A Guide to SensorTag Hackathons: Resources

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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

https://play.google.com/store/apps/details?id=com.ti.ble.sensortag

SensorTag iOS app

https://itunes.apple.com/us/app/ti-sensortag/id552918064?mt=8

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

https://developer.ibm.com/recipes/tutorials/connect-a-cc2650-sensortag-to-the-iot-foundations-quickstart/

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

https://play.google.com/store/apps/details?id=com.togosoft.sensortag2

Making a mobile app for SensorTag using Javascript

http://evothings.com/quick-guide-to-making-a-mobile-app-for-the-ti-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

http://apps.microsoft.com/windows/en-us/app/best-ti-sensortag-ble/ec511d25-9a15-4b52-8749-e4a05befa4ed/m/ROW

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-Multple-SensorTags-ebook/dp/B00NHXDJOQ

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
http://blog.stylingandroid.com/bluetooth-le-part-3/

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

Descriptors and UUIDs
http://blog.stylingandroid.com/bluetooth-le-part-5/

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

http://blog.stylingandroid.com/app-ui-ux-part-2/

Changing background color based on sensor data

http://blog.stylingandroid.com/app-ui-ux-part-3/

Action bar, device scan and handling disconnects

http://blog.stylingandroid.com/app-ui-ux-part-4/

Improving UX during scans

http://blog.stylingandroid.com/app-uiux-part-5/

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)

http://blog.risingstack.com/using-devops-tools-to-monitor-polytunnel/

Beacons

iBeacon™ app:

http://processors.wiki.ti.com/index.php/SensorTag_with_iBeacon

Eddystone™ example

http://processors.wiki.ti.com/index.php/CC26xx_Eddystone_Beacon_Implementation

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/

Source code: **http://www.devfright.com/wp-content/uploads/2013/09/iBeacons-Demo.zip**

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

https://developer.apple.com/library/ios/documentation/userexperience/Conceptual/LocationAwarenessPG/RegionMonitoring/RegionMonitoring.html

Writing mobile iBeacon applications in Javascript

http://evothings.com/quick-guide-to-writing-mobile-ibeacon-applications-in-javascript/

Two way iBeacon communication in the Swift programming language

http://www.pubnub.com/blog/smart-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

http://techblog.rga.com/determining-indoor-position-using-ibeacon/

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

https://developer.bluetooth.org/Pages/smart-starter-kit.aspx

Bluetooth SIG – Specifications

https://www.bluetooth.org/en-us/specification/adopted-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=lprf-bletrain&HQS=lprf-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

http://www.perceptualedge.com/articles/visual_business_intelligence/introducing_bandlines.pdf

Practical rules for using colors in charts

http://www.perceptualedge.com/articles/visual_business_intelligence/rules_for_using_color.pdf

Android design

Typography and style

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

Practical Steps for Android Development for Graphic Designers, Vesa Antikainen, Thesis, 2014

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

https://viaforensics.com/articles-presentations/bluetooth-packet-capture-android.html

iOS design

The iOS design guidelines

http://iosdesign.ivomynttinen.com/

Designing for iOS

https://developer.apple.com/library/ios/documentation/userexperience/conceptual/MobileHIG/index.html

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

https://e2e.ti.com/blogs_/b/connecting_wirelessly/archive/2015/06/11/controlling-ultra-low-power-cc2650-wireless-mcu-from-anywhere-in-the-world

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

http://www.pubnub.com/blog/mcdonalds-ios-and-android-digital-billboard-campaign/

Connecting with WebSockets

http://msdn.microsoft.com/en-us/library/windows/apps/hh761442.aspx

Get some ideas from these pages …

http://evothings.com/magic-stone-make-mobile-iot-applications-using-the-ti-sensortag-in-javascript/

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

http://makezine.com/2014/01/21/streaming-data-with-plotly/

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-communcations-and-bluetooth?related=1

Azure Mobile Services

https://github.com/Azure/azure-mobile-services

Using Windows Azure mobile services in Android applications

http://www.codeguru.com/csharp/azure/using-windows-azure-mobile-services-in-android-applications.htm

Developing Windows Azure Mobile Services server side

http://blog.maartenballiauw.be/post/2013/10/11/Developing-Windows-Azure-Mobile-Services-server-side.aspx

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

http://blogs.msdn.com/b/azuremobile/archive/2014/05/30/realtime-with-signalr-and-azure-mobile-net-backend.aspx

Use Socket IO with Azure Mobile Service Node backend

http://azure.microsoft.com/blog/2014/08/26/how-to-use-socket-io-with-azure-mobile-service-node-backend/

Windows Azure Node JS developer centre

http://www.windowsazure.com/en-us/develop/nodejs/

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

http://www.dotnetcurry.com/showarticle.aspx?ID=1005

Miscellaneous

Why we need storytellers at the heart of product development

http://uxmag.com/articles/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

https://medium.com/hackers-and-hacking/hackathon-stories-2077482865f3

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

http://blog.hackerearth.com/2015/11/tips-perform-well-hackathon.html

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Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

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