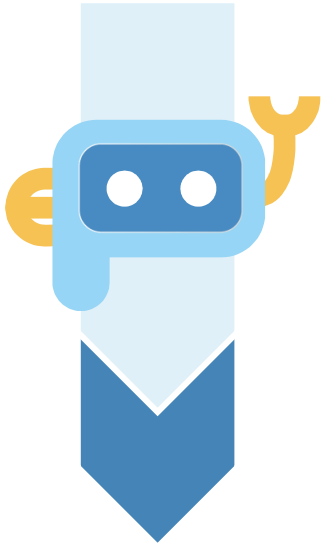
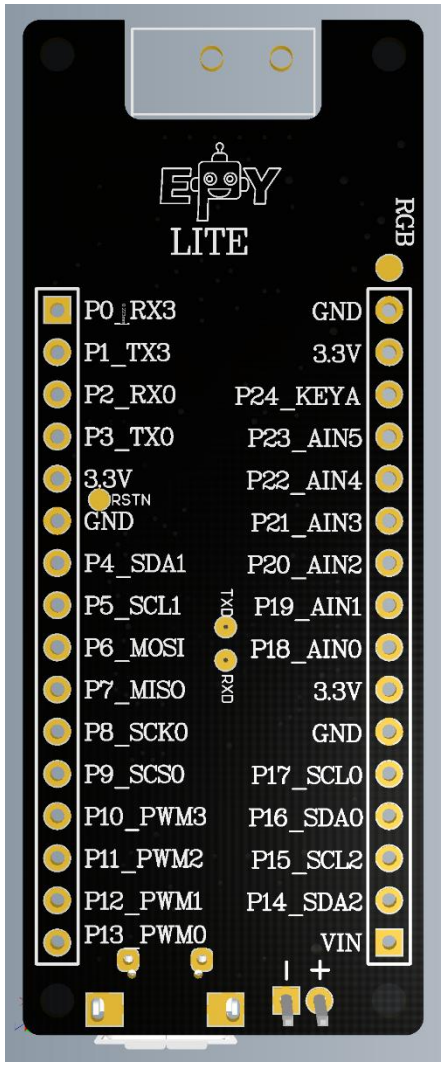
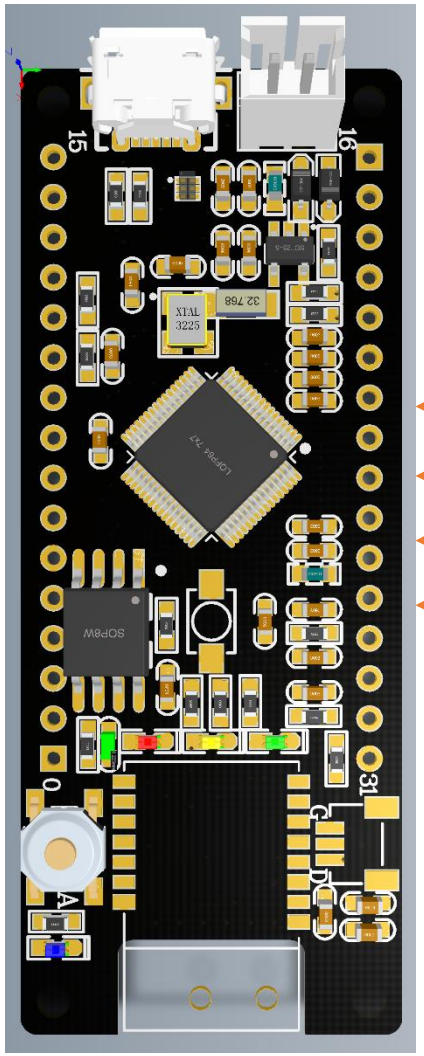


App Inventor2 BLE 資料接收

傳遞 ePy Lite ADC 資料

ePy Lite 裝置硬體配置



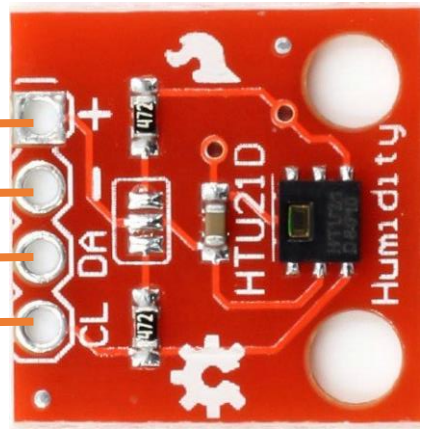


3.3V

GND

P16_SDA0

P17_SCL0



HTU21D

溫濕度感應

HTU21D 規格

TEMPERATURE

Characteristics		Symbol	Min	Typ	Max	Unit
Resolution	14 bit			0.01		°C
	12 bit			0.04		°C
Temperature Operating Range		T	-40		+125	°C
Temperature Accuracy @25°C	typ			±0.3		°C
	max			See graph 2		°C
Replacement				fully interchangeable		
Measuring time (1)	14 bit			44	50	ms
	13 bit			22	25	ms
				11	13	ms
				6	7	ms
					±25	LSB
				0.04		°C/yr
				10		s

