

# App Inventor2 連接 開放資料庫JSON格式 空氣品質APP製作 進階功能

國立臺中教育大學 大學部人工智慧應用  
數位系三年級

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吳智鴻

教學網站：[HTTP://120.108.221.55/PROFCHWU/DCTEC](http://120.108.221.55/PROFCHWU/DCTEC)

FB社團： 10X 數位系人工智慧

APP INVENTOR PROJECT: AIRQUALITY



# 兩個重要的空氣品質監控網站

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# 1. 空氣品質監測網

<https://taqm.epa.gov.tw/taqm/tw/default.aspx>

行政院環境保護署  
Environmental Protection Administration  
Executive Yuan, R.O.C. (Taiwan)

## 空氣品質監測網

環保署提醒竹山、高屏及屏東(琉球)地區橘色提醒(對敏感族群不健康)。

環保署 \ 空氣品質監測網 \ 空氣品質指標

環 保 署   地方環保局   大型事業   特殊性工業區   全國即時監測   全國交通空氣品質監測

空氣品質指標   空氣品質指標(GIS)   空氣品質預報   前一日空氣品質指標   細懸浮微粒濃度

健康影響與活動建議

發布時間：2017/12/13 10:00   請點擊左方測站位置或  
空氣品質指標(AQI)   所屬單位：

地區： >   

發布時間：2017-12-13 10:00:00

### 基隆 (一般站)

**AQI 37**  
空氣品質指標 良好

O <sub>3</sub> (ppb)	8小時 移動平均	40
臭氧	小時 濃度	39
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	移動 平均	5
細懸浮微粒	小時 濃度	5
PM <sub>10</sub> (µg/m <sup>3</sup> )	移動 平均	12
懸浮微粒	小時 濃度	11

歷年監測資料  
測站地圖資訊



# 重要的空氣品質指標與判斷標準

污染物	O <sub>3</sub> , 8hr	O <sub>3</sub> <sup>(1)</sup>	PM <sub>2.5</sub>	PM <sub>10</sub>	CO	SO <sub>2</sub>	NO <sub>2</sub>
即時統計	最近連續 8小時移動 平均值	即時 濃度值	0.5 ×前12小時平均 + 0.5 × 前4小時平均	0.5 ×前12小時平均 + 0.5 × 前4小時平均	最近連續 8小時移動 平均值	即時 濃度值	即時 濃度值
單位	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ppm	ppb	ppb
AQI 值							
0~50	0.000 - 0.054	-	0.0 - 15.4	0 - 54	0 - 4.4	0 - 35	0 - 53
51~100	0.055 - 0.070	-	15.5 - 35.4	55 - 125	4.5 - 9.4	36 - 75	54 - 100
101~150	0.071 - 0.085	0.125 - 0.164	35.5 - 54.4	126 - 254	9.5 - 12.4	76 - 185	101 - 360
151~200	0.086 - 0.105	0.165 - 0.204	54.5 - 150.4	255 - 354	12.5 - 15.4	186 - 304 <sup>(3)</sup>	361 - 649
201~300	0.106 - 0.200	0.205 - 0.404	150.5 - 250.4	355 - 424	15.5 - 30.4	305 - 604 <sup>(3)</sup>	650 - 1249
301~400	<sup>(2)</sup>	0.405 - 0.504	250.5 - 350.4	425 - 504	30.5 - 40.4	605 - 804 <sup>(3)</sup>	1250 - 1649
401~500	<sup>(2)</sup>	0.505 - 0.604	350.5 - 500.4	505 - 604	40.5 - 50.4	805 - 1004 <sup>(3)</sup>	1650 - 2049

資料來源：<https://taqm.epa.gov.tw/taqm/tw/b0203.aspx>

# 2. 空氣品質open data

OpenData.epa  
行政院環境保護署·環境資源資料開放平臺

資料集目錄 / 資料查詢

空氣品質指標(AQI)

