



Building an Android App that Detects BLE Beacons (Estimote)

Mini Lab | Digital Summit '18

Miracle Innovation Labs

Miracle Software Systems, Inc.

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Introduction

This document contains a step-by-step process to create a native mobile app, where a group of Beacons are kept in different regions and identify them through Bluetooth or Location manager.

Pre-Requisites

All attendees must have their workstation (with Internet) to participate in the workshop (Both PC and MAC are compatible). The following pre-requisites will help you to make the workshop experience easier.

- Knowledge on Java
- Android part encompasses learning XML for the app design, understanding concepts of Android and programmatically with Java
- Beginners should probably use an IDE (Android Studio over Eclipse)

Technologies Involved

- JAVA
- Android
- XML
- Gradle

Lab Steps

So, let us get started with the application!

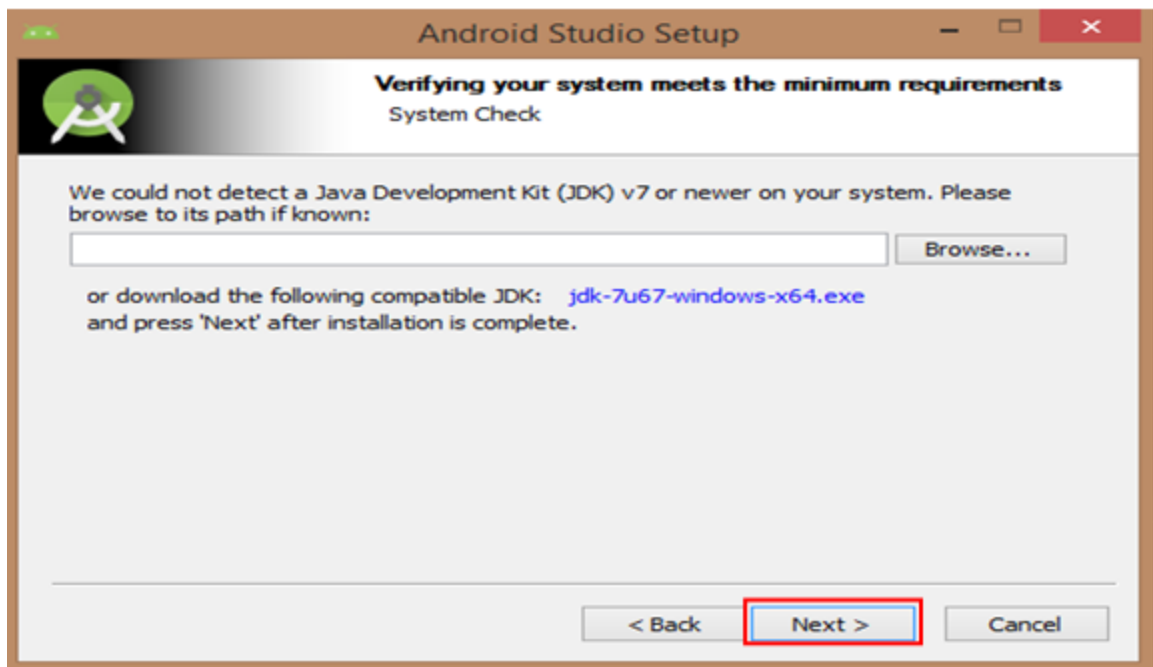
In this document, we will show you how to install Java, Android Steps and setting their permanent paths.

Step #1 | Installation of Android Studio

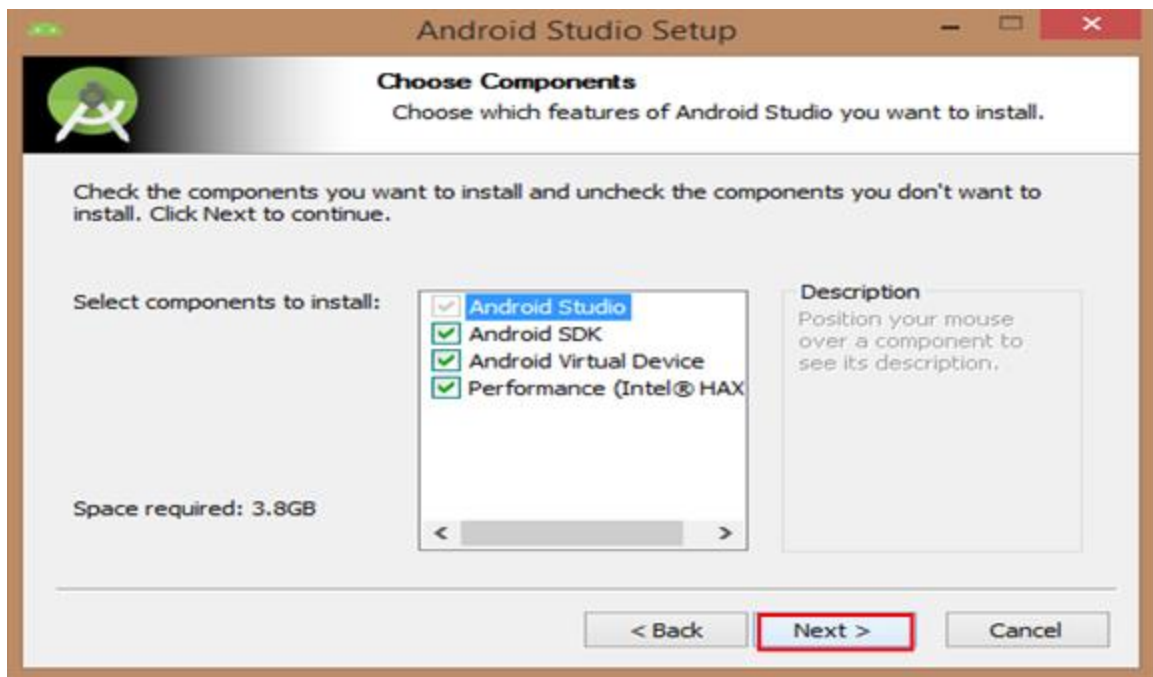
Go to <https://developer.android.com/studio> and download Android Studio. Once the download is done, launch **Android Studio.exe**. Click on **Next**.



