

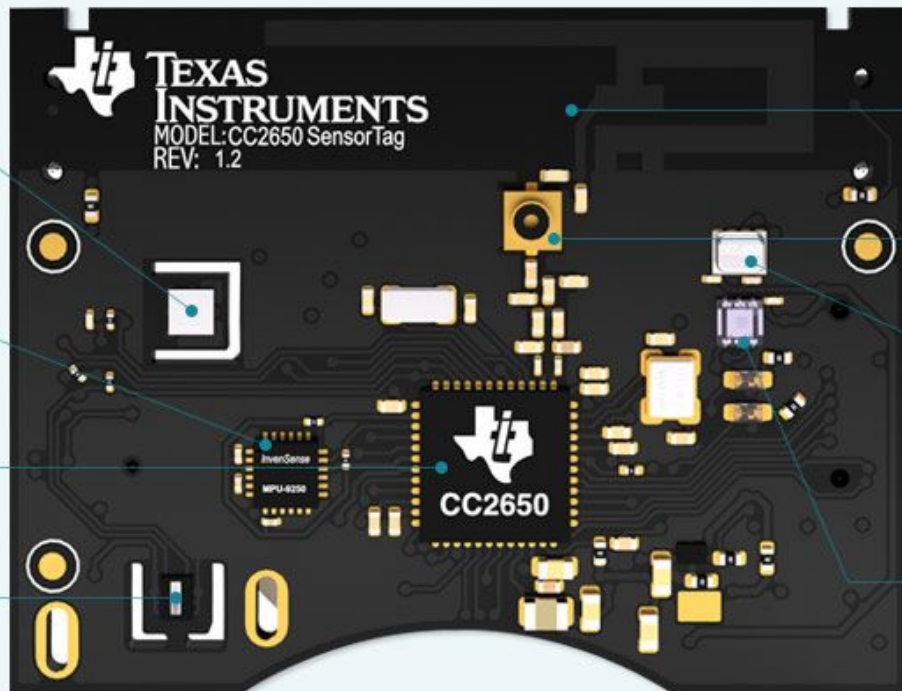


The Abdus Salam  
International Centre  
for Theoretical Physics

# Sensortag 2.0



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Workshop on New Frontiers in Internet of Things  
Trieste, 11th March 2016