請增加過濾條件

請選擇要過濾的項目

請選擇要過濾的方式

輸入過濾條件 加篩選條件

顯示查詢結果

關於資料集 資料檢視

應用程式存取網址 `https://opendata.epa.gov.tw/webapi/api/rest/datastore/355000000I-000:`

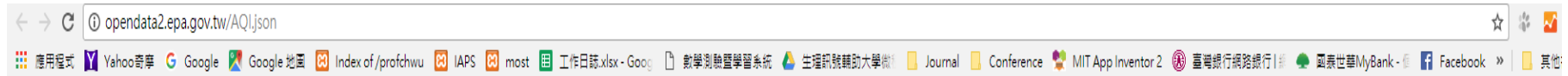
顯示欄位設定 網頁嵌入 使用範例

JSON XML CSV

AQI	CO	CO_8hr	County
37	0.17	0.2	基隆市
41	0.21	0.2	新北市
44	0.13	0.1	新北市
30	0.41	0.3	新北市
31	0.36	0.3	新北市
31	0.4	0.3	新北市
32	0.35	0.3	新北市
31	0.37	0.3	新北市
31	0.29	0.2	新北市

<https://opendata.epa.gov.tw/Data/Contents/AQI/>

# 程式存取網址 (JSON格式) : <http://opendata2.epa.gov.tw/AQI.json>



```
[{"AQI": "37", "CO": "0.17", "CO_8hr": "0.2", "County": "基隆市", "NO": "0.4", "NO2": "3.6", "NOx": "4", "O3": "40", "O3_8hr": "40", "PM10": "13", "PM10_AVG": "12", "PM2.5": "5", "PM2.5_AVG": "5", "Pollutant": "", "PublishTime": "2017-12-13 11:00", "SiteName": "基隆", "SO2": "0.4", "Status": "良好", "WindDirec": "74", "WindSpeed": "2.8"}, {"AQI": "41", "CO": "0.2", "CO_8hr": "0.2", "County": "新北市", "NO": "3.4", "NO2": "11", "NOx": "15", "O3": "36", "O3_8hr": "36", "PM10": "13", "PM10_AVG": "11", "PM2.5": "12", "PM2.5_AVG": "13", "Pollutant": "", "PublishTime": "2017-12-13 11:00", "SiteName": "汐止", "SO2": "1", "Status": "良好", "WindDirec": "30", "WindSpeed": "3.4"}, {"AQI": "44", "CO": "0.14", "CO_8hr": "0.1", "County": "新北市", "NO": "0.7", "NO2": "1.2", "NOx": "1.9", "O3": "47", "O3_8hr": "47", "PM10": "24", "PM10_AVG": "24", "PM2.5": "8", "PM2.5_AVG": "10", "Pollutant": "", "PublishTime": "2017-12-13 11:00", "SiteName": "萬里", "SO2": "1.5", "Status": "良好", "WindDirec": "51", "WindSpeed": "12"}, 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```

# 用JSON線上編輯網站瀏覽一下資料

The screenshot shows the JSON Editor Online interface. The main editor displays a large JSON array of air quality data for various locations in Taiwan. The data includes fields such as AQI, CO, CO\_8hr, County, NO, NO2, NOx, O3, O3\_8hr, PM10, PM10\_AVG, PM2.5, PM2.5\_AVG, Pollutant, PublishTime, SiteName, SO2, Status, and WindSpeed. The right-hand pane shows a tree view of the JSON structure, highlighting the current selection. The top navigation bar includes options like New, Open, Save, Settings, and Help. The browser's address bar shows the URL [jsoneditoronline.org](http://jsoneditoronline.org).