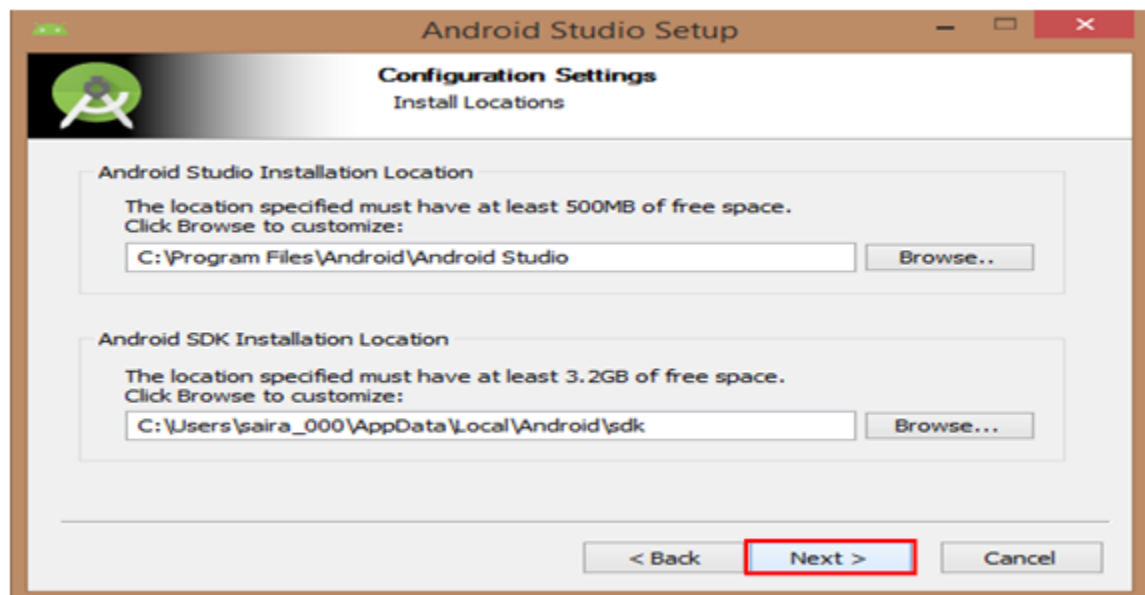
Once you have launched Android Studio, it's time to mention JDK7 path or later version in android studio installer. Click on **Next**.



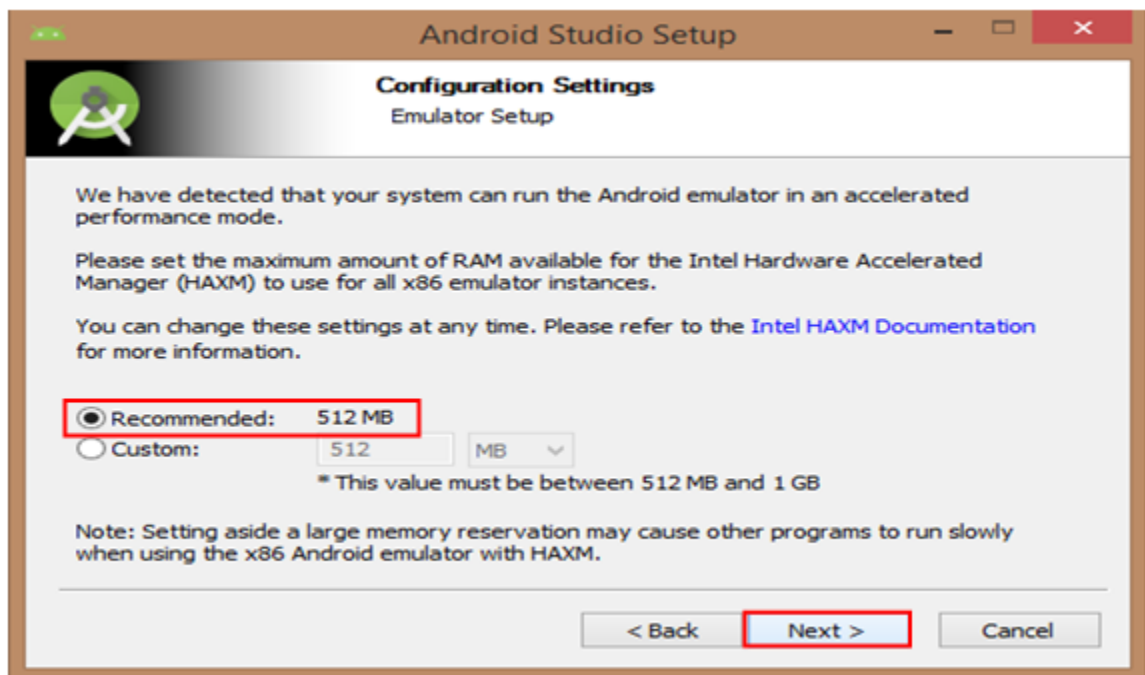
Choose the components which are required to create applications. The below image has checked Android studio, Android SDK, Android Virtual Machine and performance (Intel chip). Click on **Next**.



