NSP32 SDK®

Android Developer Guide

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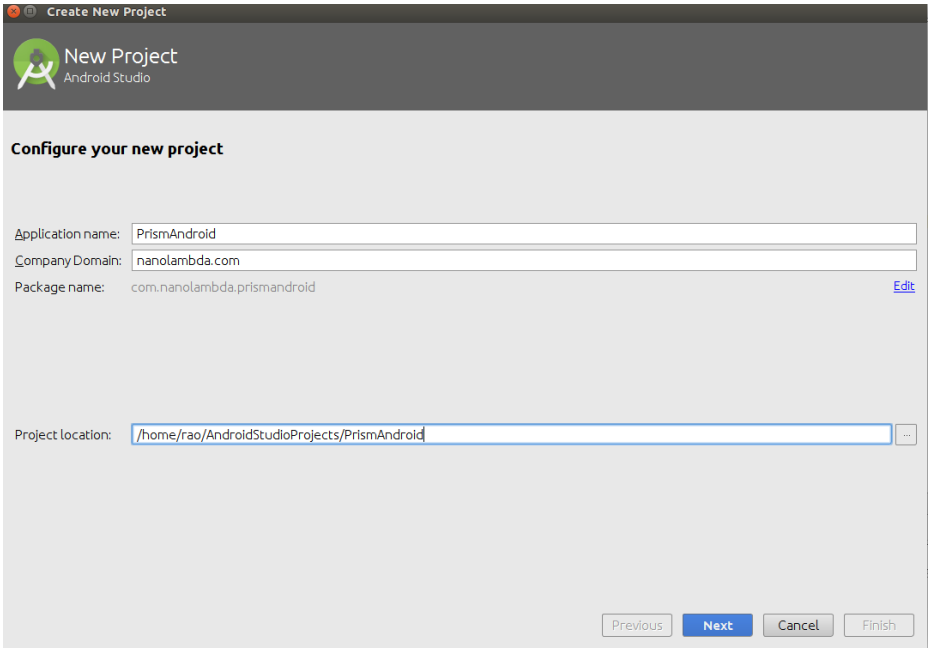
Application Programming Interface (API) For NSP32 Spectral Sensor

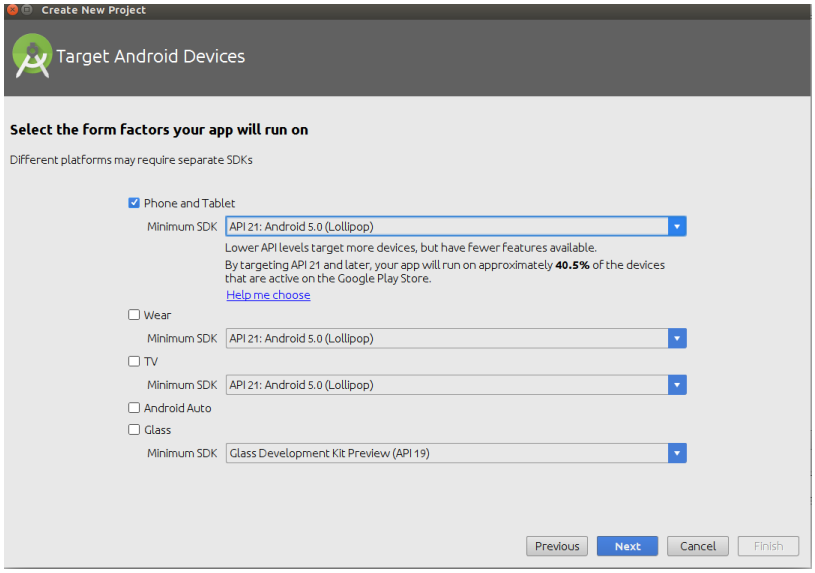
NSP32 application programming interface (API) is a list of all classes that are part of the NSP32 Software Development Kit (SDK). It includes all libraries, classes, and interfaces, along with their methods, fields, and constructors. These prewritten classes provide a tremendous amount of functionality to a programmer. A programmer should be aware of these classes and should know how to use them. If you browse through the list of packages in the API, you will observe that there are packages written for reading data from NSP32 spectral sensor, connecting single or multiple sensors, managing input and output, getting spectrum data for single or multiple sensors, and many more. Please browse this manual for complete list of available functions and their descriptions to see how they can be used.

Developing Android Example:

Insert Application, company Domain, and Project Location. After that click next. You can choose your own application, company domain, and projection location.

