IoT Programming with Basic for iOS

B4i and Bluetooth

October 27, 2017

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DesignNews

CEC CONTINUING EDUCATION CENTER

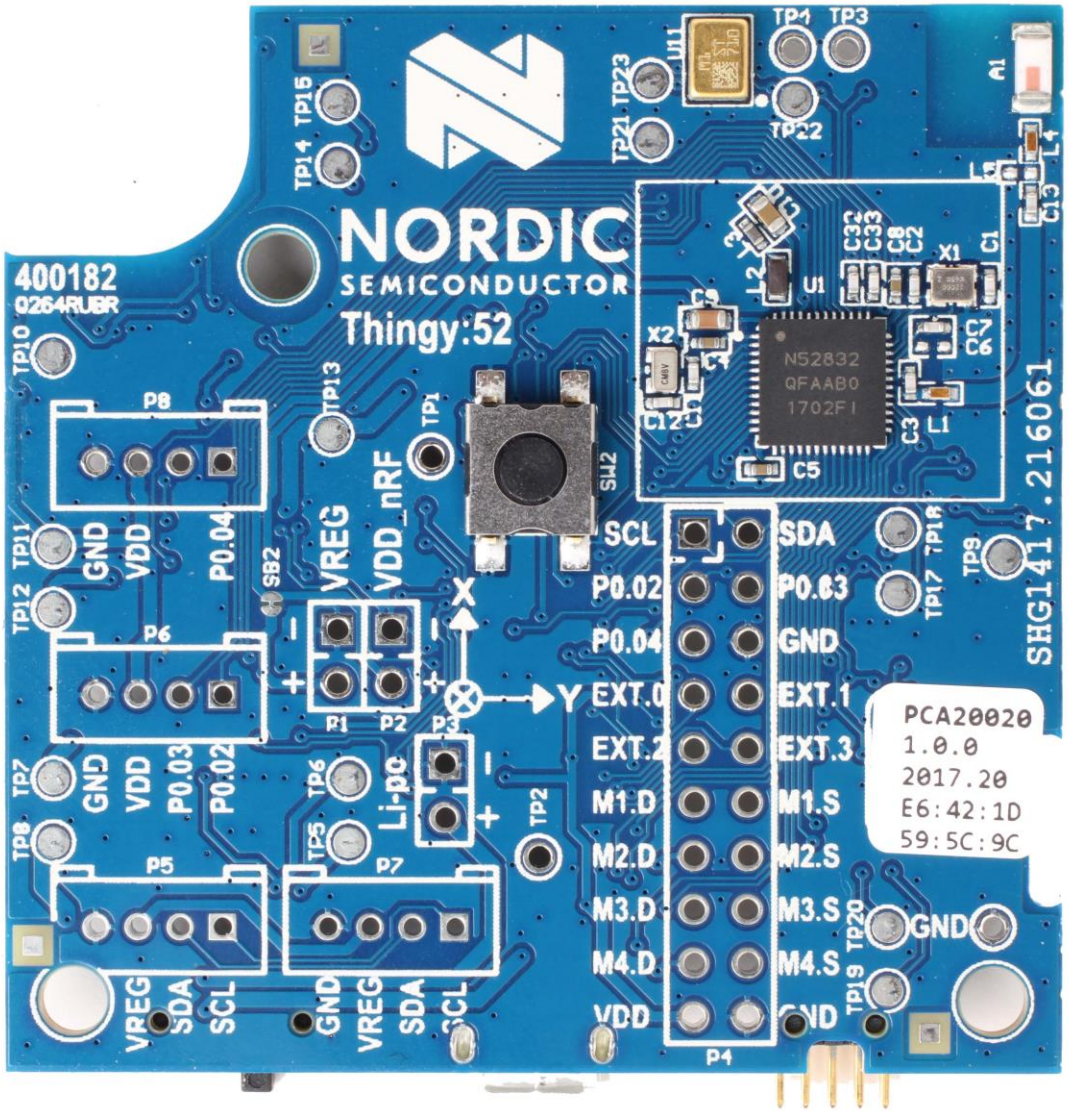
Presented by: Digi-Key ELECTRONICS