RELATIVE HUMIDITY

(@T = 25°C, @Vdd = 3V)

Characteristics		Symbol	Min	Typ	Max	Unit
Resolution	12 bits			0.04		%RH
	8 bits			0.7		%RH
Humidity Operating Range		RH	0		100	%RH
Relative Humidity Accuracy @25°C (20%RH to 80%RH)	typ			±2		%RH
	max			See graph 1		%RH
Replacement		fully interchangeable				
Temperature coefficient (from 0°C to 80°C)		T_{cc}			-0.15	%RH/°C
Humidity Hysteresis				±1		%RH
Measuring Time (1)	12 bits			14	16	ms
	11 bits			7	8	ms
	10 bits			4	5	ms
	8 bits			2	3	ms
PSRR					±10	LSB
Recovery time after 150 hours of condensation		t		10		s
Long term drift				0.5		%RH/yr
Response Time (at 63% of signal) from 33 to 75%RH (2)		τ_{RH}		5	10	s

(1) Typical values are recommended for calculating energy consumption while maximum values shall be applied for

HTU21D I²C

- 工作電壓 1.5V ~ 3.3V (適合低功號應用)
- I2C Clock = max 400K
- I2C Slave Address = 7-bit 0x40 (64)

Command	Code	Comment
Trigger Temperature Measurement	0xE3	Hold master
Trigger Humidity Measurement	0xE5	Hold master
Trigger Temperature Measurement	0xF3	No Hold master
Trigger Humidity Measurement	0xF5	No Hold master
Write user register	0xE6	
Read user register	0xE7	
Soft Reset	0xFE	

資料轉換公式

$$RH = -6 + 125 \times \frac{S_{RH}}{2^{16}}$$

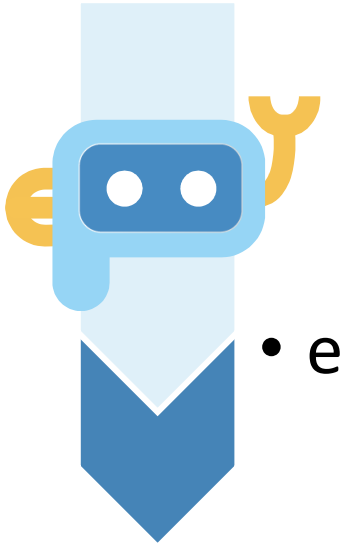
$$Temp = -46.85 + 175.72 \times \frac{S_{Temp}}{2^{16}}$$

ePy Lite 如何讀取 I²C

- Micro-python I2C module
  - from machine import I2C
- 初始化一個 i2c 物件 (port 0 , 400K clock)
  - i2c0 = I2C (0,I2C.MASTER,baudrate=400000)
- I2C 基本功能
  - Scan -- 掃描 I2C Bus上的裝置 Address
  - Send -- 傳送 資料到 I2C裝置
  - Recv – 由I2C 裝置讀取接收 資料

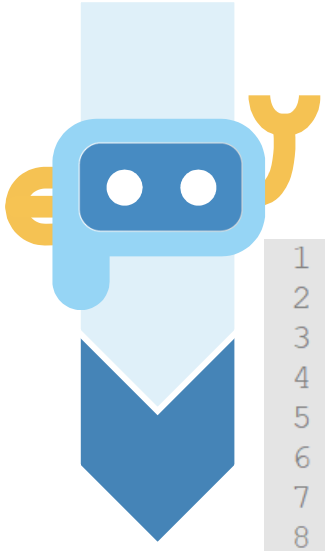
Micropython Code

```
from machine import I2C

import utime

HTU21D_ADDR = 0x40
temp=bytearray(2)
i2c0=I2C(0,I2C.MASTER,baudrate=400000)
i2c0.send(0xE3,HTU21D_ADDR)
utime.sleep_ms(50)
i2c0.recv(temp,HTU21D_ADDR)
rawTemperature = temp[0]<<8 | temp [1]
Temperature = round((0.002681 * float(rawTemperature) - 46.85),2)
print (Temperature)

#read_Humidity():
temp=bytearray(3)
i2c0.send(0xE5,HTU21D_ADDR)
utime.sleep_ms(50)
i2c0.recv(temp,HTU21D_ADDR)
rawHumidity = temp[0]<<8 | temp [1]
rawHumidity ^= 0x02; #clear status bits, humidity always returns xxxxxx10 in the LSB field
Humidity = round((0.001907 * float(rawHumidity) - 6),2)
print (Humidity)
```