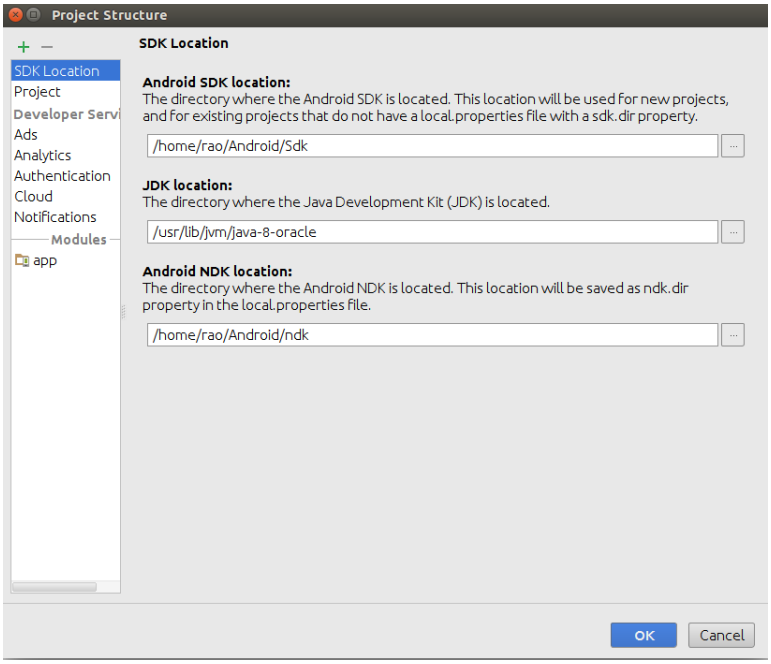


We will work with Phone and Tablet so select this option and select Minimum SDK from drop-down menu. (API-21: Android 5.0 (Lollipop)). After that Click Next.

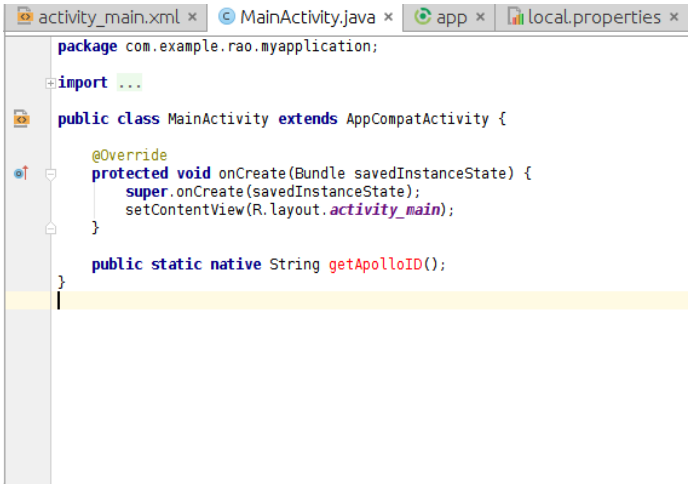


Select Empty Activity and click next and then click finish.

1. **NDK Path:** First of all write the NDK path in local.properties or you can set it by File->Project Structure->SDK Location. In the last option set the NDK location.



2. Write one native function in MainActivity. This function will be interface with native libraries. Let's take an example of getting sensorID from apollo. This function can have any name, it doesn't need to be name from Crystal-libraries.