```
array [ 77 ]
  0 {20}
  1 {20}
  2 {20}
  3 {20}
  4 {20}
  5 {20}
  6 {20}
  7 {20}
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  9 {20}
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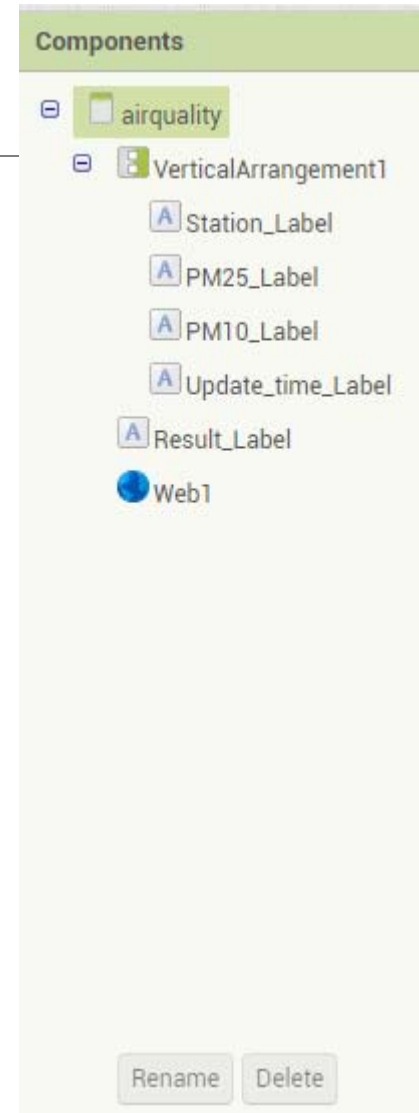
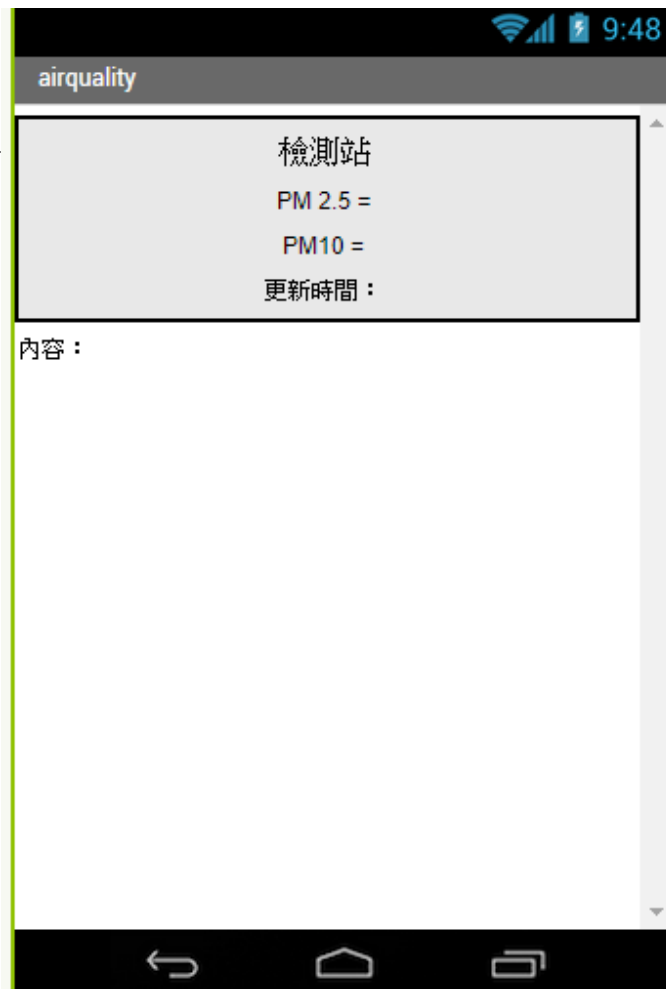
# 先以臺中市的空氣品質 試做雛形

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# 螢幕設計



Non-visible components

Web1

# 程式

---

```
initialize global airquality to create empty list

when airquality .Initialize
do
  set Web1 . Url to "http://opendata2.epa.gov.tw/AQI.json"
  call Web1 .Get

when Web1 .GotText
  url responseCode responseType responseContent
do
  set global airquality to call Web1 .JsonTextDecode
  jsonText get responseContent
  set Result_Label . Text to get global airquality
```



# 執行結果

先確認能否抓到資料，  
再做下一步的資料解析。

右方顯示已經能抓到資料了。

airquality

檢測站

PM 2.5 =

PM10 =

更新時間：

((AQI 37) (CO 0.17) (CO\_8hr 0.2) (County 基隆市) (NO 0.4) (NO2 3.6) (NOx 4) (O3 40) (O3\_8hr 40) (PM10 13) (PM10\_AVG 12) (PM2.5 5) (PM2.5\_AVG 5) (Pollutant ) (PublishTime 2017-12-13 11:00) (SO2 0.4) (SiteName 基隆) (Status 良好) (WindDirec 74) (WindSpeed 2.8)) ((AQI 41) (CO 0.2) (CO\_8hr 0.2) (County 新北市) (NO 3.4) (NO2 11) (NOx 15) (O3 36) (O3\_8hr 36) (PM10 13) (PM10\_AVG 11) (PM2.5 12) (PM2.5\_AVG 13) (Pollutant ) (PublishTime 2017-12-13 11:00) (SO2 1) (SiteName 汐止) (Status 良好) (WindDirec 30) (WindSpeed 3.4)) ((AQI 44) (CO 0.14) (CO\_8hr 0.1) (County 新北市) (NO 0.7) (NO2 1.2) (NOx 1.9) (O3 47) (O3\_8hr 47) (PM10 24) (PM10\_AVG 24) (PM2.5 8) (PM2.5\_AVG 10) (Pollutant ) (PublishTime 2017-12-13 11:00) (SO2 1.5) (SiteName 萬里) (Status 良好) (WindDirec 51) (WindSpeed 12)) ((AQI 30) (CO 0.33) (CO\_8hr 0.3) (County 新北市) (NO 4.3) (NO2 16) (NOx 20) (O3 29) (O3\_8hr 31) (PM10 11) (PM10\_AVG 10) (PM2.5 12) (PM2.5\_AVG 9) (Pollutant )