IR Thermopile Temperature Sensor  
TMP007  
Texas Instruments

9-axis Motion Sensor  
MPU-9250  
Invensense

Multi-Standard Wireless MCU  
CC2650  
Texas Instruments

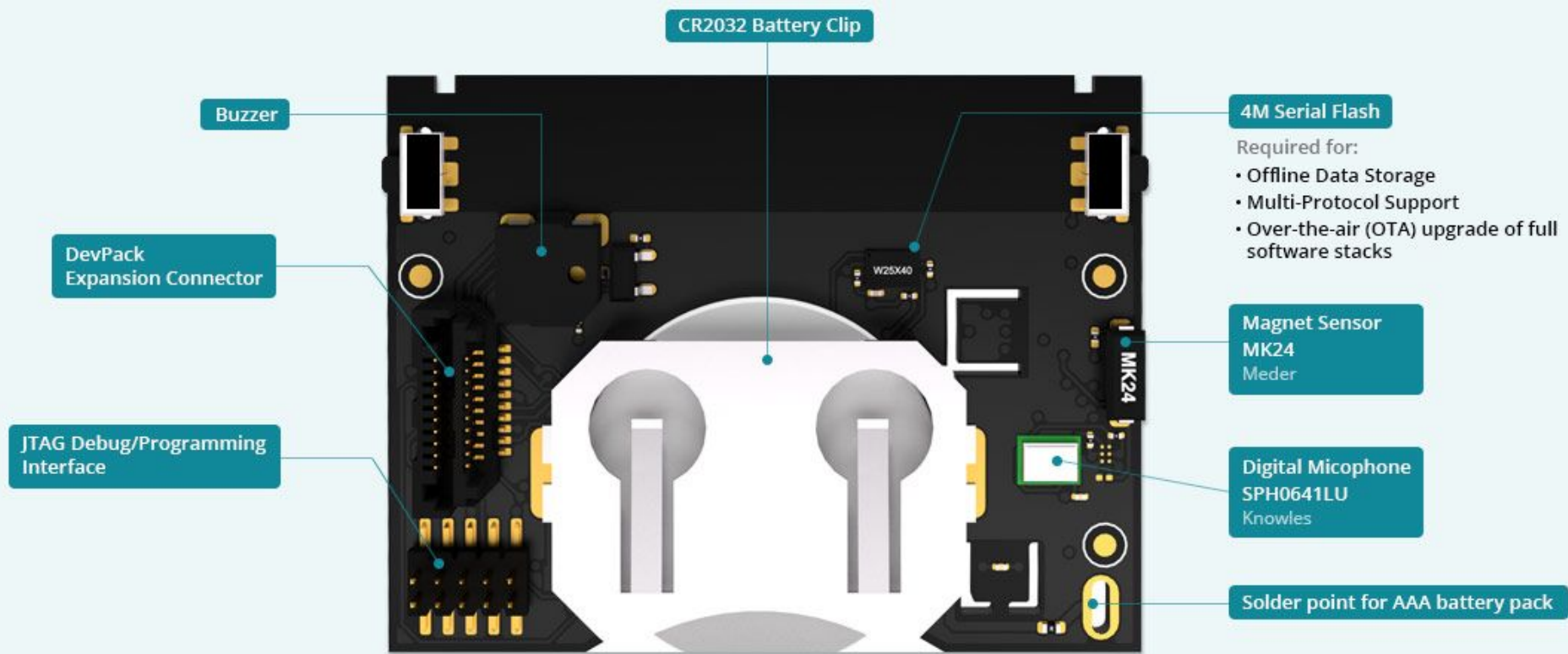
Digital Humidity Sensor  
HDC1000  
Texas Instruments

PCB antenna  
High-performance Inverted-F  
PCB Antenna

uSMA RF connector

Altimeter/Pressure Sensor  
BMP280  
Bosch Sensortec

Ambient Light Sensor  
OPT3001  
Texas Instruments



### Small size

1.97 x 2.64 x 0.55 inch  
5 x 6.7 x 1.4 cm  
(WxHxD)



### Benefits

- Low-power design
- Easy-to-use, get started in three minutes
- Download app and connect
- No programming required

#### Power Button

- Report to app: click once
- On/Off: hold three seconds
- RESET to Bluetooth Smart mode: hold power button + user button 10 seconds

#### Sensors Interface

- Plastic material perforated for humidity sensor and microphone
- Optional Velcro strap mounting
- Clear plastic material for infrared temperature and ambient light sensors

#### Keychain Mounting

#### User Button

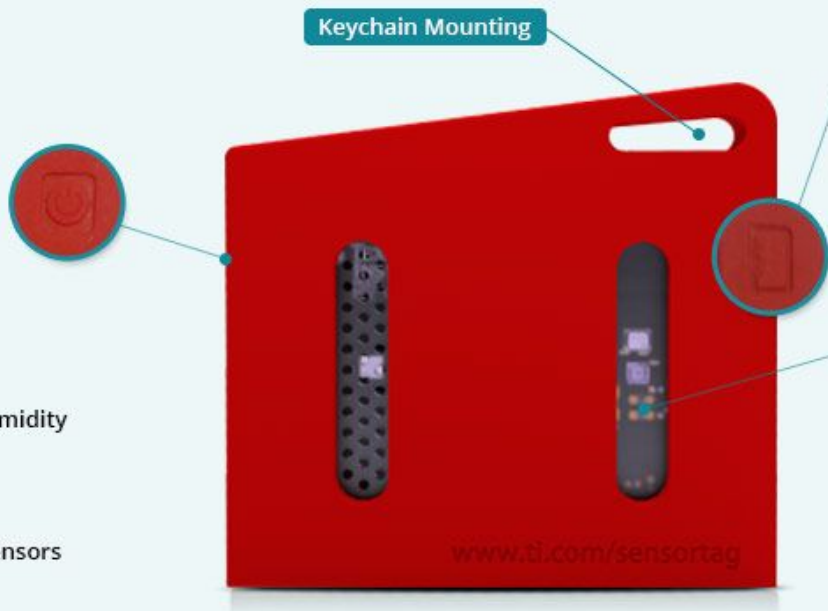
- Toggle (Bluetooth Smart/6LoWPAN/ZigBee): hold three seconds
- Beacon mode: hold six seconds
- RESET to Bluetooth Smart mode: hold power button + user button 10 seconds

