A Guide to SensorTag Hackathons: Resources

Michael Setton  
Founder and CEO IoT Stars

Jarle Boe  
Development Kit Manager  
Wireless Connectivity Solutions, Texas Instruments
Overview

We made the SimpleLink™ SensorTag kit with one simple goal: connect your product and receive sensor data from the cloud in three minutes. We wanted to make a development tool that encourages cool and crazy ideas for the Internet of Things (IoT) without having to deal with the complicated details that may restrict the most amazing concept before the first prototype is produced.

The SensorTag kit was created to make life easier for all developers with creative ideas regardless of their technical background; software developers, hardware developers, system architects, big data analytics, etc. have all embraced the SensorTag kit to bring their product ideas to life.

The SensorTag kit has already been used in a lot of Hackathons, and based on our collective experience from countless sleepless nights, we have assembled this list of resources for everything you need to create a hackathon of your own. From sample source code and 3D files for printing to tips on how to stay awake for 24 hours, we hope this guide can help you create the next exciting IoT device.

And remember, help is always available on our TI E2E™ community forum (www.ti.com/e2e), and remember to tweet about your projects by using #SensorTag and tag us @TXInstruments!

First step

(Do this step well ahead of the Hackathon)

Buy the SimpleLink SensorTag kit: https://store.ti.com/cc2650stk.aspx

Resources

Lean about the SimpleLink SensorTag kits (including the User Guide) on the following TI pages:

www.ti.com/sensortag

www.ti.com/sensortag-wiki

Getting started

The first step is to connect the SensorTag directly to a phone to access the sensor data through the Bluetooth® Smart interface. The app gives a direct link to the cloud interface to view the data in a web browser.

SensorTag Android™ app


SensorTag iOS app

IBM quick start cloud
https://quickstart.internetofthings.ibmcloud.com/#/
Replace the # in the link with the MAC address of your SensorTag

IBM cloud foundation recipe

Freeboard visualization
http://freeboard.io/

**Mobile app code development**

For mobile developers, we have released the complete SensorTag app source (Android) and a sample code (iOS) that shows how to get started.

**SensorTag software source for iOS**
https://git.ti.com/sensortag-ios-source-code-example

**SensorTag source code for Android**
https://git.ti.com/sensortag-20-android

**Other source codes**
https://github.com/Inanek/BleActionLog

**Making a mobile app for SensorTag using Javascript**

**SensorTag and Javascript source code:**
https://github.com/evothings/evothings-examples/tree/master/examples/ble-ti-sensortag-cc2650-demo

**Using Bluetooth low energy with Windows® 8.1**
http://sviluppomobile.blogspot.fr/2014/02/ble-for-windows-81-part-i.html
http://sviluppomobile.blogspot.fr/2014/06/ble-for-developers-in-windows-81-part-ii.html

**Writing Bluetooth Smart apps for Windows phones**
http://code.msdn.microsoft.com/windowsapps/Keep-The-Keys-Bluetooth-LE-6d4e6d47

**SensorTag with Windows Phone 8.1**
http://talkingaboutit.azurewebsites.net/post/windows-phone-8-1-ble-communications-part-1
http://talkingaboutit.azurewebsites.net/post/windows-phone-8-1-ble-communications-part-2

**Bluetooth low energy browser for multiple TI SensorTags: C# implementation for Windows 8.1**
An eBook by ilya Tepelboym
http://www.amazon.com/Bluetooth-Energy-Browser-Multiple-SensorTags-ebook/dp/B00NHXDJ0Q
Host Test App (HCI) implementation for TI SensorTag

In case you want to use an external MCU:

https://github.com/snegovick/HostTestApp-SensorTag

Connecting a SensorTag to an Android phone

A complete tutorial with source code by Mark Allison. Final app displays temperature and humidity. Includes a high level of detail about Bluetooth Smart and Android.

Bluetooth Smart background
http://blog.stylingandroid.com/bluetooth-le-part-1/

Messenger implementation
http://blog.stylingandroid.com/bluetooth-le-part-2/

Device discovery

GATT
http://blog.stylingandroid.com/bluetooth-le-part-4/

Descriptors and UUIDs

Fully working app
http://blog.stylingandroid.com/bluetooth-le-part-6/

Embedded firmware development

The SensorTag can easily be used without modifying the firmware. But if you want to make your own products you will have to get into the details of the SensorTag firmware.