## 資料結構長這樣

```
array ▶ 0 ▶
├── array [77]
│   ├── 0 {20}
│   │   ├── AQI : 37
│   │   ├── CO : 0.17
│   │   ├── CO_8hr : 0.2
│   │   ├── County : 基隆市
│   │   ├── NO : 0.4
│   │   ├── NO2 : 3.6
│   │   ├── NOx : 4
│   │   ├── O3 : 40
│   │   ├── O3_8hr : 40
│   │   ├── PM10 : 13
│   │   ├── PM10_AVG : 12
│   │   ├── PM2.5 : 5
│   │   ├── PM2.5_AVG : 5
│   │   ├── Pollutant : value
│   │   ├── PublishTime : 2017-12-13 11:00
│   │   ├── SiteName : 基隆
│   │   ├── SO2 : 0.4
│   │   ├── Status : 良好
│   │   ├── WindDirec : 74
│   │   └── WindSpeed : 2.8
│   └── 1 {20}
```

# 確認一下資料抓取是否正確

## 程式

```
initialize global airquality to create empty list
initialize global Air_Record to create empty list
initialize global Air_field to create empty list

when airquality .Initialize
do
  set Web1 .Url to "http://opendata2.epa.gov.tw/AQI.json"
  call Web1 .Get

when Web1 .GotText
  url responseCode responseType responseContent
do
  set global airquality to call Web1 .JsonTextDecode
  jsonText get responseContent
  for each item in list get global airquality
  do
    set global Air_Record to select list item list get global airquality
    index get global number
    set global number to get global number + 1
  set Result_Label .Text to get global Air_Record
```

## 最後一筆資料

```
airquality
  檢測站
  PM 2.5 =
  PM10 =
  更新時間：
  ((AQI) (CO) (CO_8hr) (County 新北市)
  (NO) (NO2) (NOx) (O3) (O3_8hr) (PM10)
  (PM10_AVG 34) (PM2.5) (PM2.5_AVG 12)
  (Pollutant) (PublishTime 2017-12-13 11:00)
  (SO2) (SiteName 富貴角) (Status 設備維護)
  (WindDirec) (WindSpeed))
```

# 比對程式執行結果與原始資料是否一致？ (設定抓到最後一筆)

## 程式執行結果

```
airquality
    檢測站
    PM 2.5 =
    PM10 =
    更新時間：
((AQI ) (CO ) (CO_8hr ) (County 新北市)
(NO ) (NO2 ) (NOx ) (O3 ) (O3_8hr ) (PM10 )
(PM10_AVG 34) (PM2.5 ) (PM2.5_AVG 12)
(Pollutant ) (PublishTime 2017-12-13 11:00)
(SO2 ) (SiteName 富貴角) (Status 設備維護)
(WindDirec ) (WindSpeed ))
```

## 原始資料

```
▼ 76 {20}
AQI : {value}
CO : {value}
CO_8hr : {value}
County : 新北市
NO : {value}
NO2 : {value}
NOx : {value}
O3 : {value}
O3_8hr : {value}
PM10 : {value}
PM10_AVG : 34
PM2.5 : {value}
PM2.5_AVG : 12
Pollutant : {value}
PublishTime : 2017-12-13 11:00
SiteName : 富貴角
SO2 : {value}
Status : 設備維護
WindDirec : {value}
WindSpeed : {value}
```

現在以臺中市 忠明觀測站  
為範例

---



# 程式裡面的資料

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
AQI	CO	CO_8hr	County	NO	NO2	Nox	O3	O3_8hr	PM10	PM10_AVG	PM2.5	PM2.5_AVG	Pollutant	PublishTime	SiteName	SO2	Status	WinDirect	WinSpeed
43	0.32	0.5	臺中市	12	17	29	19	7	26	22	9	13		2017/12/13	忠明	2.6	良好	336	1.9