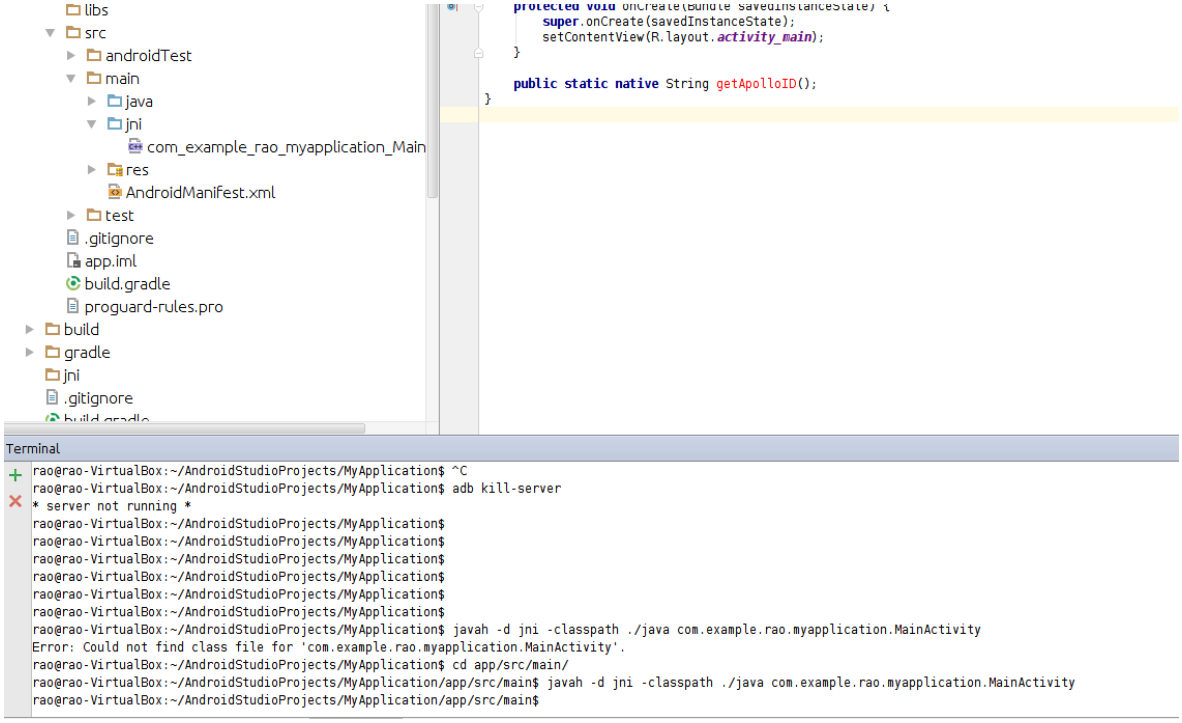


3. Now open the terminal in the Android studio and write this command.

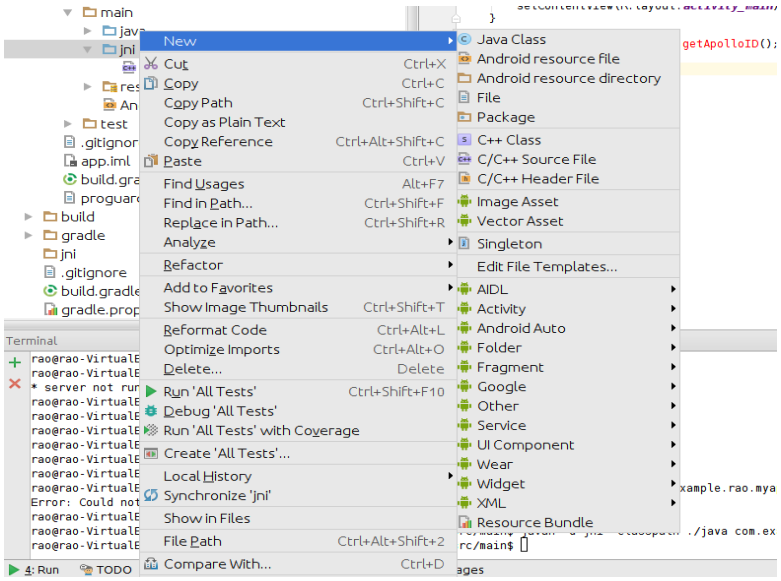
   cd app/src/main

   javah -d jni -classpath ./java com.example.nanoandroid.MainActivity

The above command will make one directory with the name of "**jni**" in app->src->main and in that directory you will see one header file with the name of your package.

