

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

Learn 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/lnanek/BleActionLog>

<https://play.google.com/store/apps/details?id=com.togosoftware.sensortag2>

Making a mobile app for SensorTag using Javascript

<http://evthings.com/quick-guide-to-making-a-mobile-app-for-the-ti-sensortag-using-javascript/>

SensorTag and Javascript source code:

<https://github.com/evthings/evthings-examples/tree/master/examples/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-e4a05bfa4ed/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-Multiple-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-ui-ux-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.capttechconsulting.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 estimates

<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=lpf-bletrain&HQS=lpf-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.ivomyntinen.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://evthings.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: Terasys WebRTC SDK

<https://github.com/Terasys/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-communications-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

<http://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/stretchers/>

Tips to perform well at a Hackathon

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

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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

TI E2E Community

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