有顏色的欄位是我們  
想要抓的資訊



## 原始資料資料

```
▼ 30 {20}
AQI : 43
CO : 0.32
CO_8hr : 0.5
County : 臺中市
NO : 12
NO2 : 17
NOx : 29
O3 : 19
O3_8hr : 7
PM10 : 26
PM10_AVG : 22
PM2.5 : 9
PM2.5_AVG : 13
Pollutant : value
PublishTime : 2017-12-13 11:00
SiteName : 忠明
SO2 : 2.6
Status : 良好
WindDirec : 336
WindSpeed : 1.9
```

要訣：要把原始資料轉成程式裡面我們熟悉的陣列格式

- initialize global AQI to create empty list
- initialize global County to create empty list
- initialize global PM25 to create empty list
- initialize global PM10 to create empty list
- initialize global Publish\_time to create empty list
- initialize global Station to create empty list
- initialize global Status to create empty list

新增這些清單  
來儲存  
重要的資訊



# 執行結果

```
when Web1 . GotText
  url responseCode responseType responseContent
do
  set global airquality to call Web1 . JsonTextDecode
  jsonText get responseContent
  for each item in list get global airquality
  do
    set global Air_Record to select list item list get global airquality
    index get global number
    set global AQI to select list item list get global Air_Record
    index 1
    set global County to select list item list get global Air_Record
    index 4
    set global PM10 to select list item list get global Air_Record
    index 10
    set global PM25 to select list item list get global Air_Record
    index 12
    set global Publish_time to select list item list get global Air_Record
    index 15
    set global Station to select list item list get global Air_Record
    index 17
    if select list item list get global County = get global County_name
    index 2
    then set Station_Label . Text to select list item list get global Station
    index 2
    set global number to get global number + 1
  set Result_Label . Text to get global Air_Record
```

initialize global County\_name to 臺中市

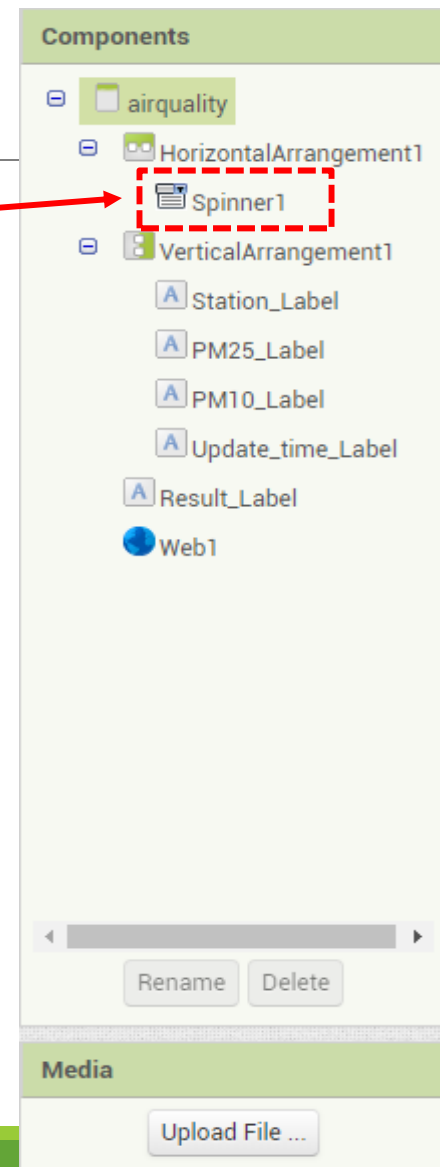
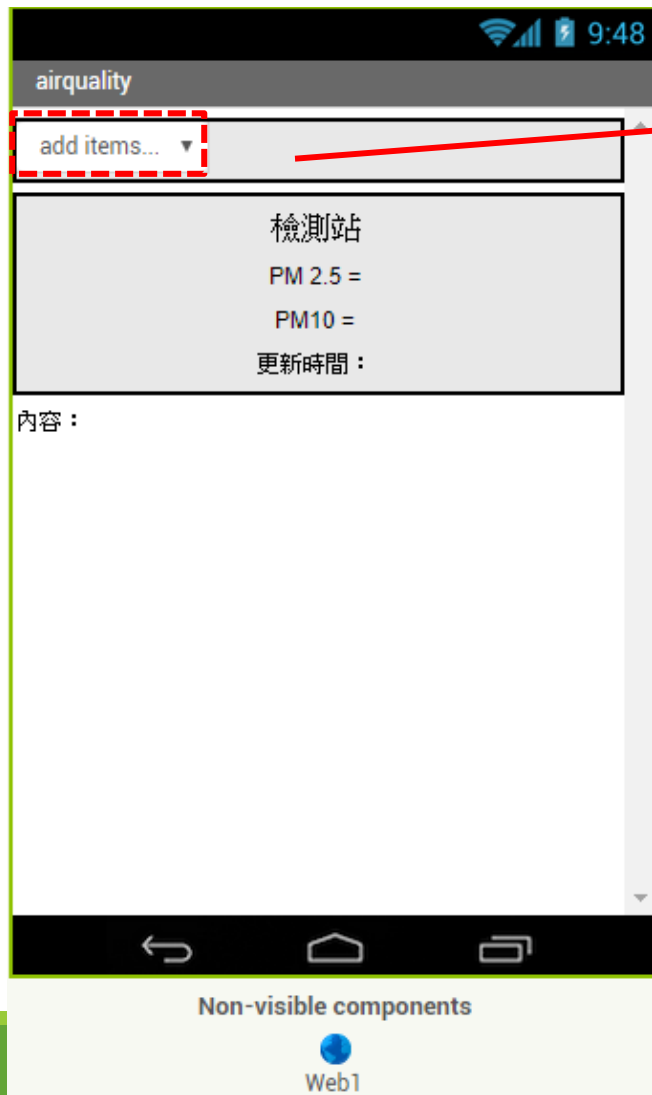