AGENDA

- The Weather According to Thingy
- Day 5's Done

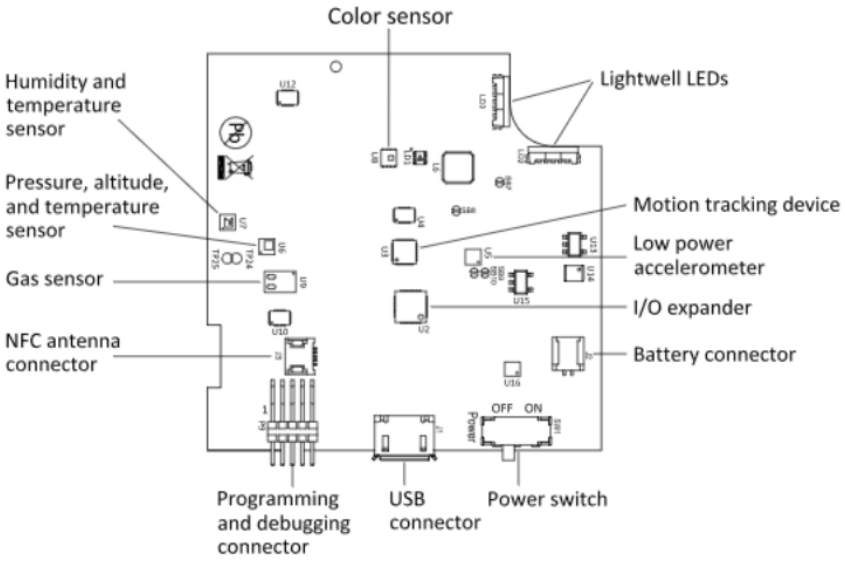
IoT Programming with Basic for iOS

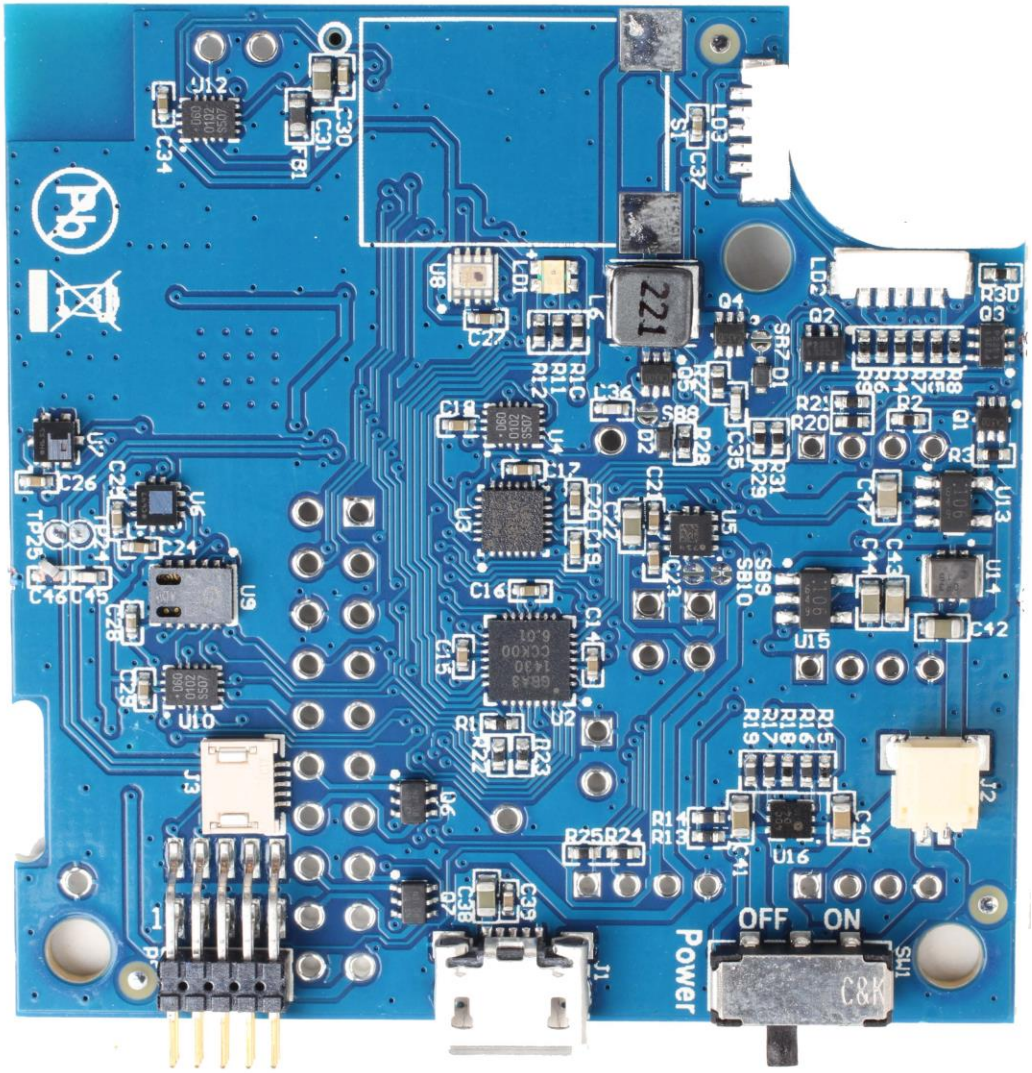
The Weather According to Thingy - Sensors