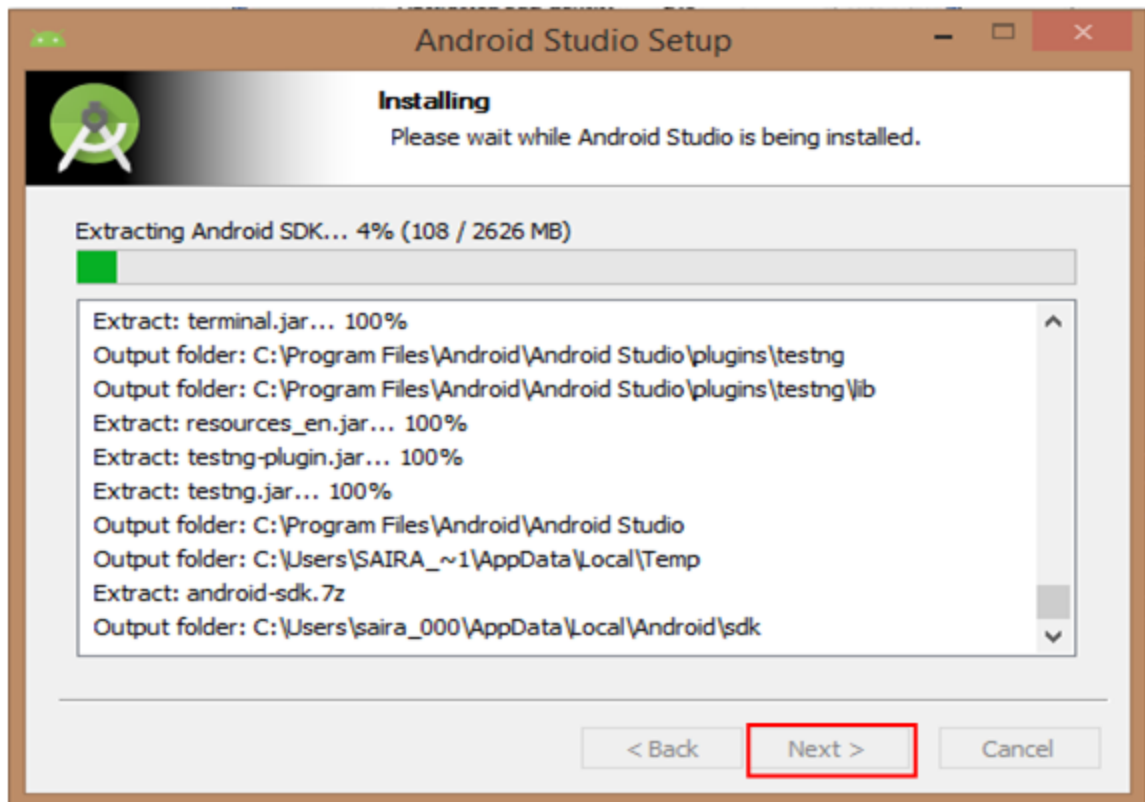
Specify the location of local machine path for Android studio and Android SDK. Click on **Next**.



Specify the ram space for Android emulator. By default, it will take 512MB of local machine RAM. Click on **Next**.



Next, it will extract SDK packages into our local machine. It will take a minute or two to finish the setup and would take 2626MB of Hard disk space. Click on **Next**.