# 加上選擇縣市功能

---



# 螢幕設計： 加上Spinner



# 加上SPINNER選擇城市

initialize global County\_name to "臺中市"

initialize global county\_selection to make a list "新北市"  
"臺中市"

when Spinner1 .AfterSelecting  
selection  
do set global County\_name to get selection  
call Web1 .Get

用清單來建立  
城市的選項

當使用者選擇選  
項後，把選擇的  
城市存入變數

# 可以選縣市

```
when Web1 .GotText
do
  set global airquality to call Web1 .JsonTextDecode
  jsonText get responseContent
  for each item in list get global airquality
  do
    set global Air_Record to select list item list get global airquality
    index get global number
    set global AQI to select list item list get global Air_Record
    index 1
    set global County to select list item list get global Air_Record
    index 4
    set global PM10 to select list item list get global Air_Record
    index 10
    set global PM25 to select list item list get global Air_Record
    index 12
    set global Publish_time to select list item list get global Air_Record
    index 15
    set global Station to select list item list get global Air_Record
    index 17
    if select list item list get global County = get global County_name
    index 2
    then
      set Station_Label .Text to join select list item list get global Station
      index 2
      " 觀測站 "
      set PM25_Label .Text to join " PM 2.5 = "
      select list item list get global PM25
      index 2
      set PM10_Label .Text to join " PM 10 = "
      select list item list get global PM10
      index 2
      set Update_time_Label .Text to join " 更新時間: "
      select list item list get global Publish_time
      index 2
      set Result_Label .Text to get global Air_Record
      set global number to get global number + 1
```

```
initialize global County_name to " 臺中市 "
```

```
initialize global county_selection to make a list " 新北市 "
" 臺中市 "
```

```
when Spinner1 .AfterSelecting
selection
do
  set global County_name to get selection
  call Web1 .Get
```

