

Sensor Software Users Guide

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1 Introduction

This document describes how to install and work with the ADI-SensorSoftware pack file. It explains what is included with the pack file and how to configure the software to run the example applications that accompanies this package.

This document is intended for users who want to write software using Sensor Software Pack. It assumes some familiarity with CrossCore Embedded Studio® and the C/C++ programming language.

Note that this document references example applications that use the Software Software Pack but are not actually located in this package . Supported Board Support Packs will contain these examples.

1.1 Acronyms and Terms

ADI	Analog Devices, Inc.
API	Application Programming Interface
BSP	Board Support Pack
CCES	CrossCore Embedded Studio®
CMSIS	Cortex® Microcontroller Software Interface Standard
DFP	Device Family Pack
HRM	Hardware Reference Manual
NoOS	No Operation System
RTE	Run-Time Environment
SoC	System on a Chip

1.2 Conventions

Throughout this document, we refer to important installation locations. These locations are defined here.

- `<cces_root>`
 - The default CCES installer for CCES 2.6.0 places the product at location **C:**
/Analog Devices/CrossCore Embedded Studio 2.6.0, but the install location may vary depending on user preferences.
 - The default packs are placed at location `<cces_root>/ARM/packs`
`/AnalogDevices`.

1.3 References

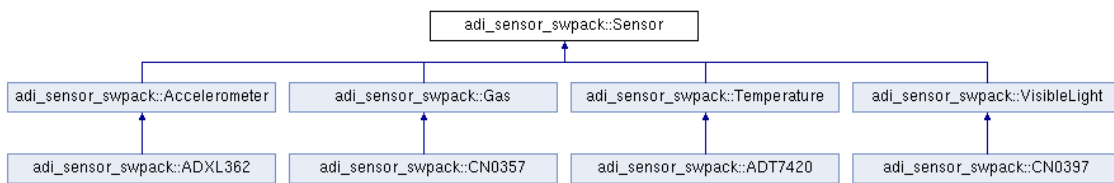
1. CrossCore Embedded Studio® (CCES) [<http://www.analog.com>]
2. ARM CMSIS PACK [www.keil.com/cmsis/pack]

1.4 Additional Information

For more information on the latest ADI processors, silicon errata, code examples, development tools, system services and devices drivers, technical support and any other additional information, please visit our website at www.analog.com/processors.

2 Product Overview

Analog Devices Sensor Software Pack (ADI-SensorSoftware) is a collection of various sensor software components and associated examples. Sensor component software uses C++ classes to abstract the common features across different sensor types. Interface to the underlying peripheral and its configuration is done in the sensor class itself, so applications can simply instantiate the object and use its services. The below class hierarchy shows the available sensor classes..



3 Installation Components

Before installing the ADI Sensor Pack 1.1.0, the following should be installed.

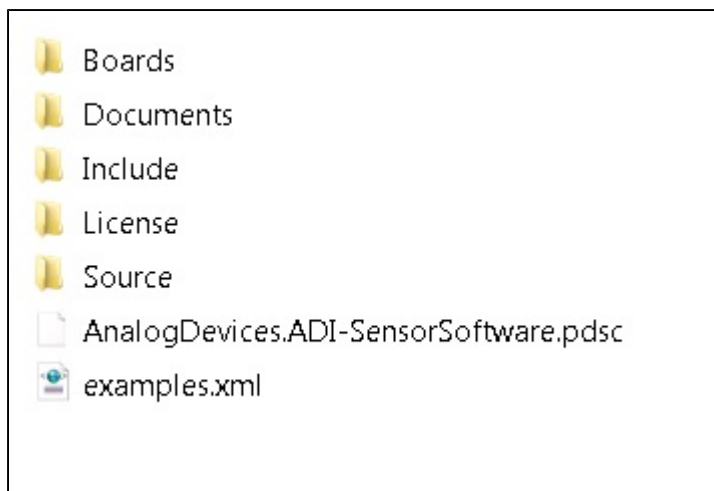
- CrossCore Embedded Studio ® 2.6.0
- Device Family Pack for the targeted processor
- Board Support Pack for the targeted board ([**Optional**]: only to get example code)

This software is released in the form of a CMSIS Pack file. CCES will extract the contents of the Pack file into the CCES installation directory. This allows for a clean partitioning of software delivered by ADI and software created by the user. The Sensor Software Pack contents (software framework, documentation, etc.) are placed at the following location

- CrossCore Embedded Studio® : `<cces_root>/ARM/packs/AnalogDevices/ADI-SensorSoftware/x.y.z`

where **x.y.z** is the installed pack version number. Figure 1 shows the contents that will be placed at this location after the installation has completed.