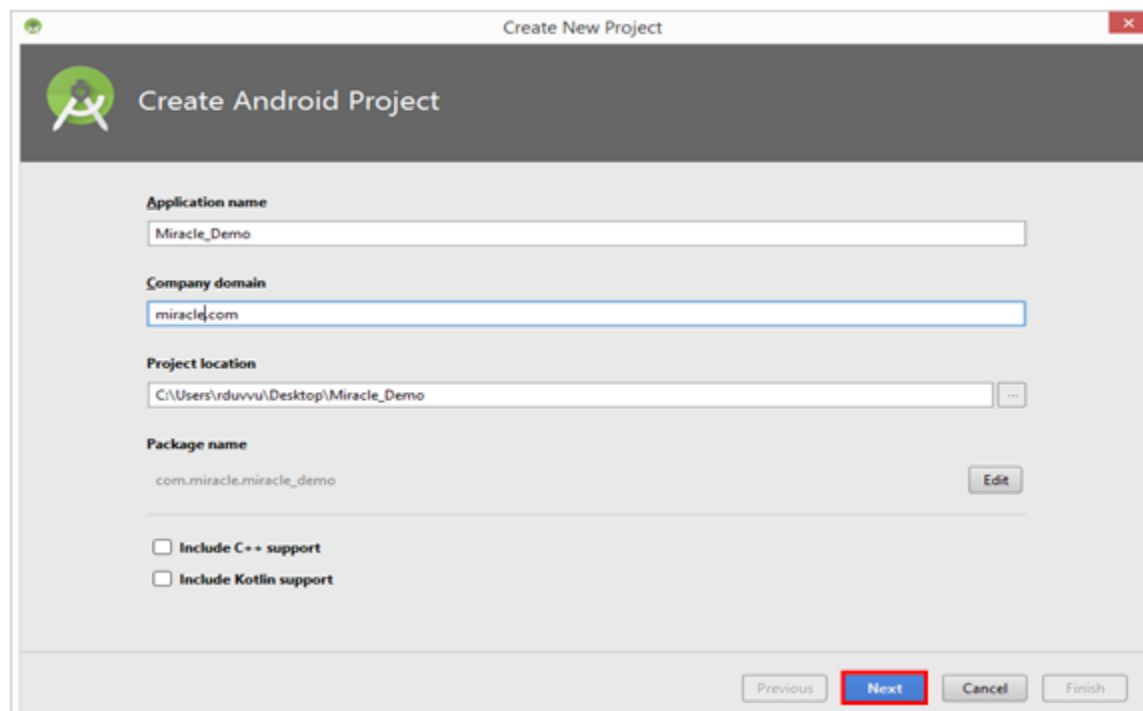
Click on **Finish**. On successful installation, Android Studio will be opened.

Step #2 | Creating First Android Application

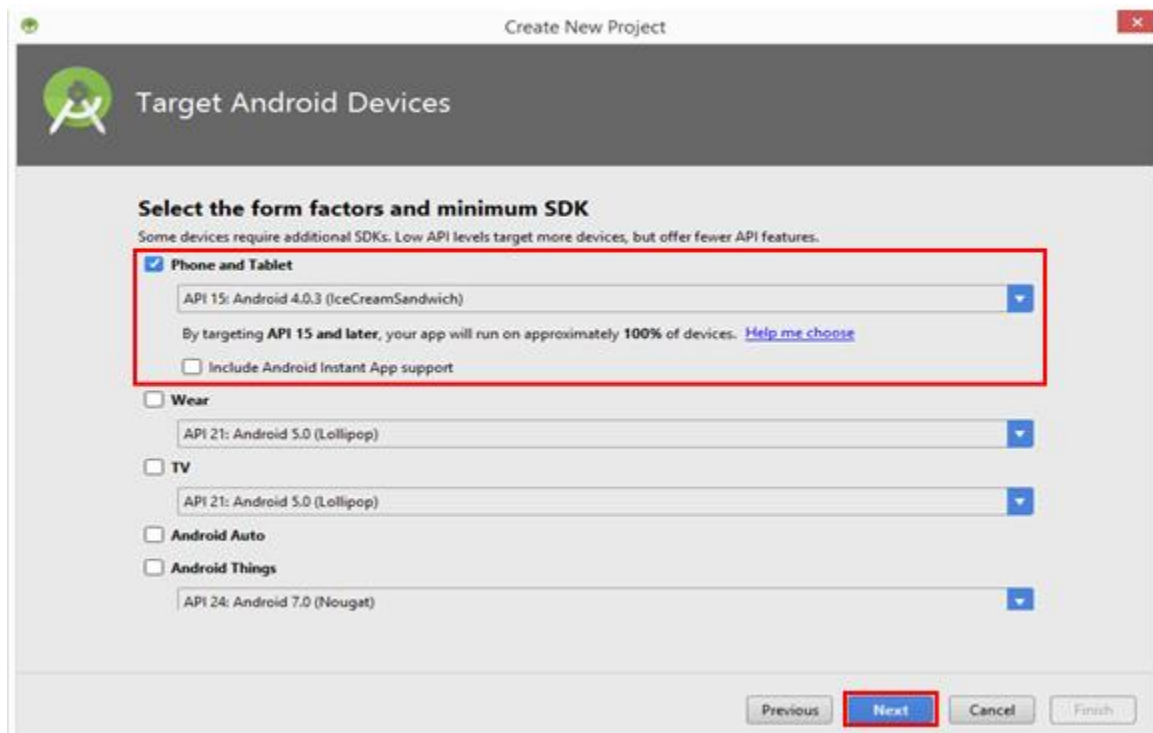
On the Android Studio window, click on **Start a new Android Studio project**.