IoT Programming with Basic for iOS

The Weather According to Thingy - Sensors





IoT Programming with Basic for iOS

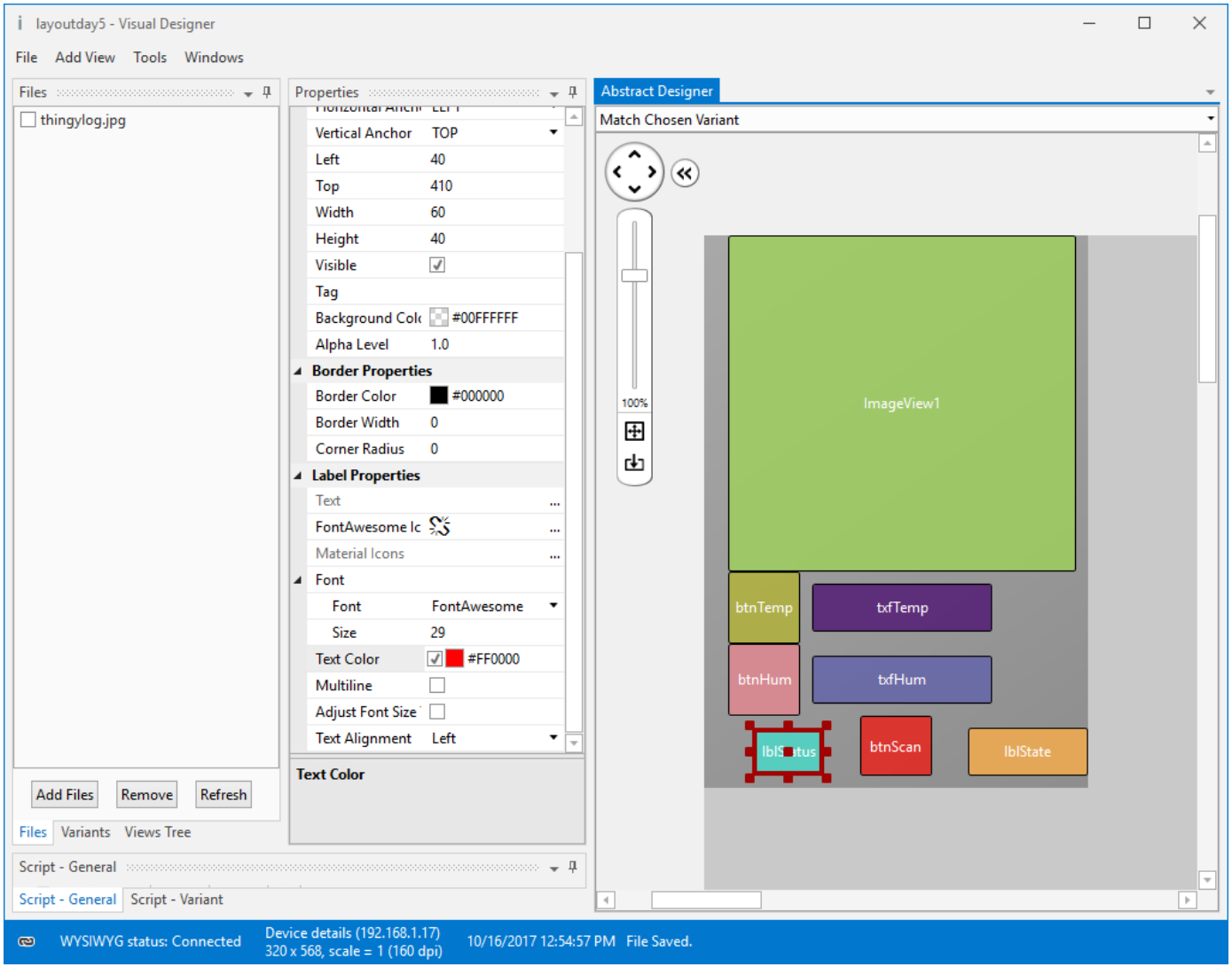
The Weather According to Thingy - Sensors