Figure 1. Installation Directory Structure



3.1 CCES Installation

To install a new Sensor Pack Software or update an existing Sensor Software go to CMSIS Pack Manager perspective, shown in Figure 2. If the Pack Manager perspective was not opened previously, the CMSIS Pack Manager icon may not be present on the toolbar as shown below. In that case, the Pack Manager perspective can be opened by clicking *Window Perspective Open Perspective Other Pack Manager*. There are two methods that can be used to install the Sensor Pack described below.

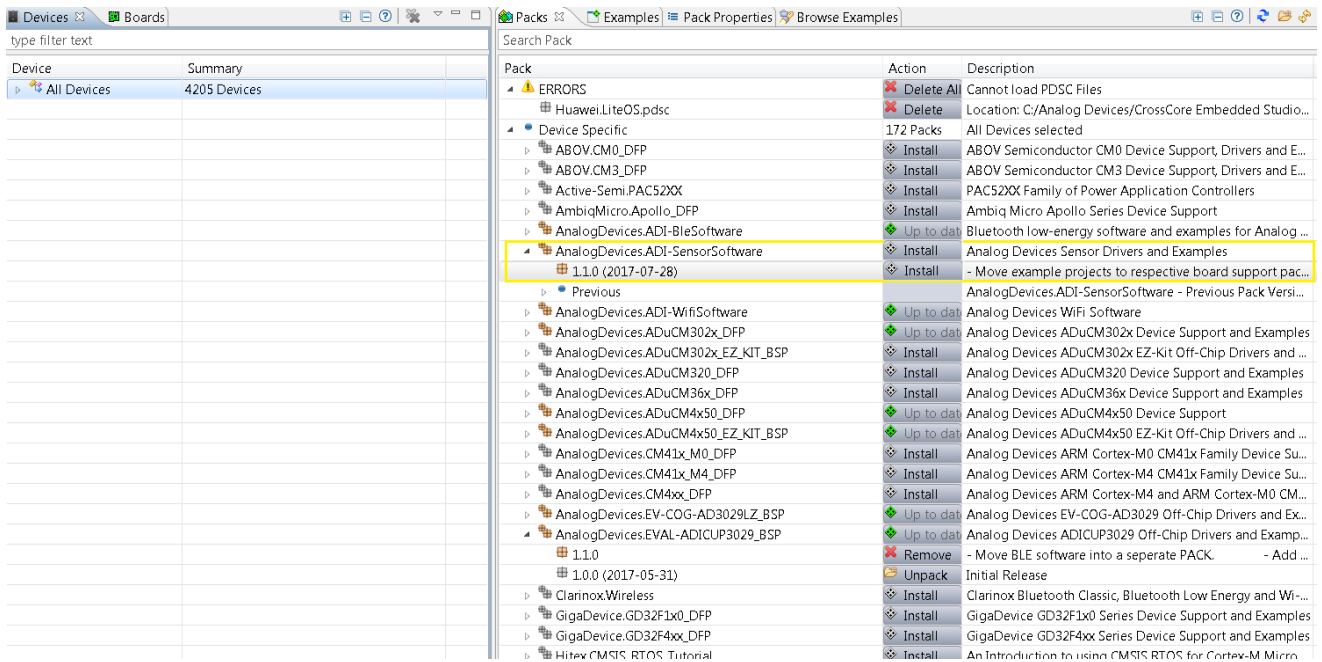


Figure 2. CMSIS Pack Manager Perspective

3.1.1 Web Installation

The Sensor Software Pack can be installed directly from the web using CCES, the user does not need to download the file and open it with CCES. This can be done by first refreshing the CMSIS Pack Manager (the blue arrows in the top left of the *Pack* tab). This will display a list of available Pack files as shown in Figure 3. Clicking on a supported processor such as the "ADuCM302x Series" will show the Sensor Pack in the *Pack* tab under *Device Specific* section as "AnalogDevices.ADI-SensorSoftware". Click "Install" and accept the license agreement in order to install the Sensor Software Pack.