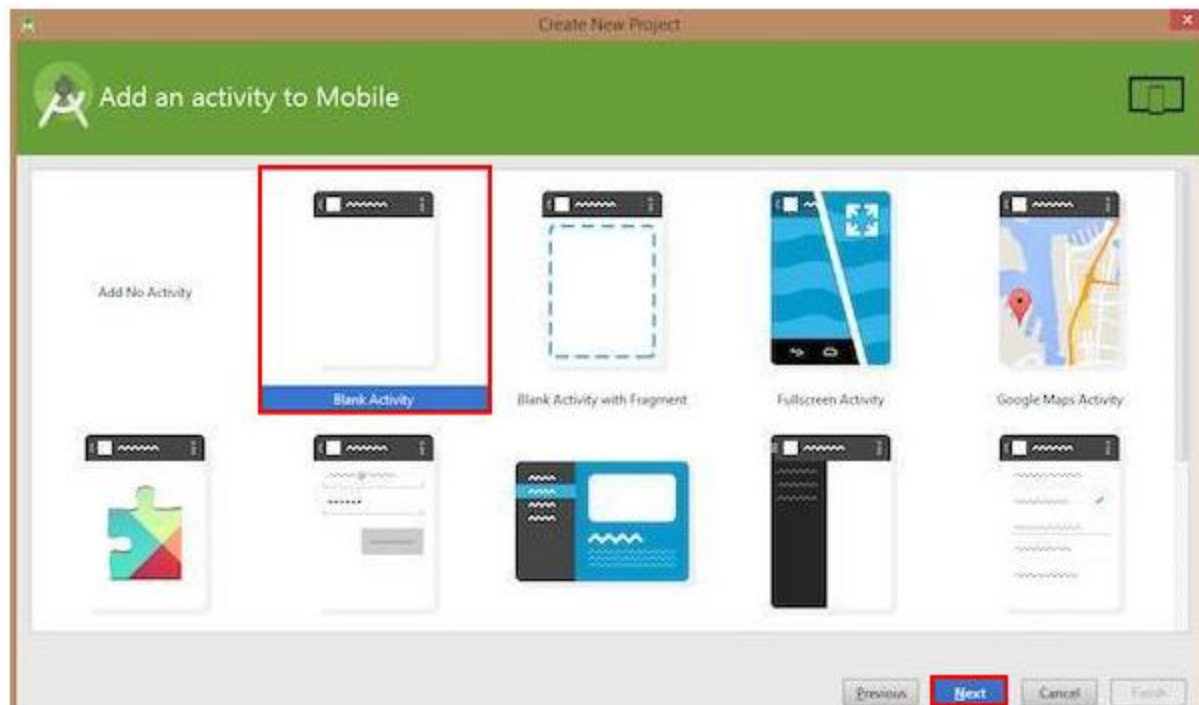
Give **Application name**, **Package information** and **Project location**.
Click on **Next**.



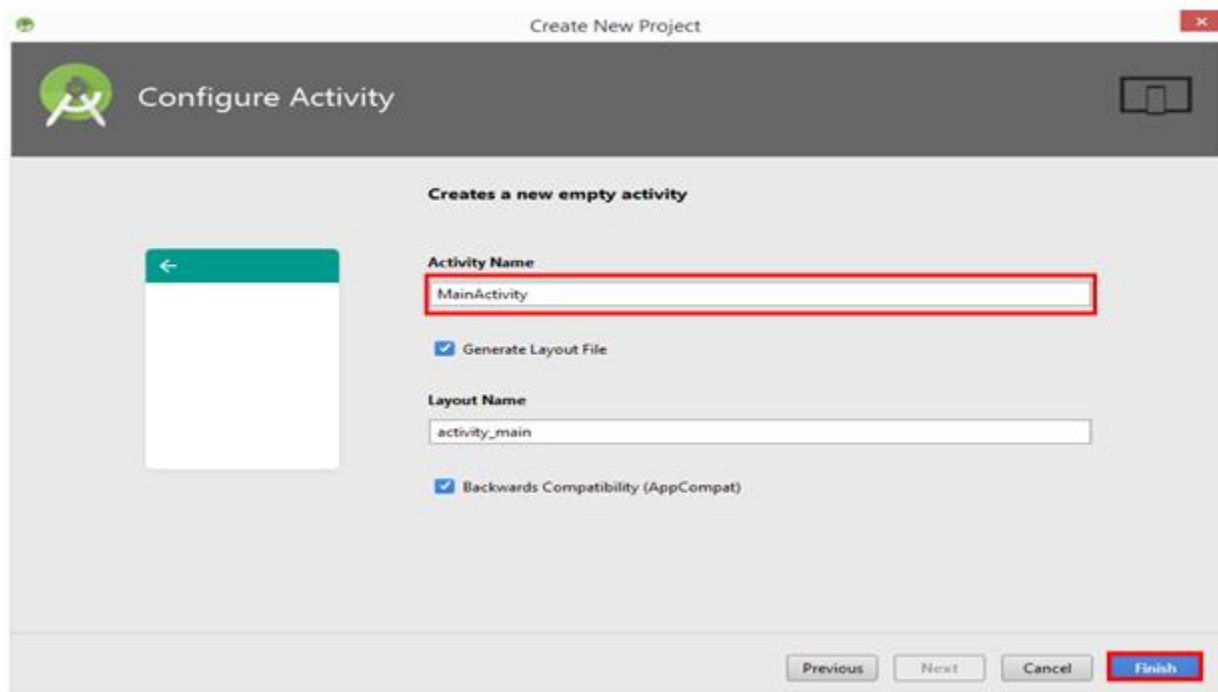
Next, select the form factors that your application runs on. Also specify Minimum SDK. Click on **Next**