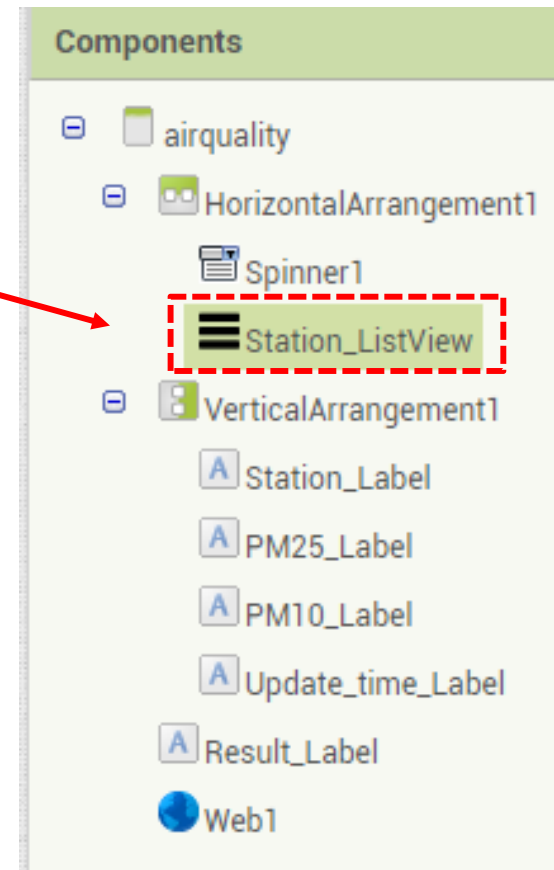
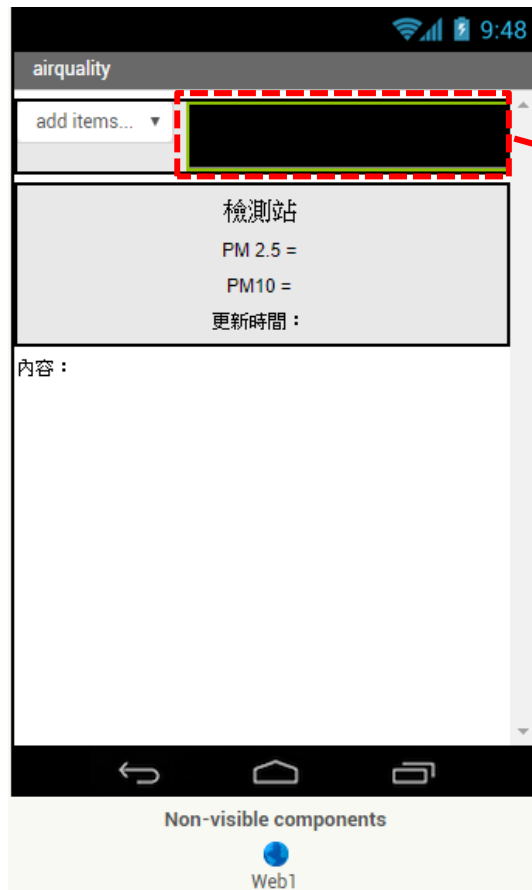


進階功能  
想要能夠從資料庫自動抓取  
所有觀測站，不要寫死在程  
式中。

---



# 螢幕設計 新增ListView (也可以用Spinner或ListPicker)



# 修改原先的WEBGET程式

---

## 想法

1. 第一次讀入WEBGET的JSON資料時，就把所有要抓的資料，分別存入不同陣列，方便之後顯示與讀取。  
例如城市->(County)、觀測站->(Station)、PM25->(PM25)等
2. 城市選單Spinner採用程式內建的程式，而不是用程式自動判斷，因為城市名稱為固定，且不多。若用程式撈取JSON開放資料在來自動寫入，城市名稱會有重複的問題，比較不好處理。
3. 使用者選好城市之後，再從JSON開放資料中，自動抓取該城市對應的觀測站至ListView中，讓使用者選擇。這樣就不用在程式中內建觀測站，可以隨著資料有更新觀測站自動更新。



# 程式#1 定義變數

initialize global airquality to create empty list

initialize global number to 1

initialize global Air\_Record to create empty list

initialize global Air\_field to create empty list

```
when airquality.Initialize
do
  set Spinner1.Elements to get global county_selection
  set Station_ListView.Selection to false
  set Web1.Url to "http://opendata2.epa.gov.tw/AQI.json"
  call Web1.Get
```

initialize global County\_name to "臺中市"

```
when Spinner1.AfterSelecting
  selection
do
  set global County_name to get selection
  call addStation_Selection
    County get global County_name
```

initialize global AQI to create empty list

initialize global County to create empty list

initialize global PM25 to create empty list

initialize global PM10 to create empty list

initialize global Publish\_time to create empty list

initialize global Station to create empty list

initialize global Status to create empty list

initialize global county\_selection to make a list

- "基隆市"
- "新北市"
- "臺北市"
- "臺中市"