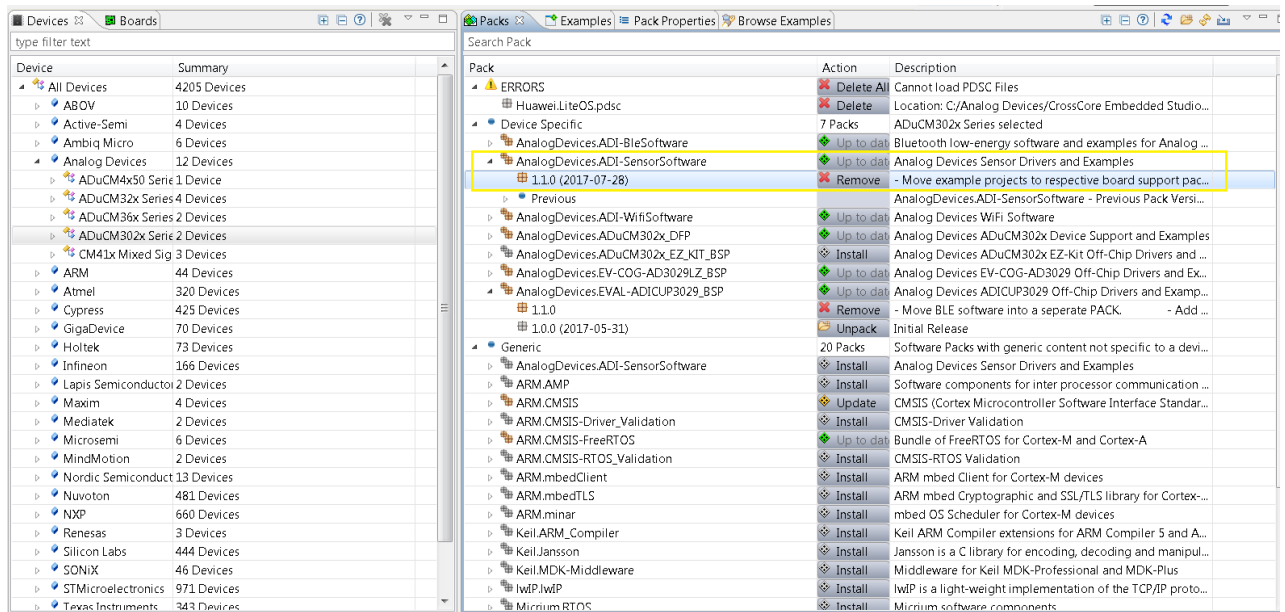


Figure 3. Available Pack Files

3.1.2 Local Installation

If the user has already obtained the Pack file, it can be installed without using the method described above. Click "Import Existing Packs" (the folder icon in the *Pack* tab) and then browse to the Pack file.