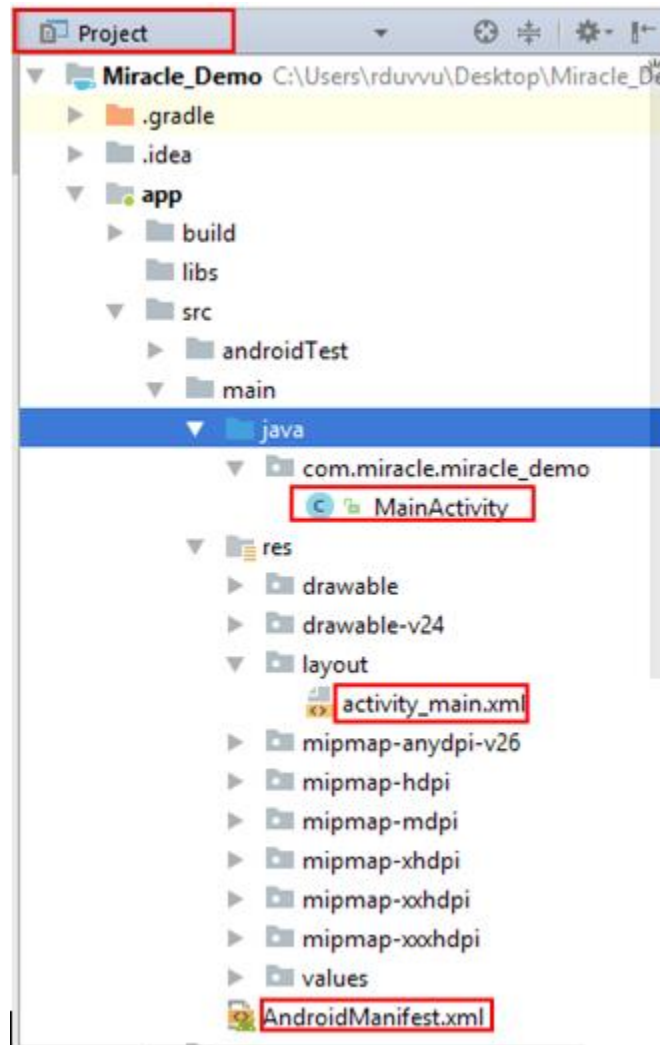
Select an activity that need to be added to mobile, it specifies the default layout for Applications. Click on **Next**.



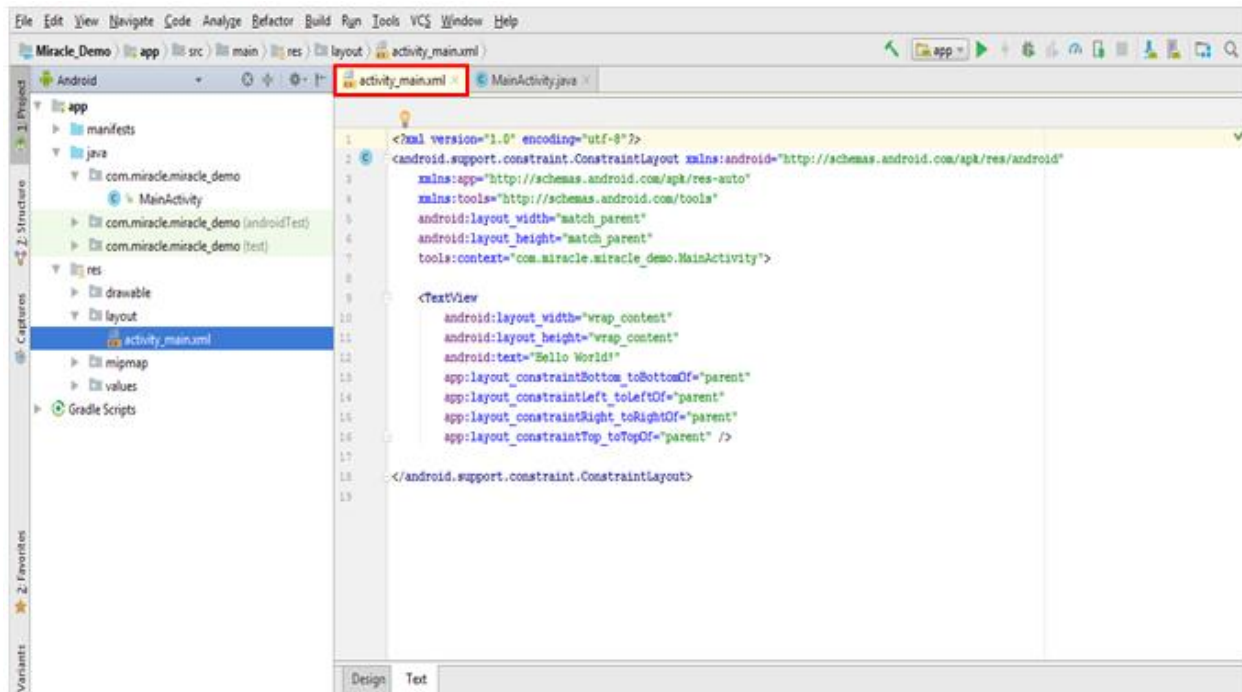
Give the **Activity Name** and click on **Finish**.