Name	UUID	Type	Data	Description
Base UUID	EF68xxxx-9B35-4933-9B10-52FFA9740042			
Weather station service	0200			
Temperature characteristic	0201	Notify	2 bytes	Temperature in Celsius • int8_t - integer • uint8_t - decimal
Pressure characteristic	0202	Notify	5 bytes	Pressure in hPa • int32_t - integer • uint8_t - decimal
Humidity characteristic	0203	Notify	1 bytes	Relative humidity in % • uint8_t - RH
Gas (Air quality) characteristic	0204	Notify	4 bytes	• uint16_t - eCO2 ppm • uint16_t - TVOC ppb
Color characteristic	0205	Notify	8 bytes	• uint16_t - Red • uint16_t - Green • uint16_t - Blue • uint16_t - Clear

Configuration characteristic	0206	Write/Read	12 bytes	• uint16_t - Temperature interval in ms (100 ms - 60 s).
				• uint16_t - Pressure interval in ms (50 ms - 60 s).
				• uint16_t - Humidity interval in ms (100 ms - 60 s).
				• uint16_t - Color interval in ms (200 ms - 60 s).
				• uint8_t - Gas mode
				  ○ 1 = 1 s interval
				  ○ 2 = 10 s interval
				  ○ 3 = 60 s interval
				• Color sensor LED calibration:
				  ○ uint8_t - Red intensity [0 - 255]
				  ○ uint8_t - Green intensity [0 - 255]
				  ○ uint8_t - Blue intensity [0 - 255]

IoT Programming with Basic for iOS

The Weather According to Thingy – Visual Designer



IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
13  Sub Process_Globals
14      'These global variables will be declared once when the application starts.
15      'Public variables can be accessed from all modules.
16      Public App As Application
17      Public NavControl As NavigationController
18      Private Page1 As Page
19      Private btleManager As BleManager
20      Private deviceServices As List
21      Private btnScan As Button
22      Private lblState As Label
23      Private tempFlag As Boolean
24      Private humFlag As Boolean
25      Private connected As Boolean
26      Private btnTemp As Button
27      Private lblStatus As Label
28      Private txfTemp As TextField
29      Private btnHum As Button
30      Private txfHum As TextField
31  End Sub
32
33  Private Sub Application_Start (Nav As NavigationController)
34      'SetDebugAutoFlushLogs(True) 'Uncomment if program crashes before a
35      NavControl = Nav
36      Page1.Initialize("Page1")
37      Page1.RootPanel.LoadLayout("layoutday5")
38      NavControl.ShowPage(Page1)
39      btleManager.Initialize("btleManager")
40      tempFlag = False
41      connected = False
42      humFlag = False
43  End Sub
```

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
45  Public Sub StateChanged
46      If connected Then
47          lblStatus.TextColor = Colors.Green
48          lblStatus.Text = "⊡"
49      Else
50          lblStatus.TextColor = Colors.Red
51          lblStatus.Text = "⊡"
52      End If
53  End Sub
54
55  Sub btleManager_StateChanged (State As Int)
56      Dim msgState As String
57      Select State
58          Case btleManager.STATE_UNKNOWN
59              msgState = "UNKNOWN"
60          Case btleManager.STATE_POWERED_OFF
61              msgState = "POWERED OFF"
62          Case btleManager.STATE_POWERED_ON
63              msgState = "POWERED ON"
64          Case btleManager.STATE_RESETTING
65              msgState = "RESETTING"
66          Case btleManager.STATE_UNAUTHORIZED
67              msgState = "UNAUTHORIZED"
68          Case btleManager.STATE_UNSUPPORTED
69              msgState = "UNSUPPORTED"
70      End Select
71      btnScan.Enabled = (State = btleManager.STATE_POWERED_ON)
72      lblState.Text = msgState
73  End Sub
```