4 Example Projects

4.1 Sensor Examples

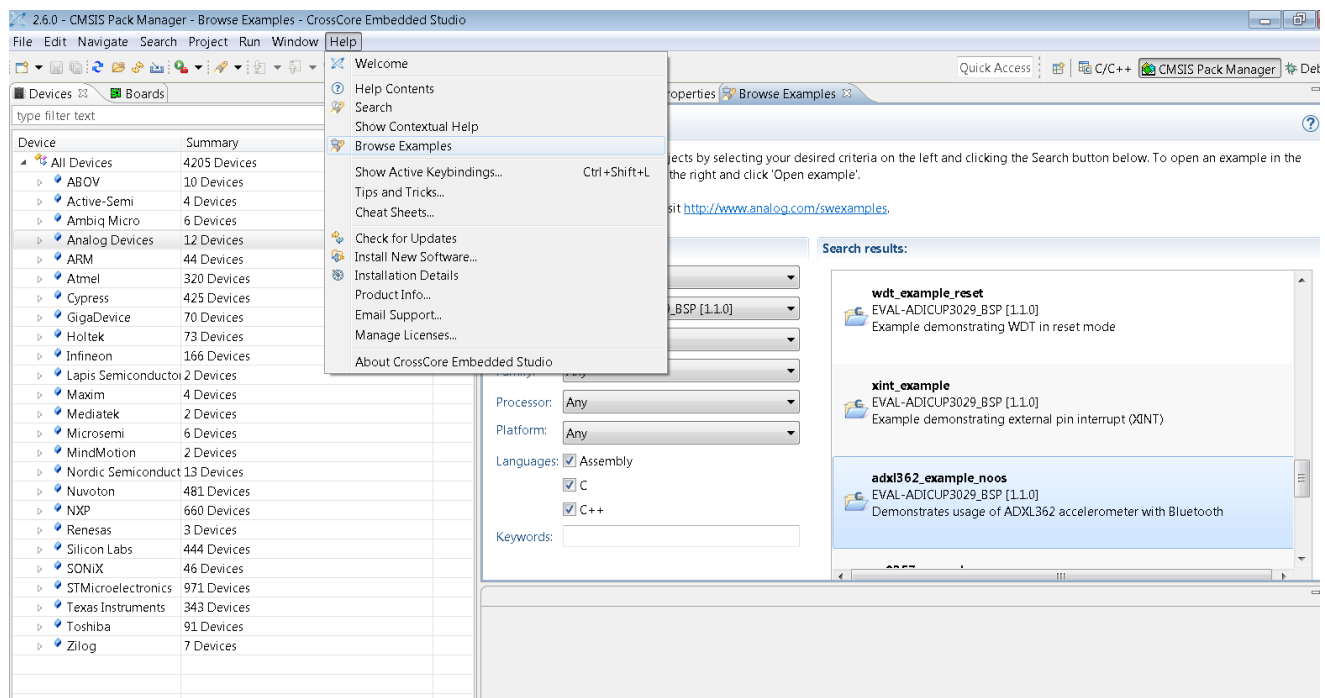
Board Support Packs that support the Sensor Software pack contain the example(s) given below.

- ADXL362 Accelerometer example
- ADT7420 Temperature Sensor example
- CO Toxic Gas measurement example
- Visible Light Detection/Measurement example

All sensor examples work with or without Bluetooth as described in the associated example's readme file. When Bluetooth is enabled all examples send sensor data to *IoTNode* android application. Please refer to *IoT_Node_Users_Guide.pdf* present in the `<cces_root>/ARM/packs/AnalogDevices/EVAL-ADICUP3029_BSP/1.0.0/Documents` folder.