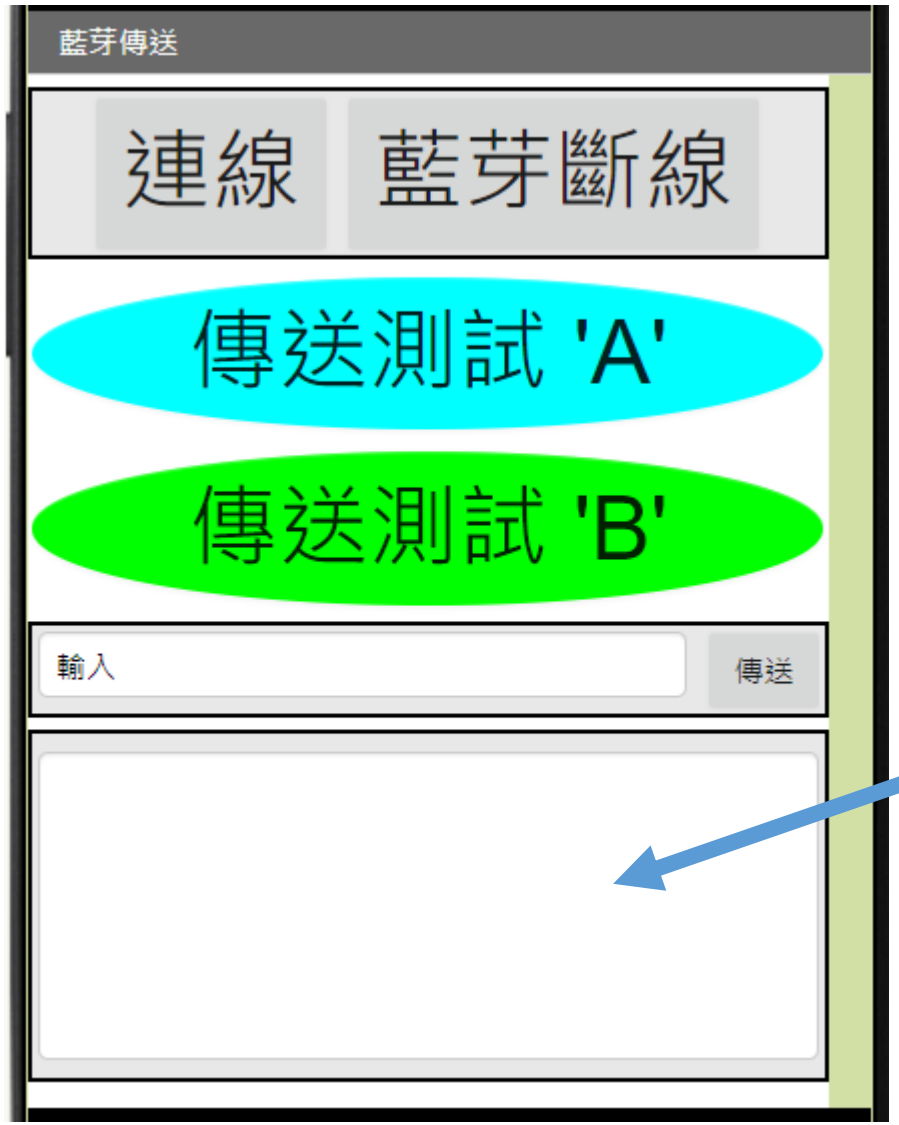
處理 藍芽傳送

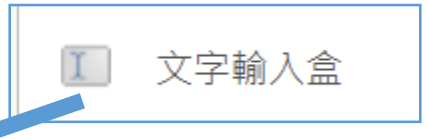
- ePy Lite 初始模式
  - Data 透傳模式
  - 使用 UART write API 送資料
- 改print 為 UART.write 即可

