogBufferTemp[copyIndex] = analogBuffer[copyIndex];

      // read the analog value more stable by the median filtering algorithm, and convert to voltage value
      averageVoltage = getMedianNum(analogBufferTemp,SCOUNT) * (float)VREF / 4096.0;

      //temperature compensation formula: fFinalResult(25^C) = fFinalResult(current)/(1.0+0.02*(fTP-25.0));
      float compensationCoefficient = 1.0+0.02*(temperature-25.0);
      //temperature compensation
      float compensationVoltage=averageVoltage/compensationCoefficient;

      //convert voltage value to tds value
      tdsValue=(133.42*compensationVoltage*compensationVoltage*compensationVoltage -
255.86*compensationVoltage*compensationVoltage + 857.39*compensationVoltage)*0.5;
```

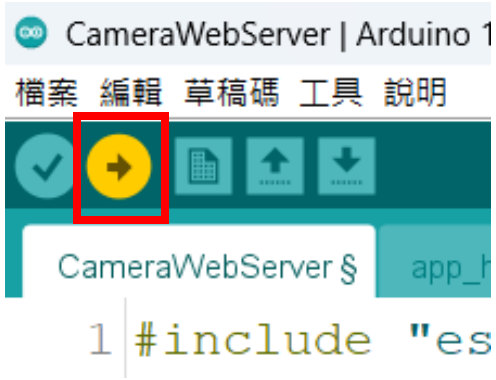
程式撰寫步驟(3/3)

```
    //Serial.print("voltage:");
     //Serial.print(averageVoltage,2);
     //Serial.print("V   ");
     Serial.print("TDS Value:");
     Serial.print(tdsValue,0);
     Serial.println("ppm");     //顯示PPM資訊
   }
  }
}
```

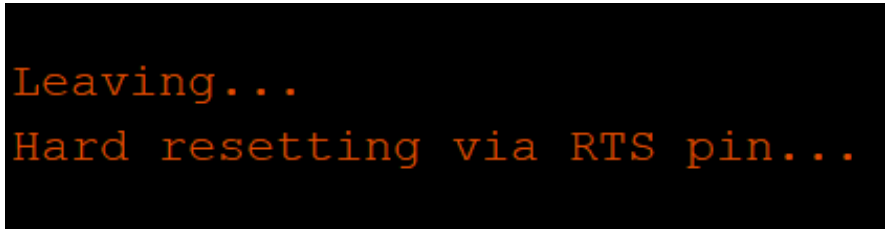
寫入程式步驟

➢ 1.確定工具欄位下的選項有正確選擇

➢ 2.確認後點擊上傳

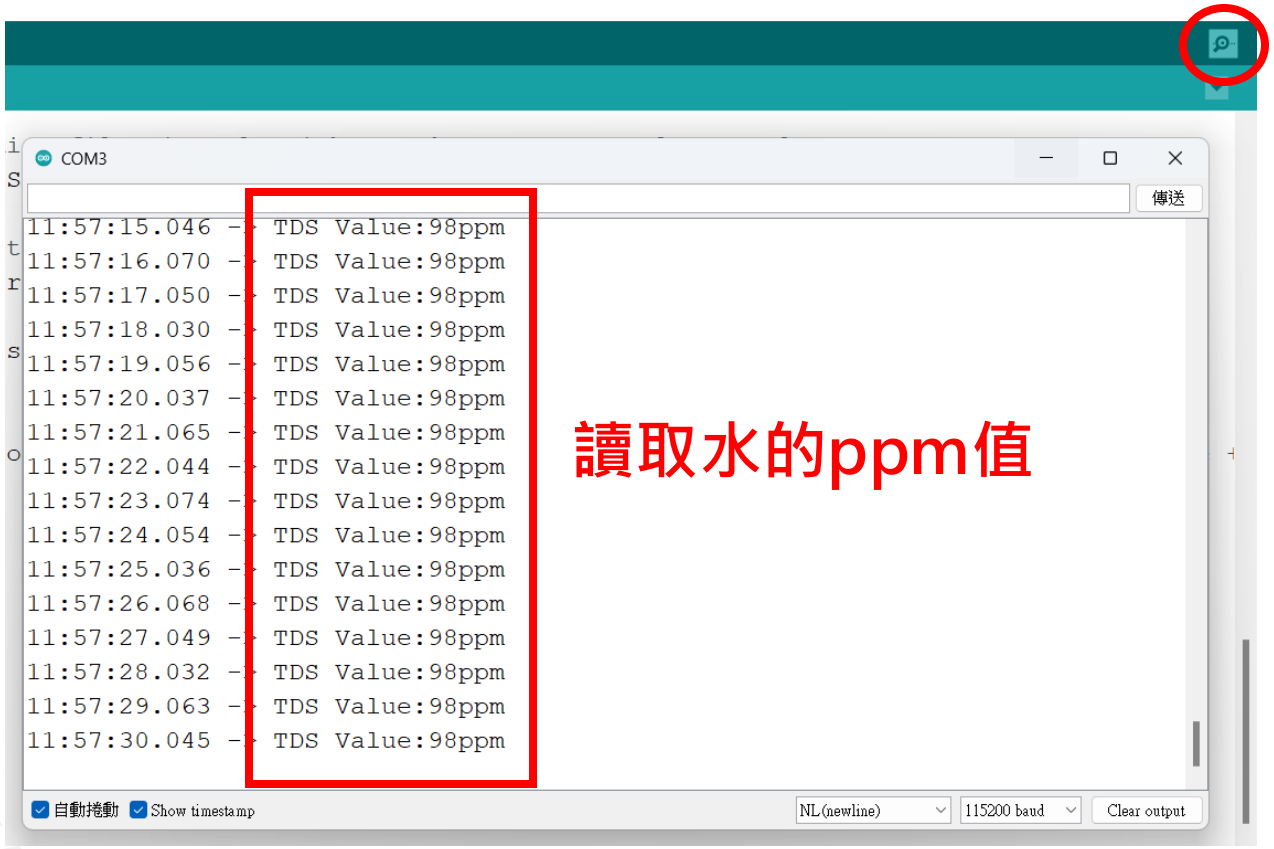


➢ 3.等待底下出現此字串即成功



查看資訊

➢ 寫入程式後，將TDS探頭放入水中，再開啟右上角序列埠監控視窗



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感謝聆聽
給予指導

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