#### Green LED / Red LED

- Service discovery: Green blinking rapidly
- Advertising: Green blinking slowly
- Sensing: Red blinking quickly

#### Buzzer

- Connect/Disconnect: Short beep



# Debug DevPack



## Debug DevPack

- Adds JTAG debug capability to your SensorTag for software development
- Includes a free license of Code Composer Studio™
- Includes pads for three Grove connectors
- Micro-USB powered
- The SensorTag and DevPacks are designed for commercial temperature range (0-50C) and power from SensorTag battery supply voltage (3V nominal voltage) or a standard Micro-USB cable



Sharing Screenshot

A link to your screenshot has been copied to your clipboard (click to view).

Type your filter text here...

▼ CC2650F128 - Texas Instruments XDS110 USB Debug F

► Flash Settings

Programs

Flash Settings < CC2650F128 - Texas Instruments XDS110 USB Debug Probe/Cortex\_

Program Load Settings

Erase Settings

- ☐ All Unprotected Sectors
- ☒ Necessary Sectors Only
- ☐ Program Load Only (do not erase sectors)

☐ Keep CCFG data. The upper N bytes of device CCFG are kept. N is given by CCFG.CCFG\_O\_SIZE\_AND\_DIS\_FLAGS[31:16] in CCFG.

Erase Actions

Erase Entire Flash

☒ Enable Verbose Output

Console

Uniflash Debug Console

```
[22:55:59] Begin Erase Entire Flash operation.
[22:56:01] Cortex_M3_0: MassErase(): Initializing.

[22:56:02] Cortex_M3_0: MassErase(): Issuing Board Reset.

[22:56:04] Cortex_M3_0: MassErase(): Mass erase complete.

[22:56:04] Operation Erase Entire Flash returned.
```



Watch DevPack



LED Audio DevPack



# SensorTag APPs



**Bluetooth®  
low energy**

# SensorTag Technologies

	Bluetooth Smart	6LoWPAN	ZigBee	Wi-Fi
Price	\$29 <a href="#">Buy Now</a>	\$29 <a href="#">Buy Now</a>	\$29 <a href="#">Buy Now</a>	
Battery type	Coin cell	Coin cell	Coin cell	
Connects to Internet	Smartphone	BeagleBone gateway	BeagleBone gateway	
Beacon support	✓			
DevPack support	✓	✓	✓	Coming Soon!
Mesh network		✓	✓	
Range	50m / 150ft	100m / 300ft (extended with mesh network)	100m / 300ft (extended with mesh network)	
Max number of devices	8	200	200	
Battery lifetime*	1 year (1 second report interval)	1 year (1 second report interval)	1 year (1 second report interval)	
User Interface	App	App, Web	App, Web	

\* For station/end device, actual battery life varies with report interval

Wednesday, August 26, 2015

## Contiki 3.0 Released, New Hardware from Texas Instruments, Zolertia

Today the Contiki team announced the release of Contiki 3.0, the latest version of the open source IoT operating system! The 3.0 release is a huge step up from the 2.x branch and brings support for new and exciting hardware, a set of new network protocols, a bunch of improvements in the low-power mesh networking protocols, along with a large number of general stability improvements. This is, by far, the best Contiki release ever!