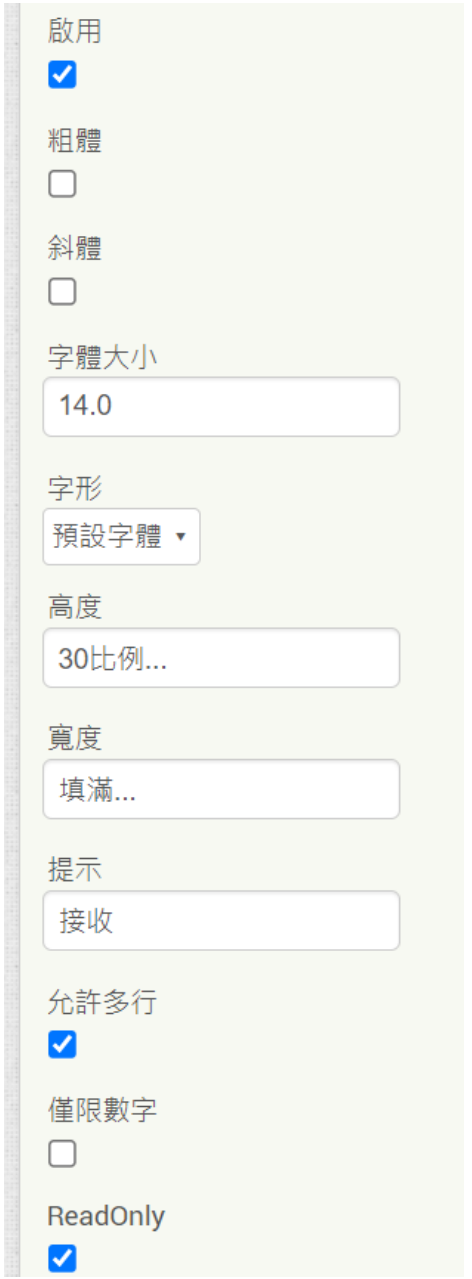


```
from machine import I2C,UART

import utime
HTU21D_ADDR = 0x40
temp=bytearray(2)
i2c0=I2C(0,I2C.MASTER,baudrate=400000)
ble = UART(1,115200)
while True:
    i2c0.send(0xE3,HTU21D_ADDR)
    utime.sleep_ms(50)
    i2c0.recv(temp,HTU21D_ADDR)
    rawTemperature = temp[0]<<8 | temp [1]
    Temperature = round((0.002681 * float(rawTemperature) - 46.85),2)
    #print (Temperature)
    ble.write('T = {}\r\n'.format (Temperature))

    #read_Humidity():
    temp=bytearray(3)
    i2c0.send(0xE5,HTU21D_ADDR)
    utime.sleep_ms(50)
    i2c0.recv(temp,HTU21D_ADDR)
    rawHumidity = temp[0]<<8 | temp [1]
    rawHumidity ^= 0x02; #clear status bits, humidity always returns xxxxxx10 in the LSB field
    Humidity = round((0.001907 * float(rawHumidity) - 6),2)
    #print (Humidity)
    ble.write('H = {}\r\n'.format (Humidity))