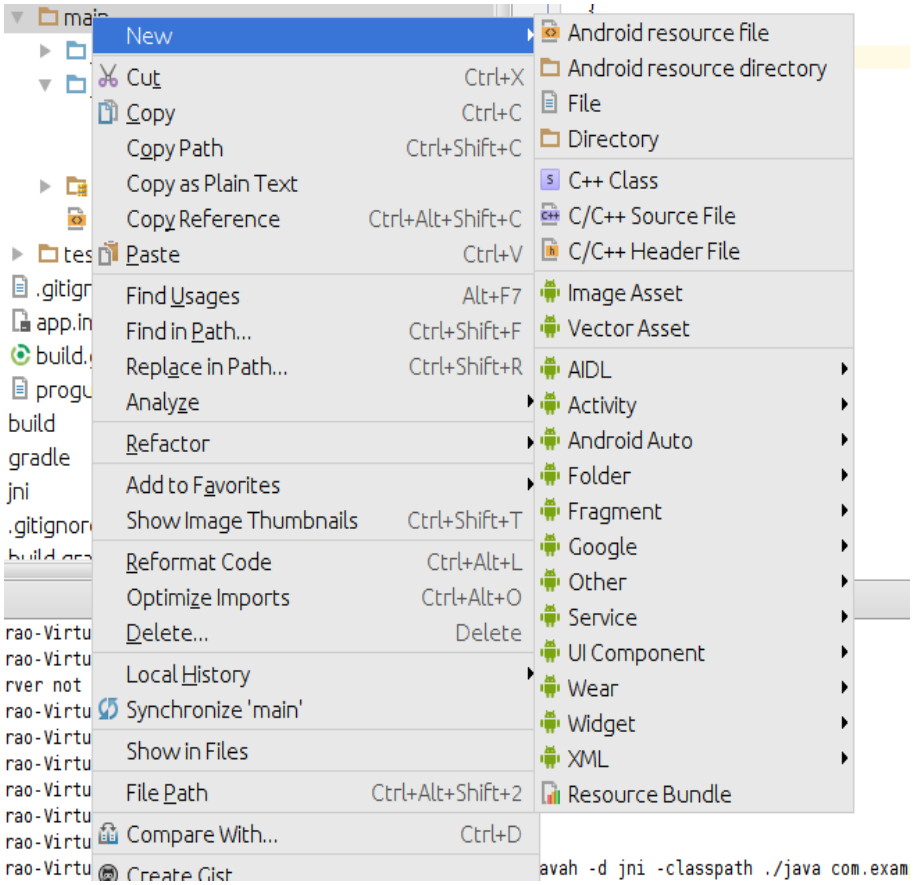


4. In jni directory make one main.cpp file. Right click on the jni and select New->C/C++ source file.



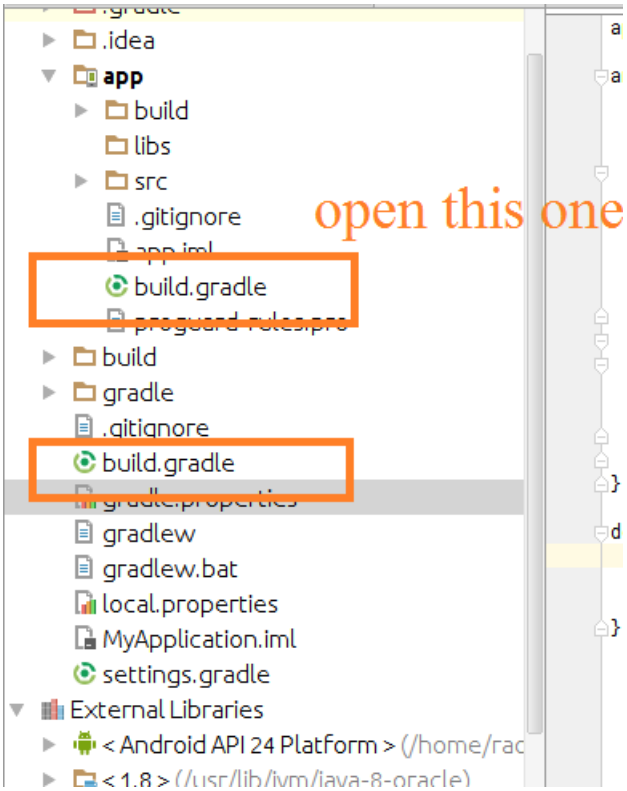
5. In the main.cpp file. Include the header file which we generated in step 9.

6. In the function write your C/C++ code.
7. Make one new folder in Project/app/src/main with the name of **jniLibs**. Right click on the main and select New->Directory.



8. In jniLibs Folder, create one more folder with the specific architecture. For our case it is "**armeabi-v7a**". In this folder copy all the cross-compiled libraries.

9. Now open build.gradle file. Notice that there are two build.gradle in this project. Remember to open the one under app folder.



10. In this build.gradle file, we need to tell where our native libraries and header files are. For user convenience, include and libraries of the compiled tool-chain is also included in the jni and jniLibs folders.

```
def libsDir = projectDir.path + "/src/main/jniLibs/"
productFlavors {
    arm {
        ndk {
            moduleName "MyAppNative"
            abiFilters "armeabi-v7a"
            ldLibs "log"
            ldLibs "android"
            stl "gnustl_shared"
            cFlags "-fexceptions"
            ldLibs libsDir + "armeabi-v7a/libusbnok.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalbase_android.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalcore_android.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalport_android.a"
            ldLibs libsDir + "armeabi-v7a/libgsl.a"
            ldLibs libsDir + "armeabi-v7a/libgslcblas.a"
        }
    }
}
```

```
buildTypes {
    release {
        minifyEnabled false
        proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'
    }
}
sourceSets.main {
    jni.srcDir 'src/main/jni'
    jni.srcDir 'src/main/jni/device'
    jni.srcDir 'src/main/jni/base'
    jni.srcDir 'src/main/jni/efm32com'
    jni.srcDir 'src/main/jni/'
    jni.srcDir 'src/main/jni/gsl'
    jni.srcDir 'src/main/jni/toolchain_include/c++/4.9'
    jniLibs.srcDir '/src/main/jniLibs/armeabi-v7a/lib'
    assets.srcDirs = ['src/main/assets']
}
```

