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

Order Now

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/lnanek/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/B00NHXDJQ
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.devfright.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

Flinto: 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
IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have not been so designated is solely at the Buyer’s risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio
www.ti.com/audio

Amplifiers
amplifier.ti.com

Data Converters
dataconverter.ti.com

DLP® Products
www.dlp.com

DSP
dsp.ti.com

Clocks and Timers
www.ti.com/clocks

Interface
interface.ti.com

Logic
logic.ti.com

Power Mgmt
power.ti.com

Microcontrollers
microcontroller.ti.com

RFID
www.ti-rfid.com

OMAP Applications Processors
www.ti.com/omap

Wireless Connectivity
www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation
www.ti.com/automotive

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

Security
www.ti.com/security

Space, Avionics and Defense
www.ti.com/space-avionics-defense

Video and Imaging
www.ti.com/video

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2016, Texas Instruments Incorporated