```

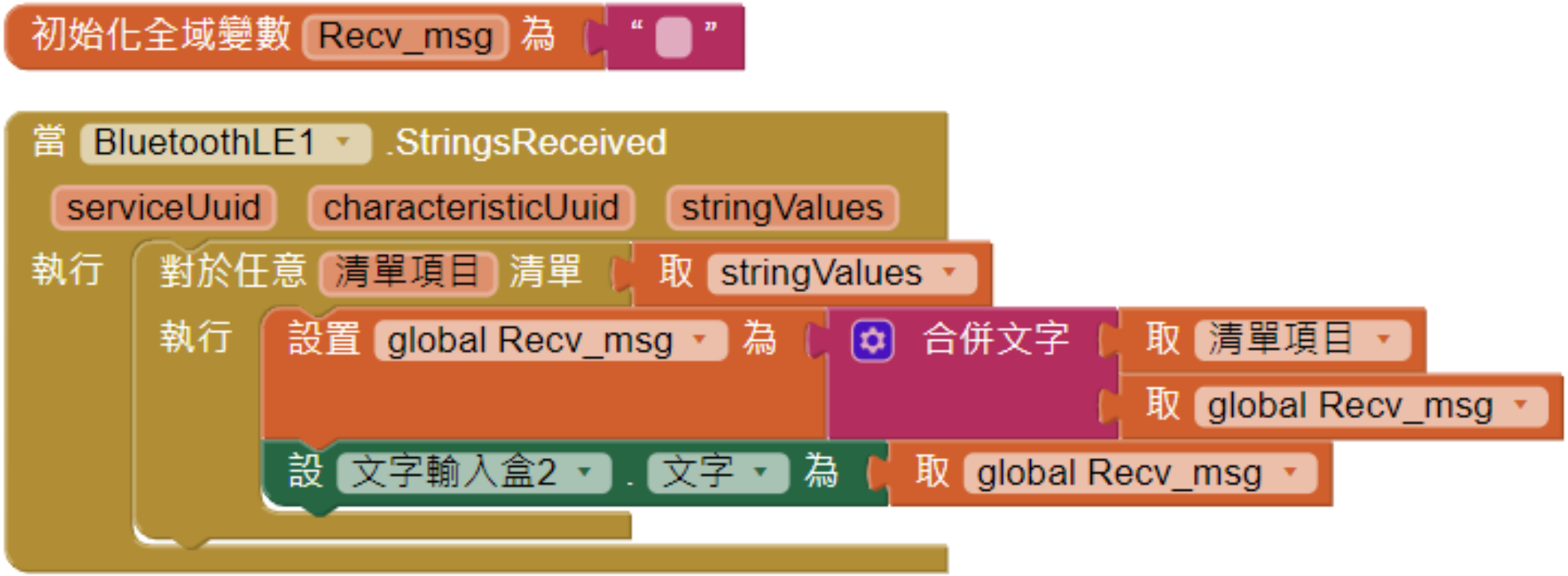
AI2 接收 畫面規劃


藍芽傳送
連線
藍芽斷線
傳送測試 'A'
傳送測試 'B'
輸入
傳送

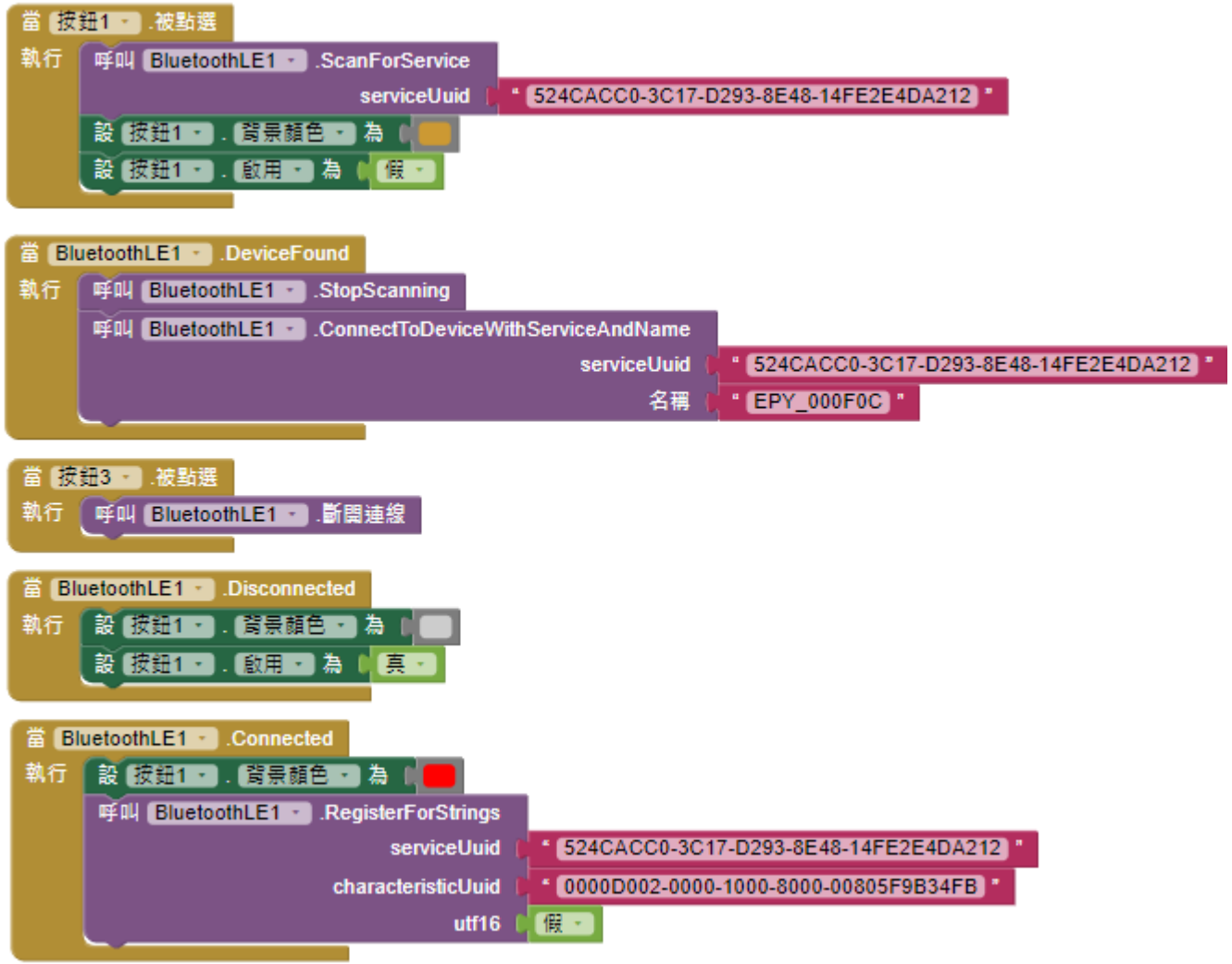

文字輸入盒


啟用
粗體
斜體
字體大小
14.0
字形
預設字體
高度