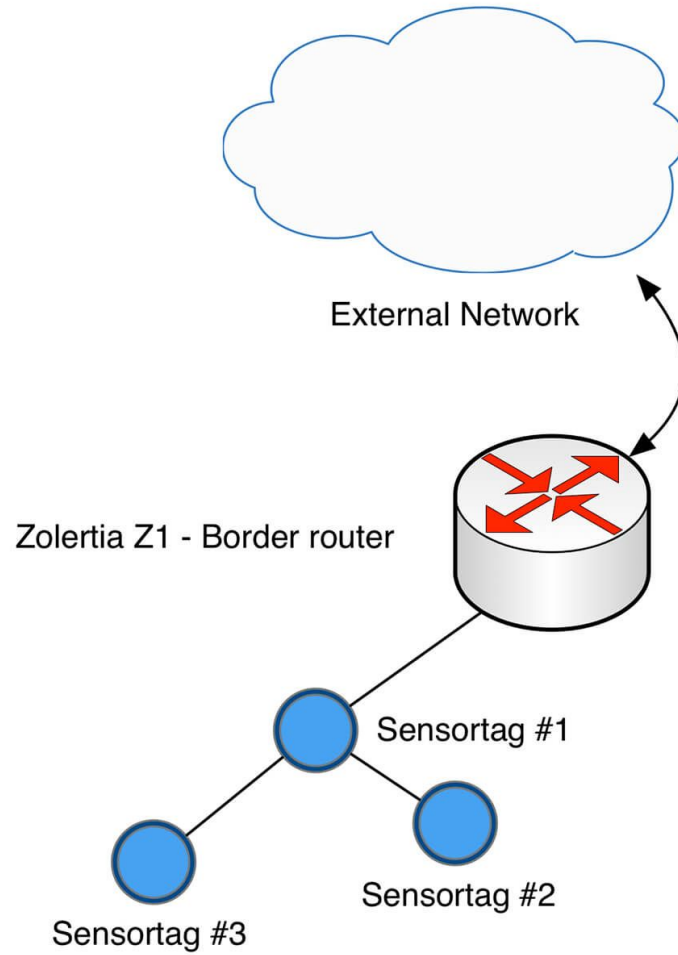
Contiki is the open source operating system for the Internet of Things, used by developers to bring low-power wireless connectivity to their products and projects. Read more about Contiki [here](#).

Since the the previous [2.7 release](#), which came out in November 2013, the Contiki team has merged some 500 pull requests with new code, bug fixes, and improvements.