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
84  Sub btnScan_Click
85      btleManager.Scan(Null)
86  End Sub
87
88  Sub btlemanager_DeviceFound (Name As String, Id As String, AdvertisingData As Map, RSSI As Double)
89      Log("Found: " & Name & ", " & Id & ", RSSI = " & RSSI & ", " & AdvertisingData)
90
91      If Name = "Thingy" Then
92          btleManager.StopScan
93          btleManager.Connect(Id)
94      End If
95  End Sub
96
97  Sub btlemanager_Connected (services As List)
98      connected = True
99      StateChanged
100     deviceServices = services
101     For Each s As String In deviceServices
102         btleManager.ReadData(s)
103         Log("UUID: "&s)
104     Next
105 End Sub
```

```
Application_Start
Application_Active
Found: Thingy, 69D2F4CA-617C-4825-AF1A-C3C49BB02AD1, RSSI = -56, (read only map) {
   kCBAdvDataIsConnectable = 1;
   kCBAdvDataLocalName = Thingy;
   kCBAdvDataServiceUUIDs =     (
      "EF680100-9B35-4933-9B10-52FFA9740042"
   );
}
Discovering services
Services discovery completed.
UUID: EF680100-9B35-4933-9B10-52FFA9740042
UUID: EF680200-9B35-4933-9B10-52FFA9740042
UUID: EF680400-9B35-4933-9B10-52FFA9740042
UUID: EF680300-9B35-4933-9B10-52FFA9740042
UUID: EF680500-9B35-4933-9B10-52FFA9740042
UUID: 180F
UUID: FE59
```

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
107 Sub btnTemp_Click
108     btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680201-9B35-4933-9B10-52FFA9740042", True)
109     tempFlag = True
110 End Sub
111
112 Sub btnHum_Click
113     btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680203-9B35-4933-9B10-52FFA9740042", True)
114     humFlag = True
115 End Sub
116
117 Sub btlemanager_DataAvailable (Service As String, Characteristics As Map)
118     Select Service
119         Case "EF680200-9B35-4933-9B10-52FFA9740042"
120             For Each id As String In Characteristics.Keys
121                 Log(id)
122                 If id = "EF680201-9B35-4933-9B10-52FFA9740042" Then
123                     If tempFlag = True Then
124                     Dim b() As Byte = Characteristics.Get("EF680201-9B35-4933-9B10-52FFA9740042")
125                     txfTemp.Text = b(0) & " C"
126                     End If
127                 End If
128
129                 If id = "EF680203-9B35-4933-9B10-52FFA9740042" Then
130                     If humFlag = True Then
131                         Dim b() As Byte = Characteristics.Get("EF680203-9B35-4933-9B10-52FFA9740042")
132                         txfHum.Text = b(0) & " %"
133                     End If
134                 End If
135             Next
136     End Select
137 End Sub
```

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
107 Sub btnTemp_Click
108     btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680201-9B35-4933-9B10-52FFA9740042", True)
109     tempFlag = Tr
110 End Sub
111
112 Sub btnHum_Click
113     btleManager.S                                                    10-52FFA9740042", True)
114     humFlag = Tru
115 End Sub
116
117 Sub btlemanager_D
118     Select Servic
119         Case "EF6
120             For E
121                 L
122                 I
123
124                                                                      A9740042")
125
126
127                 E
128
129                 I
130
131                                                                      52FFA9740042")
132
133
134                 E
135             Next
136     End Select
137 End Sub
```