The quickest way to get started is to use Code Composer Studio™ Cloud integrated development environment (IDE):

https://dev.ti.com/

If you prefer to install Code Composer Studio IDE on your PC you can download it directly.

http://www.ti.com/tool/ccstudio-wcs

Everything you need to develop your own Bluetooth Smart-enabled applications is covered in the SimpleLink Academy:

http://software-dl.ti.com/lprf/simplelink_academy/overview.html

SensorTag app implementation

Improving the UI
http://blog.stylingandroid.com/appui-part-1/

Adding icons

Changing background color based on sensor data

Action bar, device scan and handling disconnects
Improving UX during scans

Automatically connecting to the SensorTag
http://blog.stylingandroid.com/app-ui-ux-part-6/

SensorTag with Intel Edison board
https://communities.intel.com/thread/56145

Using SensorTags to monitor temperature and humidity in greenhouses (polytunnels)

Beacons

iBeacon™ app:

Eddystone™ example

Beacon library for Android
https://github.com/AltBeacon/android-beacon-library

iBeacon demos for iOS
http://www.dev freight.com/ibeacons-tutorial-ios-7-clbeaconregion-clbeacon/

Core location beacons
http://www.captechconsulting.com/blog/christopher-mann/ios-7-tutorial-series-core-location-beacons

How to use iBeacon and iOS 7 to enhance your apps:
http://www.appcoda.com/ios7-programming-ibeacons-tutorial/

Configure and calibrate an iOS devices acting as a Beacon
https://github.com/xamarin/monotouch-samples/tree/master/AirLocate

Region monitoring and iBeacon

Writing mobile iBeacon applications in Javascript

Two way iBeacon communication in the Swift programming language

Use a MAC running Maverick as an iBeacon
https://github.com/mttrb/BeaconOSX

Configure your iPhone or iPad as an iBeacon
http://blog.passkit.com/configure-iphone-ibeacon-transmitter/
**Quick Beacon**

Use Android L to configure your phone to transmit as an iBeacon – Uses AltBeacon format from Radius Networks.

https://github.com/AltBeacon/altbeacon-transmitter-android

**Determining indoor position using iBeacons**


**Physics of iBeacons**

RSSI formulas, noise etc. ... Overview from estimotes

http://www.slideshare.net/firstmarkcap/estimote-hardwired-nyc-september-2014

**General Bluetooth Smart resources**

**Bluetooth SIG – Smart Starter Kit**


**Bluetooth SIG – Specifications**


**GATT – Specifications**

https://developer.bluetooth.org/gatt/Pages/default.aspx

**Texas Instruments – Introduction to TI SimpleLink – Bluetooth Smart for the IoT**

http://focus.ti.com/docs/training/catalog/events/event.jhtml?sku=OLT313008&DCMP=lpref-bletrain&HQS=lpref-bletrain-bn

**UI and UX design resources**

**A psychologist’s view of UX design**

http://uxmag.com/articles/the-psychologists-view-of-ux-design

**Easy GUI prototyping: (MAC OS X, Windows, Linux)**

Pencil Project: http://pencil.evolus.vn/

Pencil provides various built-in shapes collection for drawing different types of user interface ranging from desktop to mobile platforms.

**Think your app is beautiful? Not without user experience**

http://www.smashingmagazine.com/2014/09/01/think-your-app-is-beautiful-not-without-user-experience-design/

**From Sketch to Execution: 20 UI Concept Sketches**

http://designrshub.com/2014/02/ui-concept-sketches.html

**Flat UI kits for designers**

http://graphicdesignjunction.com/2014/01/creative-flat-ui-kits/

**Innovative design concepts to boost user experience**

http://graphicdesignjunction.com/2014/01/innovative-ui-design-concepts-to-boost-user-experience/

**Displaying change between 2 points in time**

http://www.perceptualedge.com/articles/visual_business_intelligence/displaying_change_between_two_points_in_time.pdf
Introducing bandlines

Practical rules for using colors in charts

Android design

Typography and style
http://www.google.com/design/spec/style/typography.html

http://www.theseus.fi/handle/10024/72914

Android Cheatsheet for graphic designers
http://petrnohejl.github.io/Android-Cheatsheet-For-Graphic-Designers/

