

BT510 Tilt Sensor (tiltad.py)

Overview

This page provides some details regarding the advertisement format used by the `tiltad.py` sample designed to run on Canvas firmware on the Sentrius BT510 sensor.

Advertising Format

Here is an example of a raw byte array containing a BLE advertisement from a BT510 running `tiltad.py`:

```
02 01 06 0B 09 42 54 35 31 30 2D 43 34 36 41 0F FF 77 00 C9 00 00 02 00 FF 00 40 F6 3C 00 67 DC
```

The advertisement contains 3 primary "Length-Tag-Value" (LTV) segments, one after another:

Advertising Flags

Len Tag Value

```
02 01 06
```

Device Name

Len Tag Value

```
0B 09 42 54 35 31 30 2D 43 34 36 41
```

Manufacturer Specific Data

Len Tag Value

```
0F FF 77 00 C9 00 00 02 00 FF 00 40 F6 3C 00 67 DC
```

This portion of the advertisement is where the sensor data is stored.

Sensor data is decoded as follows:

77 00 - Company ID for the Manufacturer Specific ad data.

C9 00 - Protocol ID (16 bit) indicating the format of the bytes to follow

02 00 - Raw Accelerometer X axis data (signed 16 bit value)

FF 00 - Raw Accelerometer Y axis data (signed 16 bit value)

40 F6 - Raw Accelerometer Z axis data (signed 16 bit value)

3C - 8 bit packet counter, increments each time ad data is updated

00 - Status Flags. This is an 8-bit value where several bits are defined to indicate the status of various sensors on the BT510.

Bit 0x01: If 0, indicates battery OK. If 1, indicates battery LOW

Bit 0x02: If 0, indicates magnet not present. If 1, indicates magnet detected

Bit 0x04: If 0, the button is not being pressed. If 1, the button is being pressed

67 DC - Temperature data (16-bit raw temp sample taken from the internal I2C SiLabs Si7055 temperature sensor). These bytes can be converted to degrees Celsius with the formula found in the Si7055 Datasheet:

5.1.1. Measuring Temperature

The measure temperature commands 0xE3 and 0xF3 will perform a temperature measurement and return the measurement value.

The results of the temperature measurement may be converted to temperature in degrees Celsius (°C) using the following expression:

$$\text{Temperature (°C)} = \frac{175.72 \cdot \text{Temp_Code}}{65536} - 46.85$$

Where:

Temperature (°C) is the measured temperature value in °C

Temp_Code is the 16-bit word returned by the Si705x

A temperature measurement will always return XXXXXX00 in the LSB field.