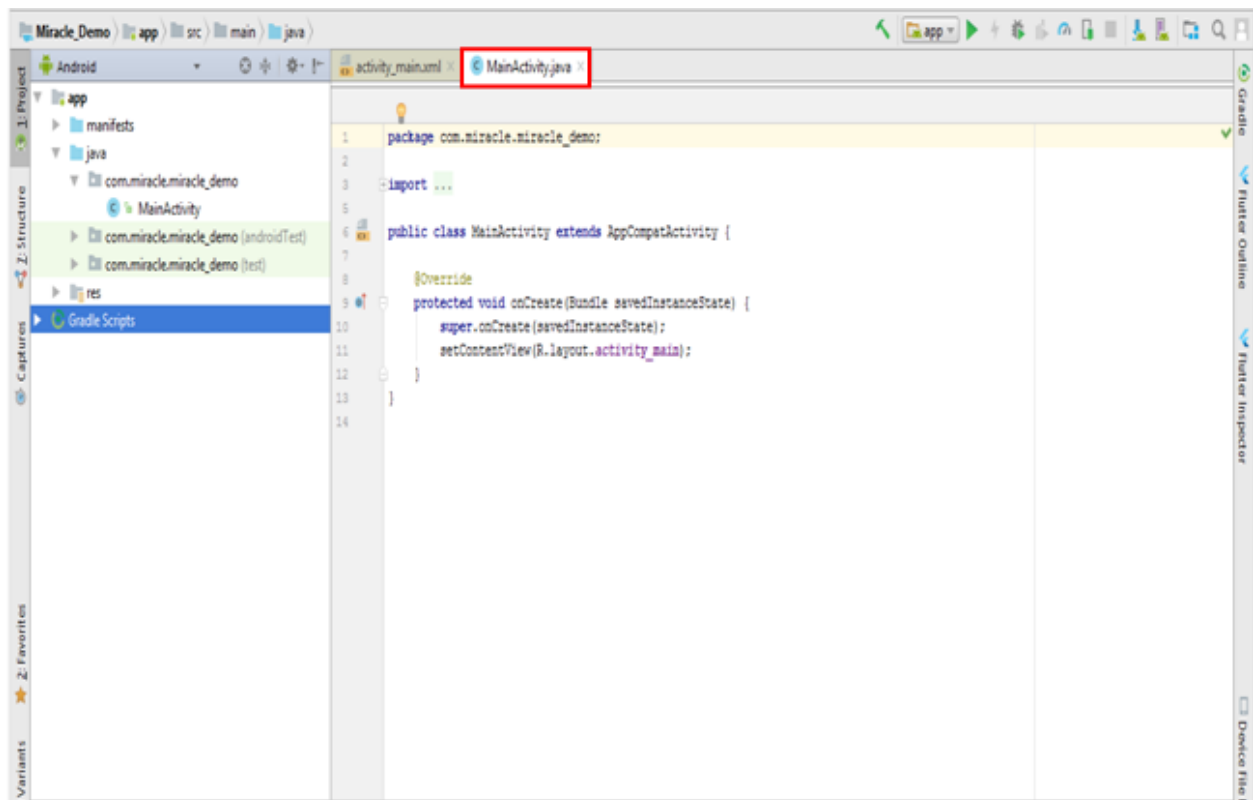


After finishing the Activity configuration, Android Studio auto generates the activity class and other required configuration files. Now an android project has been created. You can explore the android project and see the simple program. It's directory structure looks like this,

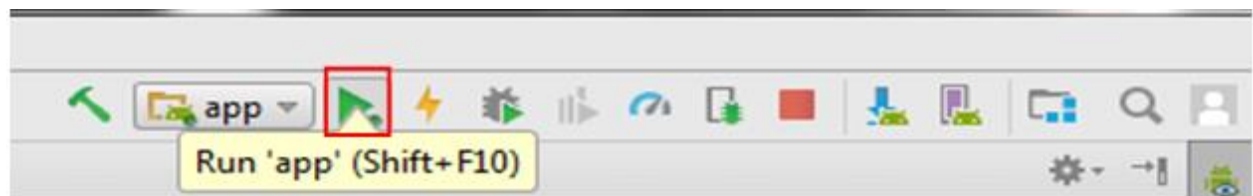


Android studio auto generates code for **activity_main.xml** and **MainActivity.java** files. You can edit this file according to your requirement.