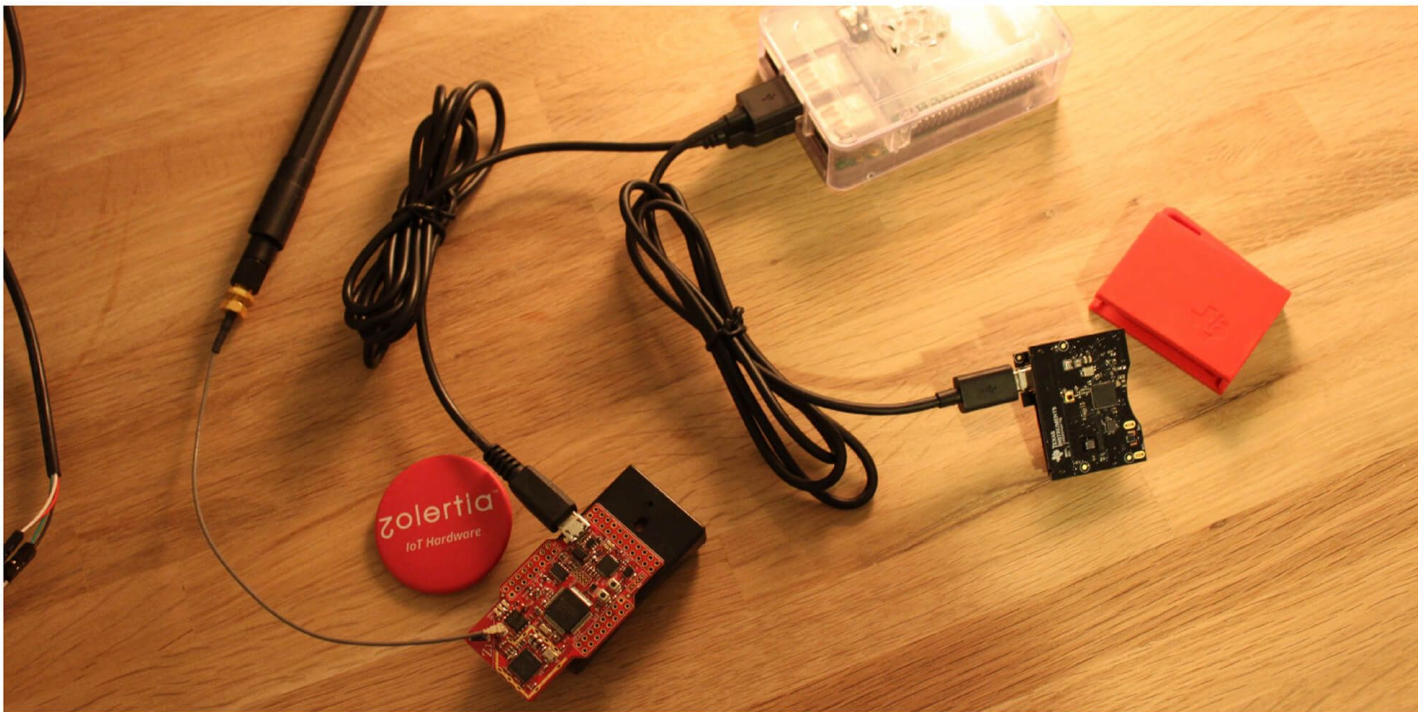
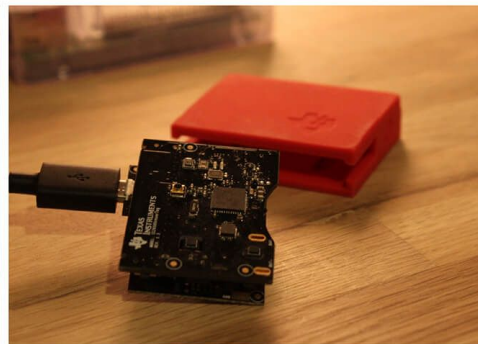
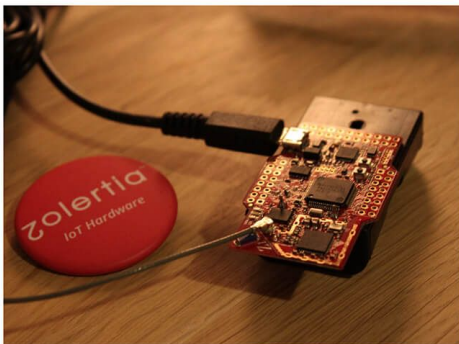
## New and Exciting Hardware

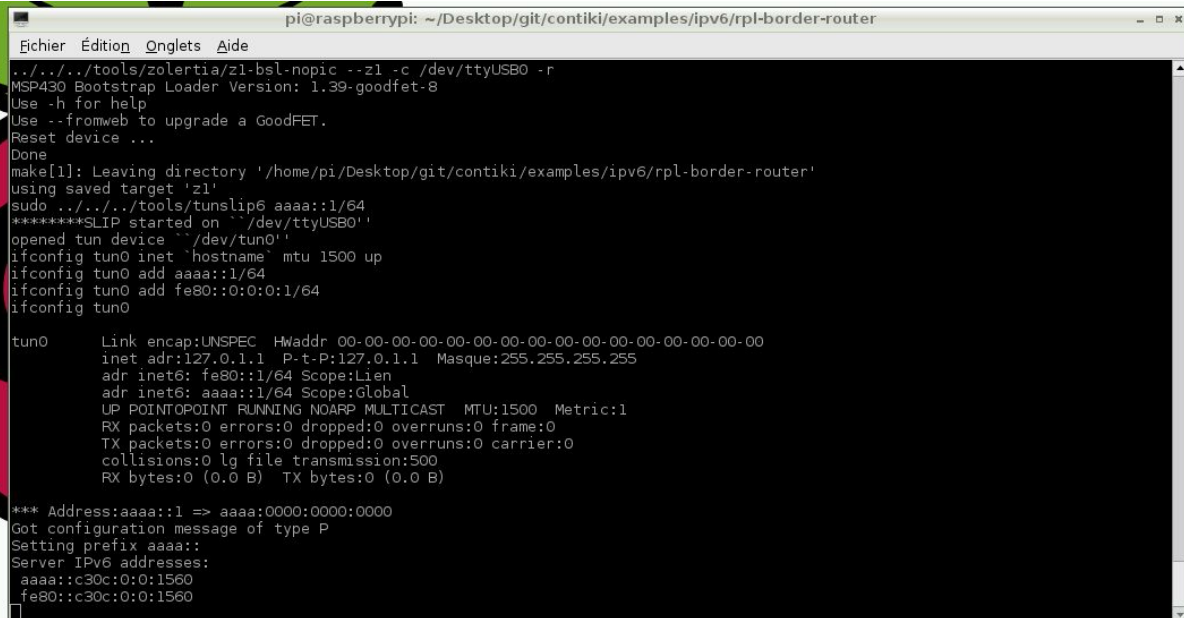
As the wireless world evolves, so does its hardware. Recently, many new Systems-on-a-Chip (SoCs) have been released, which makes hardware design much easier, as you only need a single chip for both radio communication and control.