initialize global station\_selection to create empty list

# 程式#2 定義變數 (修改原先WebGet)

```
when Web1 .GotText
  url responseCode responseType responseContent
do
  set global airquality to call Web1 .JsonTextDecode
  jsonText get responseContent
  for each item in list get global airquality
  do
    set global Air_Record to select list item list get global airquality
    index get global number
    add items to list list get global AQI
    item select list item list get global Air_Record
    index 1
    add items to list list get global County
    item select list item list get global Air_Record
    index 4
    add items to list list get global PM10
    item select list item list get global Air_Record
    index 10
    add items to list list get global PM25
    item select list item list get global Air_Record
    index 12
    add items to list list get global Publish_time
    item select list item list get global Air_Record
    index 15
    add items to list list get global Station
    item select list item list get global Air_Record
    index 17
    add items to list list get global Status
    item select list item list get global Air_Record
    index 19
  set global number to get global number + 1
```

用清單來把所有  
要的資料分別存  
入對應的清單中

# 程式#3 自動抓取觀測站，並存入ListView

```
to addStation_Selection County
do
  set global number to 1
  set global station_selection to create empty list
  for each item in list get global County
  do
    if
      select list item list index get global County = get global County_name
      then
        add items to list list get global station_selection
        item select list item list index get global Station
        index get global number
      set global number to get global number + 1
  set Station_ListView.Elements to get global station_selection
  set Station_ListView.Visible to true
```

```
when Station_ListView.AfterPicking
do
  set Station_ListView.Visible to false
  call show_info station_input Station_ListView.Selection
```

# 程式#4 修改顯示資訊部分

1. 把它變成副程式。 2. 呼叫時傳送參數（觀測站名稱）

呼叫時須傳入  
觀測站名稱

判斷觀測站  
名稱

```
to show_info station_input
do
  set global number to 1
  for each item in list get global Station
  do
    if
      select list item list index
      select list item list index
      get global Station = get station_input
      get global number
    then
      set Station_Label . Text to
        join
          select list item list index
          " 觀測站 "
          select list item list index
          get global PM25
          index 2
        set PM25_Label . Text to
          join
            " PM 2.5 = "
            select list item list index
            get global PM25
            index 2
          set PM10_Label . Text to
            join
              " PM 10 = "
              select list item list index
              get global PM10
              index 2
            set Update_time_Label . Text to
              join
                " 更新時間: "
                select list item list index
                get global Publish_time
                index 2
              set Result_Label . Text to
                get global Air_Record
            set global number to
              get global number + 1
```

# 美化畫面 當把程式功能測試完成後， 就可以把畫面美化了。

---

要訣：要先把雛形 & 功能作出來，不要考慮畫面美觀。

確認程式功能與資訊都正常後，就可以加上畫面。



# 螢幕設計



Non-visible components



### Components

- airquality
  - HorizontalArrangement1
    - Spinner1
    - Station\_ListView
  - VerticalArrangement1
    - Station\_Label
    - Status\_Button
  - HorizontalArrangement1
    - PM25\_color\_Button
    - PM10\_color\_Button
  - HorizontalArrangement1
    - PM25\_Button
    - PM10\_Button
  - Update\_time\_Label
  - Result\_Label
  - Web1

Rename Delete

### Properties

Status\_Button

- BackgroundColor
  - Default
- Enabled
  -
- FontBold
  -
- FontItalic
  -
- FontSize
  - 60
- FontTypeface
  - default
- Height
  - 150 pixels...
- Width
  - 150 pixels...
- Image
  - None...
- Shape
  - oval
- ShowFeedback
  -
- Text
  - Air
- TextAlignment
  - center : 1
- TextColor
  - Default
- Visible
  -

# 顯示資訊的程式

```
to show_info station_input
do
  set global number to 1
  for each item in list get global Station
  do
    if
      select list item list select list item list get global Station = get station_input
      index get global number
    then
      set Station_Label . Text to join
        select list item list select list item list get global Station
        index get global number
        " 觀測站 "
      set Status_Button . Text to
        select list item list select list item list get global Status
        index get global number
      if
        Status_Button . Text = " 良好 "
      then
        set Status_Button . BackgroundColor to #00FF00
      set PM25_Button . Text to
        select list item list select list item list get global PM25
        index get global number
      set PM10_Button . Text to
        select list item list select list item list get global PM10
        index get global number
      set Update_time_Label . Text to
        join " 更新時間: "
        select list item list select list item list get global Publish_time
        index get global number
    set global number to get global number + 1
```

# 執行結果

---