30比例...
寬度
填滿...
提示
接收
允許多行
僅限數字
ReadOnly

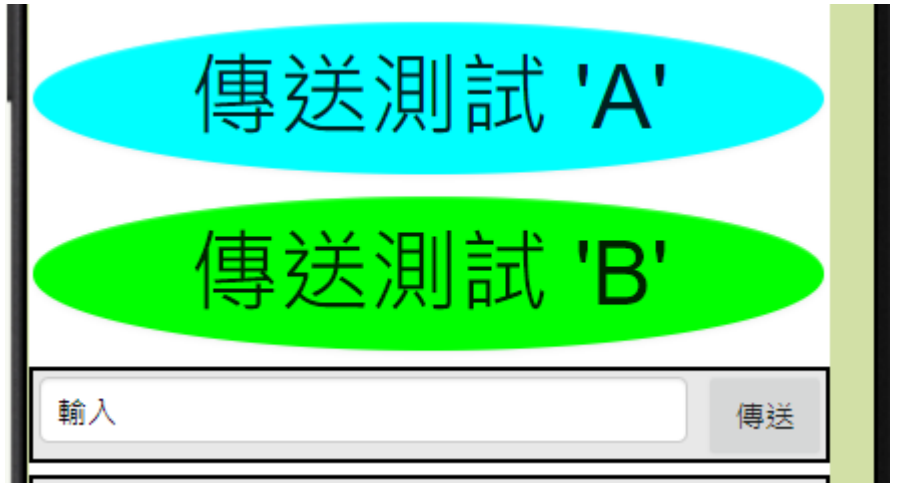
AI2 程式設計

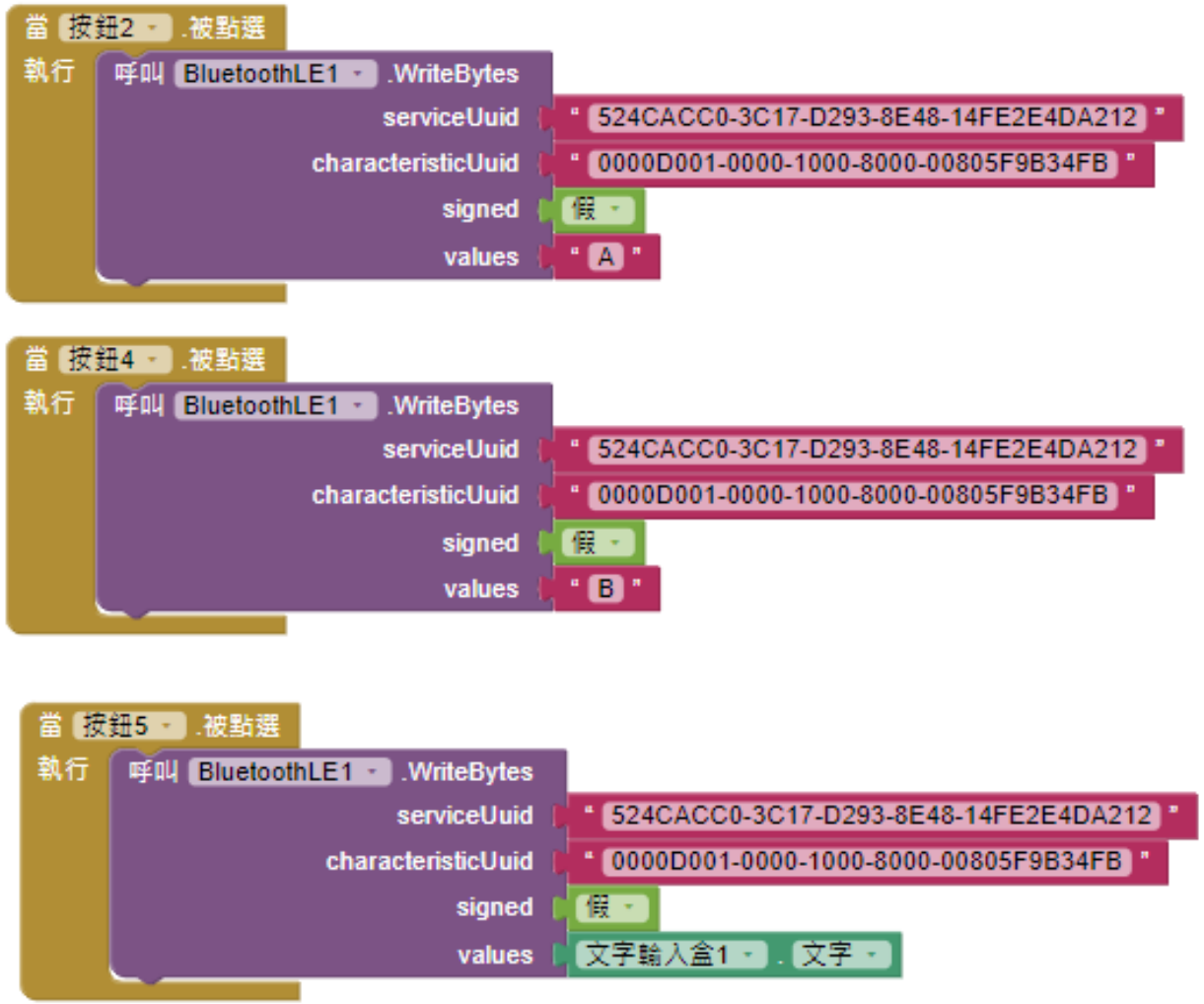

初始化全域變數 Recv_msg 為 " "
當 BluetoothLE1 .StringsReceived
serviceUuid characteristicUuid stringValues
執行
對於任意 清單項目 清單 取 stringValues
執行
設置 global Recv_msg 為 合併文字 取 清單項目
取 global Recv_msg
設 文字輸入盒2 . 文字 為 取 global Recv_msg