```
Application_Start
Application_Active
Found: Thingy, 69D2F4CA-617C-4825-AF1A-C3C49BB02AD1, RSSI = -44, (read only map) {
   kCBAdvDataIsConnectable = 1;
   kCBAdvDataLocalName = Thingy;
   kCBAdvDataManufacturerData = <590017c9 0941>;
   kCBAdvDataServiceUUIDs =    (
      "EF680100-9B35-4933-9B10-52FFA9740042"
   );
}
Discovering services
Services discovery completed.
UUID: EF680100-9B35-4933-9B10-52FFA9740042
UUID: EF680200-9B35-4933-9B10-52FFA9740042
UUID: EF680400-9B35-4933-9B10-52FFA9740042
UUID: EF680300-9B35-4933-9B10-52FFA9740042
UUID: EF680500-9B35-4933-9B10-52FFA9740042
UUID: 180F
UUID: FE59
EF680205-9B35-4933-9B10-52FFA9740042
EF680201-9B35-4933-9B10-52FFA9740042
EF680203-9B35-4933-9B10-52FFA9740042
EF680202-9B35-4933-9B10-52FFA9740042
EF680204-9B35-4933-9B10-52FFA9740042
EF680206-9B35-4933-9B10-52FFA9740042
```

Services

Characteristics

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
84  Sub btnScan_Click
85      btleManager.Scan(Null)
86  End Sub
87
88  Sub btlemanager_DeviceFound (Name As String, Id As String, AdvertisingData As Map, RSSI As Double)
89      Log("Found: " & Name & ", " & Id & ", RSSI = " & RSSI & ", " & AdvertisingData)
90
91      If Name = "Thingy" Then
92          btleManager.StopScan
93          btleManager.Connect(Id)
94      End If
95  End Sub
96
97  Sub btlemanager_Connected (services As List)
98      connected = True
99      StateChanged
100     deviceServices = services
101     For Each s As String In deviceServices
102         btleManager.ReadData(s)
103         Log("UUID: "&s)
104     Next
105 End Sub
```

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
Sub btnTemp_Click
    btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680201-9B35-4933-9B10-52FFA9740042", True)
    tempFlag = True
End Sub

Sub btnHum_Click
    btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680203-9B35-4933-9B10-52FFA9740042", True)
    humFlag = True
End Sub

Sub btlemanager_DataAvailable (Se                                          As Map)
    Select Service
        Case "EF680200-9B35-4933-
            For Each id As String
                Log(id)
                If id = "EF680201                                          en
                    If tempFlag =
                    Dim b() As By                                          01-9B35-4933-9B10-52FFA9740042")
                    txfTemp.Text
                    End If
                End If

                If id = "EF680203                                          en
                    If humFlag =
                        Dim b() A                                          580203-9B35-4933-9B10-52FFA9740042")
                        txfHum.Te
                    End If
                End If
            Next
    End Select
End Sub
```

IoT Programming with Basic for iOS

The Weather According to Thingy – iPhone

```
Sub btnTemp_Click
    btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680201-9B35-4933-9B10-52FFA9740042", True)
    tempFlag = True
End Sub

Sub btnHum_Click
    btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680203-9B35-4933-9B10-52FFA9740042", True)
    humFlag = True
End Sub

Sub btlemanager_DataAvailable (Se                                    As Map)
    Select Service
        Case "EF680200-9B35-4933-
            For Each id As String
                Log(id)
                If id = "EF680201                                    en
                    If tempFlag =
                    Dim b() As By                                    01-9B35-4933-9B10-52FFA9740042")
                    txfTemp.Text
                    End If
                End If

                If id = "EF680203                                    en
                    If humFlag =
                        Dim b() A                                    580203-9B35-4933-9B10-52FFA9740042")
                        txfHum.Te
                    End If
                End If
            Next
    End Select
End Sub
```

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The Weather According to Thingy – iPhone

```
Sub btnTemp_Click
    btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680201-9B35-4933-9B10-52FFA9740042", True)
    tempFlag = True
End Sub

Sub btnHum_Click
    btleManager.SetNotify("EF680200-9B35-4933-9B10-52FFA9740042","EF680203-9B35-4933-9B10-52FFA9740042", True)
    humFlag = True
End Sub

Sub btlemanager_DataAvailable (Se                                          As Map)
    Select Service
        Case "EF680200-9B35-4933-
            For Each id As String
                Log(id)
                If id = "EF680201                                          en
                    If tempFlag =
                    Dim b() As By                                          01-9B35-4933-9B10-52FFA9740042")
                    txfTemp.Text
                    End If
                End If

                If id = "EF680203                                          en
                    If humFlag =
                        Dim b() A                                          580203-9B35-4933-9B10-52FFA9740042")
                        txfHum.Te
                    End If
                End If
            Next
    End Select
End Sub
```

IoT Programming with Basic for iOS

Day 5's Done

We Successfully Tapped Into a Thingy Using B4i