Bluetooth Packet capture on Android

iOS design

The iOS design guidelines
http://iosdesign.ivomynttinen.com/

Designing for iOS

Integrating SensorTag with Swift
http://anasimtiaz.com/?p=201

App prototyping

Flinfo: Web-based App prototyping tool
https://www.flinto.com/

Proto IO
http://proto.io/

MarvelApp
https://marvelapp.com/

App implementation

Node JS module for Bluetooth Smart peripherals
https://github.com/sandeepmistry/bleno

Node JS module for Bluetooth Smart central devices
https://github.com/sandeepmistry/noble

Node JS and Websockets
http://www.slideshare.net/gonzaloayuso/nodejs-and-websockets
Introduction to Bluetooth low energy security  
http://twelvedot.com/blog/?p=621

Building real time applications with Android and Websockets  
http://www.slideshare.net/sergialmar/building-realtime-applications-with-android-and-websockets

Controlling ultra-low power CC2650 wireless MCU from anywhere in the world with Xsockets  

How PubNub takes Socket IO to the next level  
http://www.pubnub.com/blog/pubnub-takes-socketio-next-level/

Stream content to an interactive billboard from a phone  

Connecting with WebSockets  

Get some ideas from these pages …  
http://www.pubnub.com/blog/iot-demo-ibeacon-mqtt-arduino-raspberry-pi/

Plush toy activated by beacons  
https://github.com/solarkennedy/equail

Skyway: Temasys WebRTC SDK  
https://github.com/Temasys/SkywayJS#skywayjs
SkywayJS is an open-source client-side library for your web-browser that enables any website to easily leverage the capabilities of WebRTC and its direct data streaming powers between peers for audio/video conferencing or file transfer.

Streaming data visualization with Plot.ly  
https://github.com/plotly/plotly-nodejs

Windows

Bluetooth and NFC for Windows 8.1  
http://www.slideshare.net/TheOliver/windows-phone-8-13-near-field-communications-and-bluetooth?related=1
Azure Mobile Services
https://github.com/Azure/azure-mobile-services

Using Windows Azure mobile services in Android applications

Developing Windows Azure Mobile Services server side

Using ASP.NET SignalR, Azure Mobile Service and Websockets for real time, bi directional communications with mobile applications.

Use Socket IO with Azure Mobile Service Node backend

Windows Azure Node JS developer centre

Windows Azure SDK for Node JS
https://github.com/WindowsAzure/azure-sdk-for-node

Socket IO store which uses service bus pub/sub for scale out
https://github.com/WindowsAzure/socket.io-servicebus

Building text-to-speech applications using Windows Phone 8.1 and Cortana overview

Miscellaneous

Why we need storytellers at the heart of product development

Tips for your first Hackathon
http://tech.blog.box.com/2014/06/5-tips-for-your-first-hackathon/

How you can prepare for a Hackathon
https://sendgrid.com/blog/prepare-hackathon/

Increase your odds of winning a Hackathon
https://sendgrid.com/blog/win-hackathon-increase-odds/

How to give a great Hackathon presentation
http://techcrunch.com/2014/09/01/how-to-crush-your-hackathon-demo/

Principles of a killer Hackathon demo
https://sendgrid.com/blog/principles-of-a-killer-hackathon-demo/
Make story telling part of hacking

Tips for winning Hackathons
http://blogs.msdn.com/b/matt-harrington/archive/2014/05/03/tips-for-winning-hackathons.aspx

Stay awake during the night
http://www.wikihow.com/Stay-Awake-at-Night

Four ways to stay awake without coffee
http://www.active.com/nutrition/articles/4-ways-to-stay-awake-without-coffee

Music collections to listen to while coding
http://8tracks.com/jfinit/collections/upbeat

Stretches to relieve tension and pain
http://www.eyeprotectorpro.com/rsirepetitive-strain-injury-explained-eyeprotectorpro/stretches/

Tips to perform well at a Hackathon
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### Applications

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| Communications and Telecom    | www.ti.com/communications     |
| Computers and Peripherals    | www.ti.com/computers          |
| Consumer Electronics         | www.ti.com/consumer-apps      |
| Energy and Lighting          | www.ti.com/energy             |
| Industrial                   | www.ti.com/industrial         |
| Medical                      | www.ti.com/medical            |
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