Ai2 藍芽連線/斷線 功能



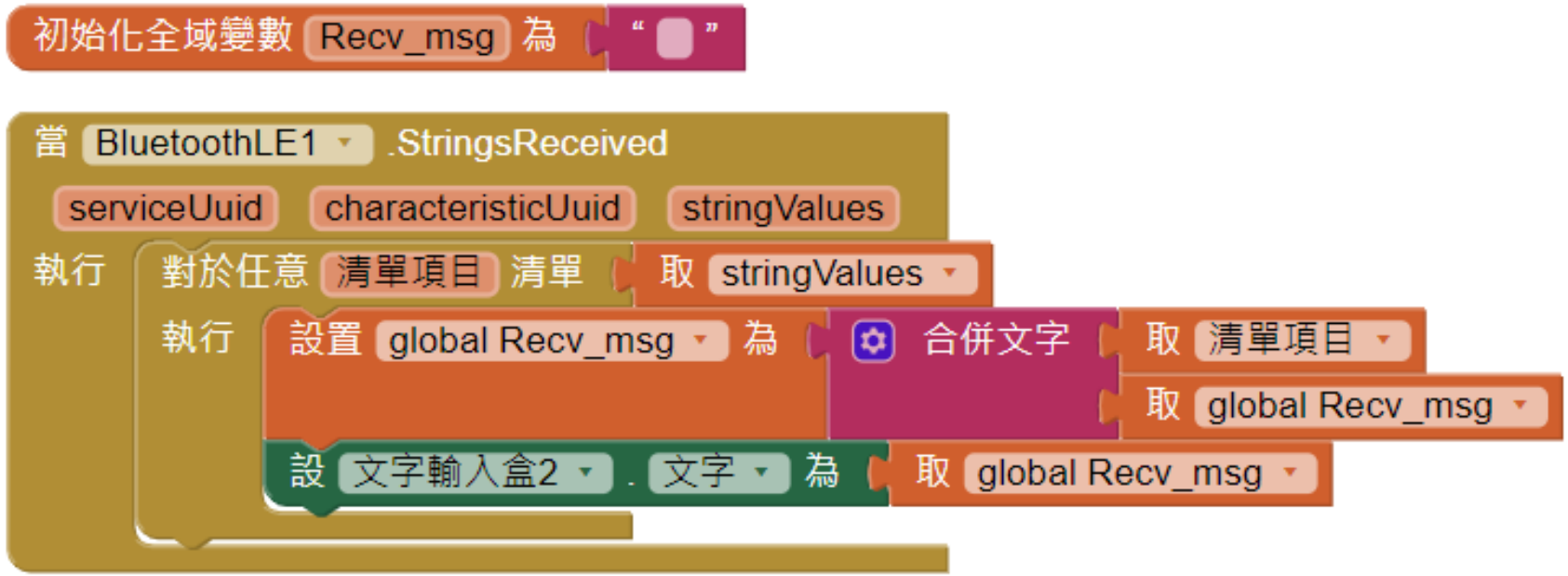
Ai2 BLE 傳送資料

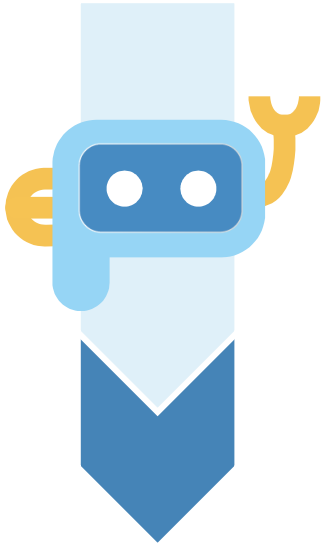

傳送測試 'A'
傳送測試 'B'
輸入
傳送


當 按鈕2 .被點選
執行 呼叫 BluetoothLE1 .WriteBytes
serviceUuid " 524CACC0-3C17-D293-8E48-14FE2E4DA212 "
characteristicUuid " 0000D001-0000-1000-8000-00805F9B34FB "
signed 假
values " A "
當 按鈕4 .被點選
執行 呼叫 BluetoothLE1 .WriteBytes
serviceUuid " 524CACC0-3C17-D293-8E48-14FE2E4DA212 "
characteristicUuid " 0000D001-0000-1000-8000-00805F9B34FB "
signed 假
values " B "
當 按鈕5 .被點選
執行 呼叫 BluetoothLE1 .WriteBytes
serviceUuid " 524CACC0-3C17-D293-8E48-14FE2E4DA212 "
characteristicUuid " 0000D001-0000-1000-8000-00805F9B34FB "
signed 假
values 文字輸入盒1 . 文字

Ai2 BLE 接收資料

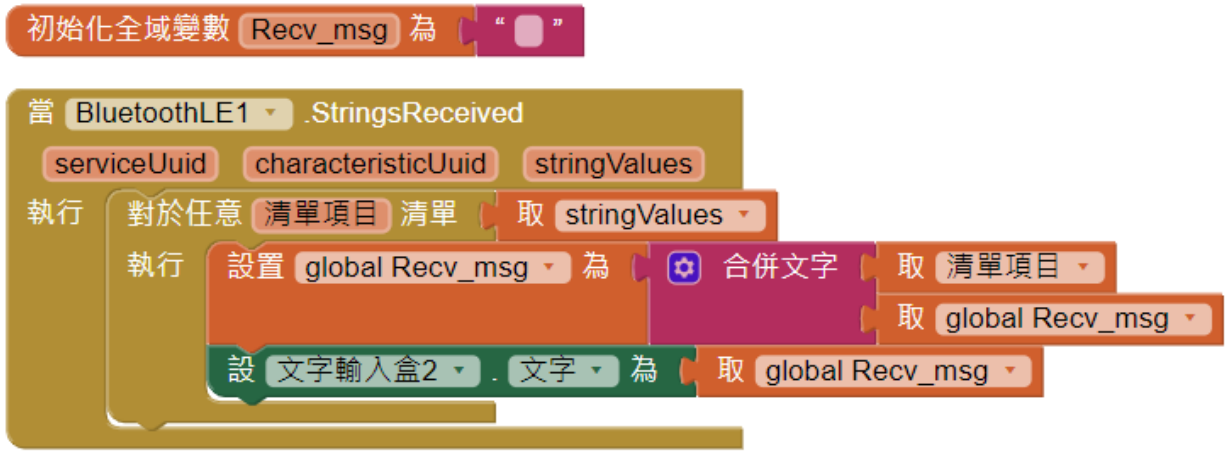

文字輸入盒1提示
H = 79.36
T = 29.13
H = 79.36
T = 29.14
H = 79.36
T = 29.14
H = 79.36
T = 29.14
H = 79.36
T = 29.13


初始化全域變數 Recv_msg 為 " "
當 BluetoothLE1 .StringsReceived
serviceUuid characteristicUuid stringValues
執行 對於任意 清單項目 清單 取 stringValues
執行 設置 global Recv_msg 為 合併文字 取 清單項目
取 global Recv_msg
設 文字輸入盒2 . 文字 為 取 global Recv_msg



清單項目

T= 30.23



清單項目

T= 30.23

New 清單項目

T= 30.23
H=75.22

文字輸入盒2

T= 30.23
H=75.22

global Recv_msg

H=75.22