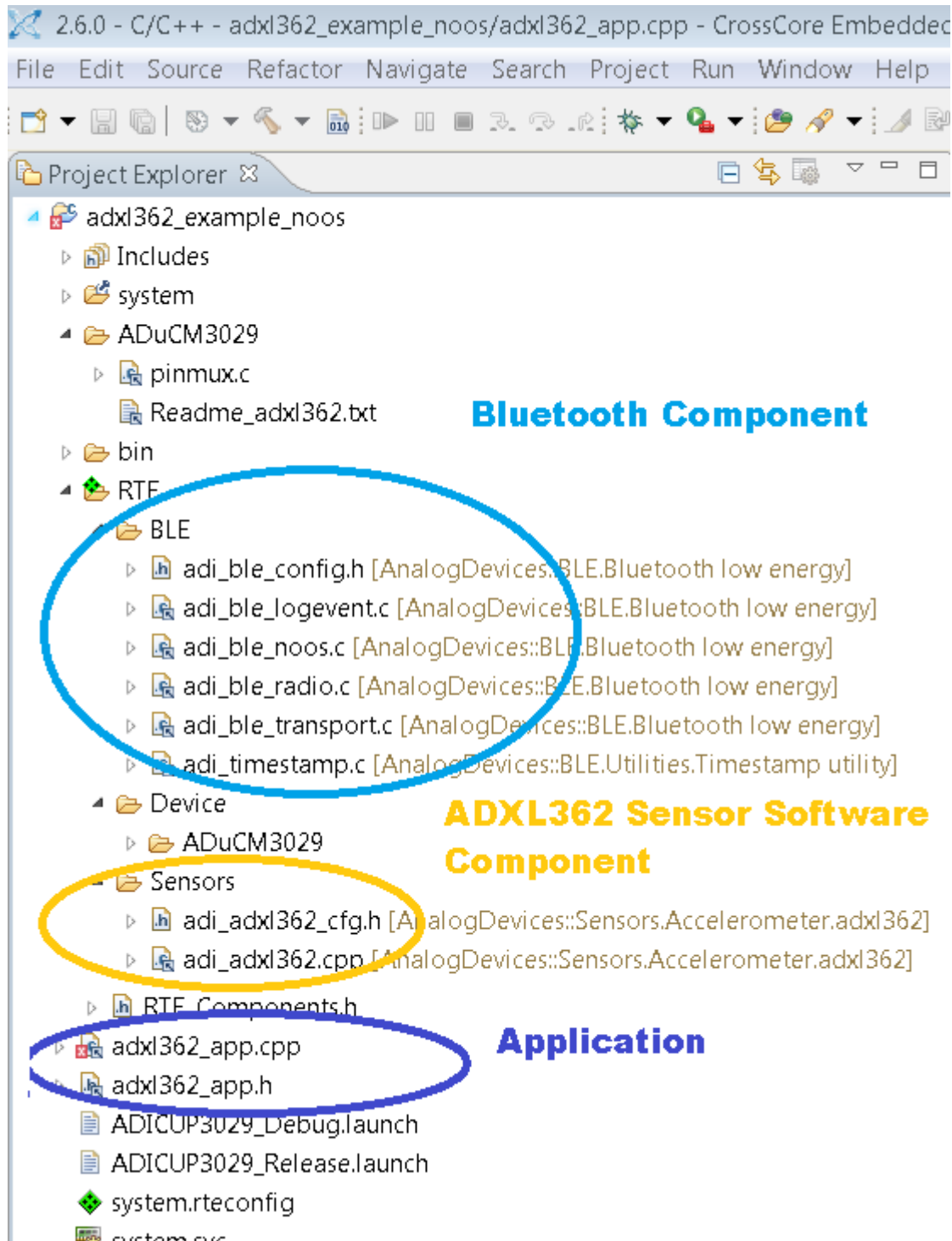
4.2 Opening Example

Examples can be opened by using CCES Browse Examples window as shown below. Double click on the example to open the project.



4.3 Example Layout

The layout of the ADXL362 example is given below. All sensor examples follow similar layout.