Contiki 3.0 adds support for two new interesting hardware platforms: the Texas Instruments Sensortag and the Zolertia ReMote.

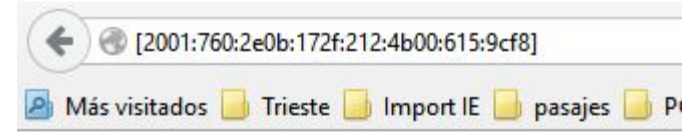








# Sensortag connected to a Zoul Border Router. UDP



## SensorTag

```
{ "measures":  
  [{ "isActive": true  
    , "guid": aaaaaaaaaa  
    , "pressure": 13.94  
    , "pressure_t": 27.69  
    , "humidity": 27.59  
    , "humidity_t": 40.69  
    , "battery": 24  
    , "key1": 4  
    , "key2": 1  
    , "reed": 10  
    , "buzzer": 0  
    , "LED1": 0  
    , "LED2": 0  
    , "Radio": 6lowpan  
    , "objtemp": 22.0  
    , "accelX": -0.65534  
    , "accelY": 0.2
```

[http://\[2001:760:2e0b:172f:212:4b00:615:9cf8\]/](http://[2001:760:2e0b:172f:212:4b00:615:9cf8]/)



## SensorTag

```
{ "measures":  
  [ { "isActive": true  
    , "guid": "aaaaaaaaa"  
    , "pressure": 163.67  
    , "pressure_t": 26.90  
    , "humidity": 26.73  
    , "humidity_t": 37.84  
    , "battery": 20  
    , "key1": 4  
    , "key2": 1  
    , "reed": 10  
    , "buzzer": 0  
    , "LED1": 0  
    , "LED2": 0  
    , "Radio": 6lowpan  
    , "objtemp": 22.906  
    , "accelX": -0.65534  
    , "accelY": -0.65535  
    , "accelZ": -65535.65532  
    , "gyroX": -0.65522  
    , "gyroY": 0.18  
    , "gyroZ": 0.61  
    , "magX": 0  
    , "magY": 0  
    , "magZ": 0  
    , "light": 26.906  
  } ]  
}
```

## Neighbors

```
fe80::212:4b00:790:fd07  
fe80::c30c:0:0:9e  
fe80::c30c:0:0:12c0
```

## Routes

```
2001:760:2e0b:172f:212:4b00:790:fd07/128 (via fe80::212:4b00:790:fd07) 16711412s
```

# Related links

- <http://www.ti.com/sensortag>
- [www.zolertia.io](http://www.zolertia.io)
- [http://processors.wiki.ti.com/index.php/CC2650\\_SensorTag\\_User's\\_Guide](http://processors.wiki.ti.com/index.php/CC2650_SensorTag_User's_Guide)
- <http://piratefatche.ch/getting-started-with-ti-6lowpan-sensortag/>

# Thanks

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