17. Open the MainActivity and there you will see the function which we define earlier.

```
package com.example.rao.myapplication;

import ...

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        this.getApolloID();
    }
```

18. Android works with shared libraries (.so). In the .apk, you will see .so files. in build.gradle we named our module **"MyAppNative"**

```
def libsDir = projectDir.path + "/src/main/jniLibs/"
productFlavors {
    arm {
        ndk {
            moduleName "MyAppNative"
            abiFilters "armeabi-v7a"
            ldLibs "log"
            ldLibs "android"
            stl "gnustl_shared"
            cFlags "-fexceptions"
            ldLibs libsDir + "armeabi-v7a/libusbnok.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalbase_android.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalcore_android.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalport_android.a"
            ldLibs libsDir + "armeabi-v7a/libgsl.a"
            ldLibs libsDir + "armeabi-v7a/libgslcblas.a"
        }
    }
}
```

In MainActivity file, we need to load this file.

```
public class MainActivity extends AppCompatActivity {

    static{
        System.loadLibrary("MyAppNative");
    }
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        this.getApolloID();
    }

    public static native String getApolloID();
}
```

Note: In case it's give error undefined reference to std::ios_base then use this changing in build.gradle

```
def libsDir = projectDir.path + "/src/main/jniLibs/"
productFlavors {
    arm {
        ndk {
            moduleName "MyAppNative"
            abiFilters "armeabi-v7a"
            ldLibs "log"
            ldLibs "android"
            stl "gnustl_shared"
            cFlags "-fexceptions"
            ldLibs libsDir + "armeabi-v7a/libusbnok.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalbase_android.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalcore_android.a"
            ldLibs libsDir + "armeabi-v7a/libcrystalport_android.a"
            ldLibs libsDir + "armeabi-v7a/libgsl.a"
            ldLibs libsDir + "armeabi-v7a/libgslcblas.a"
            ldLibs "path/to/ndk/sources/cxx-stl/gnu-libstdc++/4.9/libs/armeabi-v7a/libgnustl_static.a"
        }
    }
}
```

```
buildTypes {
    release {
        minifyEnabled false
        proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'
    }
}
sourceSets.main {
    jni.srcDir 'src/main/jni'
    jni.srcDir 'src/main/jni/device'
    jni.srcDir 'src/main/jni/base'
    jni.srcDir 'src/main/jni/efm32com'
    jni.srcDir 'src/main/jni/'
    jni.srcDir 'src/main/jni/gsl'
    jni.srcDir 'src/main/jni/toolchain_include/c++/4.9'
    jniLibs.srcDir '/src/main/jniLibs/armeabi-v7a/lib'
    assets.srcDirs = ['src/main/assets']
    jni.srcDir "path/to/ndk/sources/cxx-stl/gnu-libstdc++/4.9/libs/armeabi-v7a/include"
}
```

Calibration files:

Assets provide a way to include arbitrary files like text, xml, fonts, music, and video in your application. If you try to include these files as "resources", Android will process them into its resource system and you will not be able to get the raw data. If you want to access data untouched, Assets are one way to do it.

Assets added to your project will show up just like a file system that can read from by your application using AssetManager.

Android has a dedicated folder in its project organization that stores all these files.

So user need to copy sensor calibration files in asset folder and example will load it in the runtime.

```
if (device != null) {
    try {
            String[] f = null;
            try {
                f = getAssets().list("");
            } catch (IOException e) {
                e.printStackTrace();
            }
            for (String f1 : f) {


                if (f1.equals("images") == true || f1.equals("webkit") == true || f1.equals("sounds")) {
                    Log.v("names", f1);
                } else {
                    String localPath_dark = this.getFilesDir().getAbsolutePath() + "/" + f1;
                    ApolloTools.copyFilterResponseFile(f1, localPath_dark, this.getBaseContext());
                }
            }
            GettingBackgroundFilterData("Simple");

    } catch (Exception e) {
        e.printStackTrace();
    }
}
```