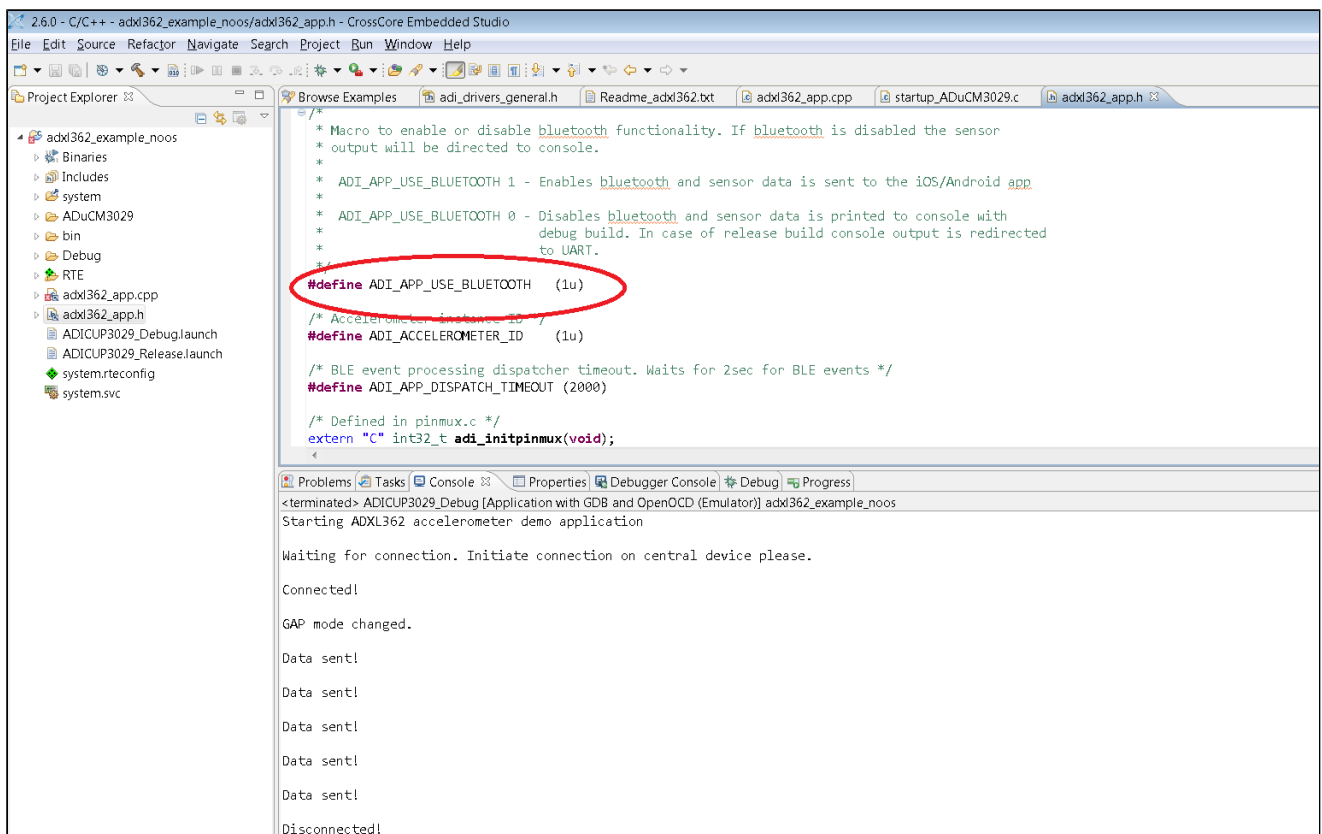


4.4 Running the example

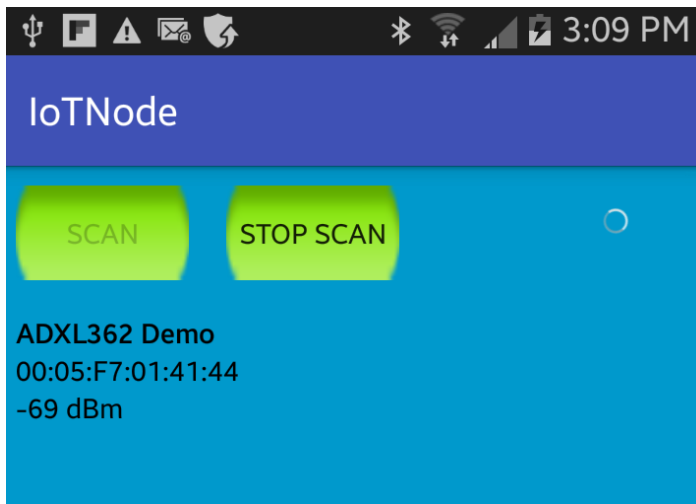
Follow below steps in order to run the project

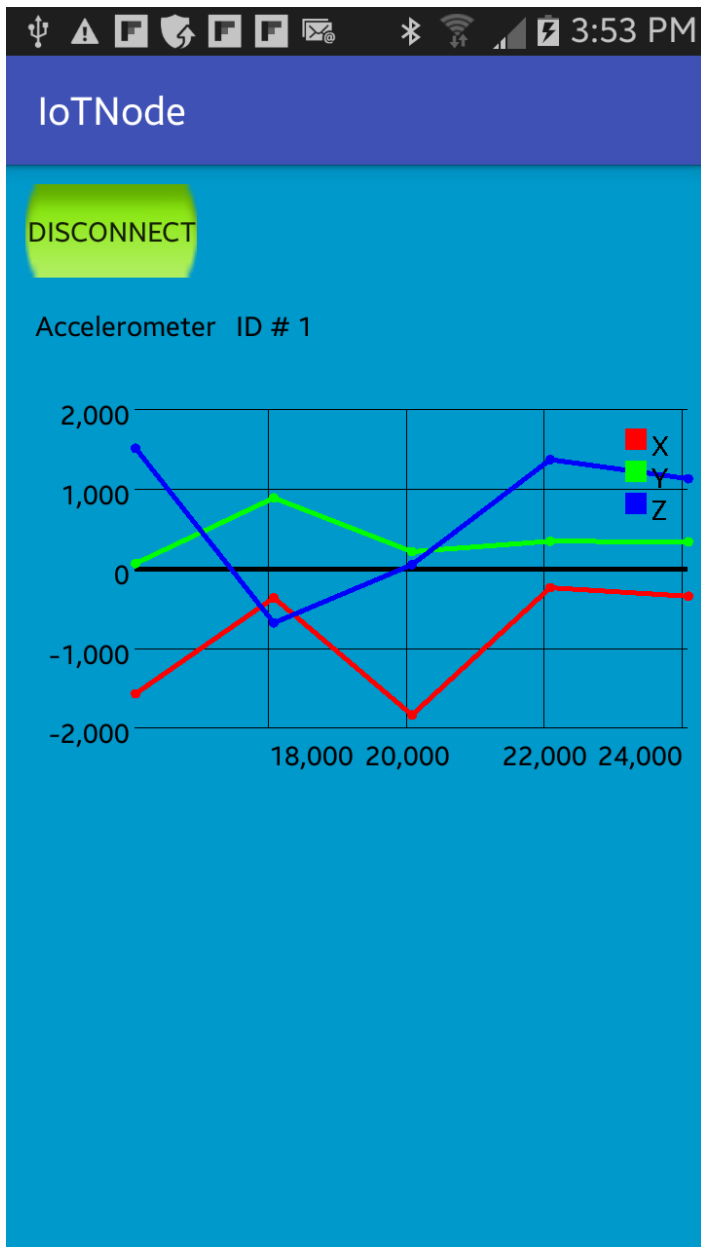
1. Open the project and build
2. Set up hardware as described in the associated project Readme file
3. Press Run Debug CCES menu option
4. Run the application
5. Open the Android application and connect to the target

The screen shots below show the adxl362_example_noos example application working in conjunction with the Android application



Android application screen shots





5 Data Packet Format

This section will cover data packet format that is to be used in conjunction with the IoTNode application.

5.1 Sensor Data Packet

Packet Type (MSB)	ID of Sensor (LSB)	Sensor Type	RTC Time Stamp	Sensor Data
1 bit	7 bits			
1 byte		1 byte	4 bytes	14 bytes

5.2 Explanation of Fields

5.2.1 Packet Type

1 (Always)

5.2.2 ID of Sensor

A 7-bit unique identifier for an instance of a particular sensor.

5.2.3 Sensor Type and Sensor Data

Each sensor type such as accelerometer, temperature, CO, etc. is assigned an ID value and an expected data format. Note: The Sensor data field is expected in the order listed in the chart below. For example the Accelerometer will expect 2-Byte X, then 2-Byte Y and then 2-Byte Z data in a single Sensor Data field.

Sensor Type Value (decimal)	Sensor	Sensor Data
01	Accelerometer (2G Sensitivity)	X: 2-Byte, Y: 2-Byte, Z: 2-Byte
02	CO Sensor	Ppm value is sent in float
03	Temperature Sensor	Celcius value is sent in float

04	String	1-Byte length of string, x-Byte string
11	Accelerometer (4G Sensitivity)	X: 2-Byte, Y: 2-Byte, Z: 2-Byte
12	Accelerometer (8G Sensitivity)	X: 2-Byte, Y: 2-Byte, Z: 2-Byte

5.2.4 Time Stamp

4-byte timestamp associated with a data point. User specified units.