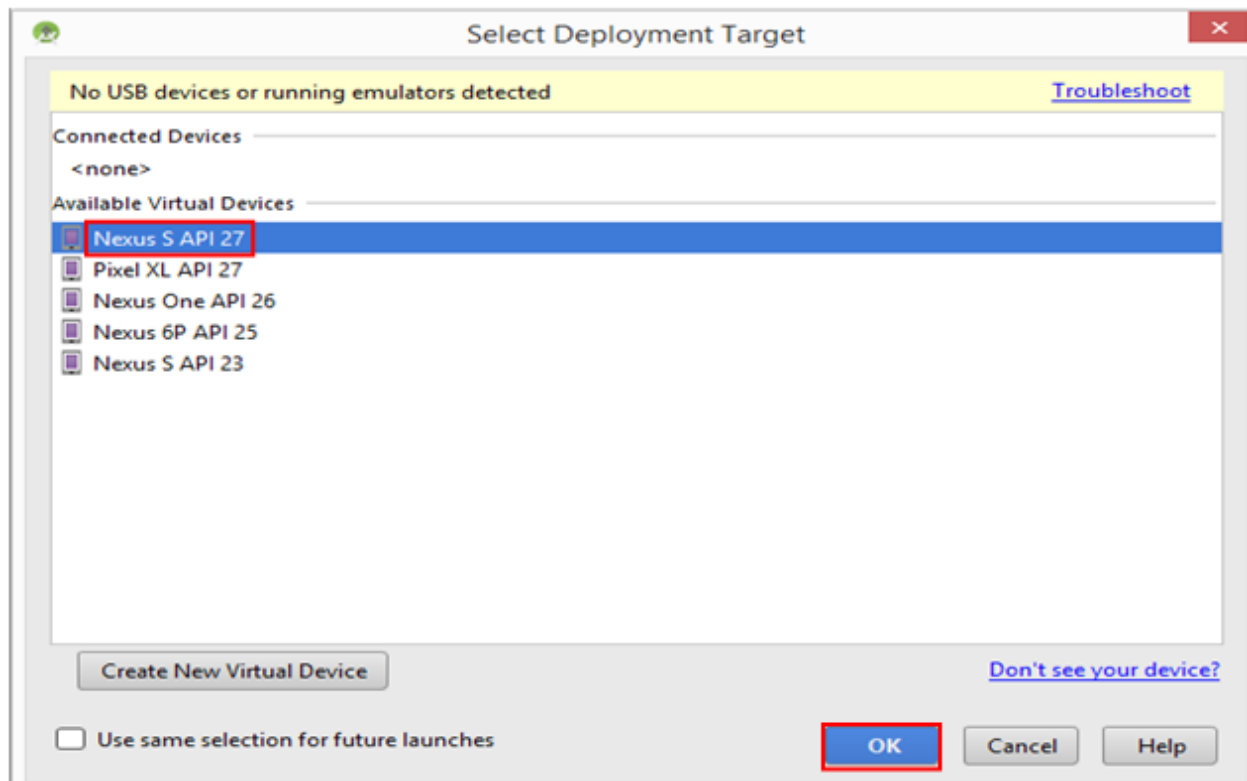




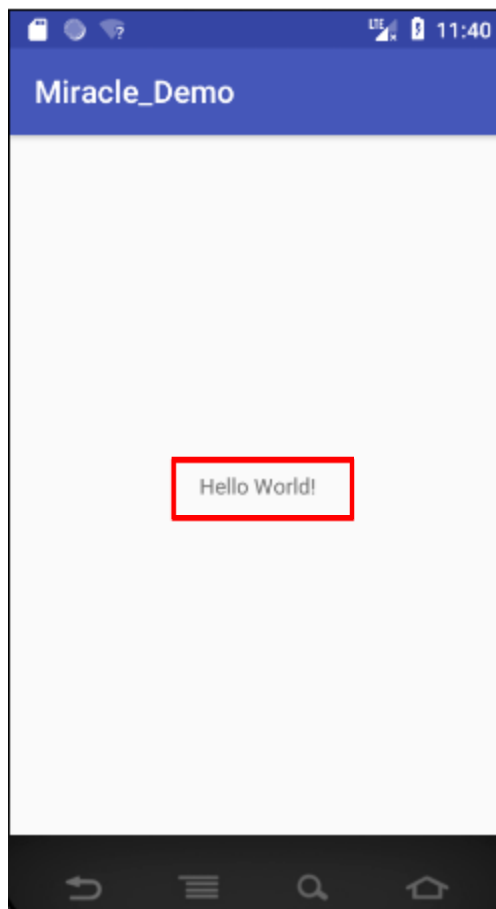
To **run** the android application, click the run icon on the toolbar or simply press **Shift + F10**.



In the Android Virtual Device Manager, select the **emulator** and click on **OK**.



The android emulator might take a minute or two to boot. After booting the emulator, the android studio installs the application and launches the activity. You will see something like this,

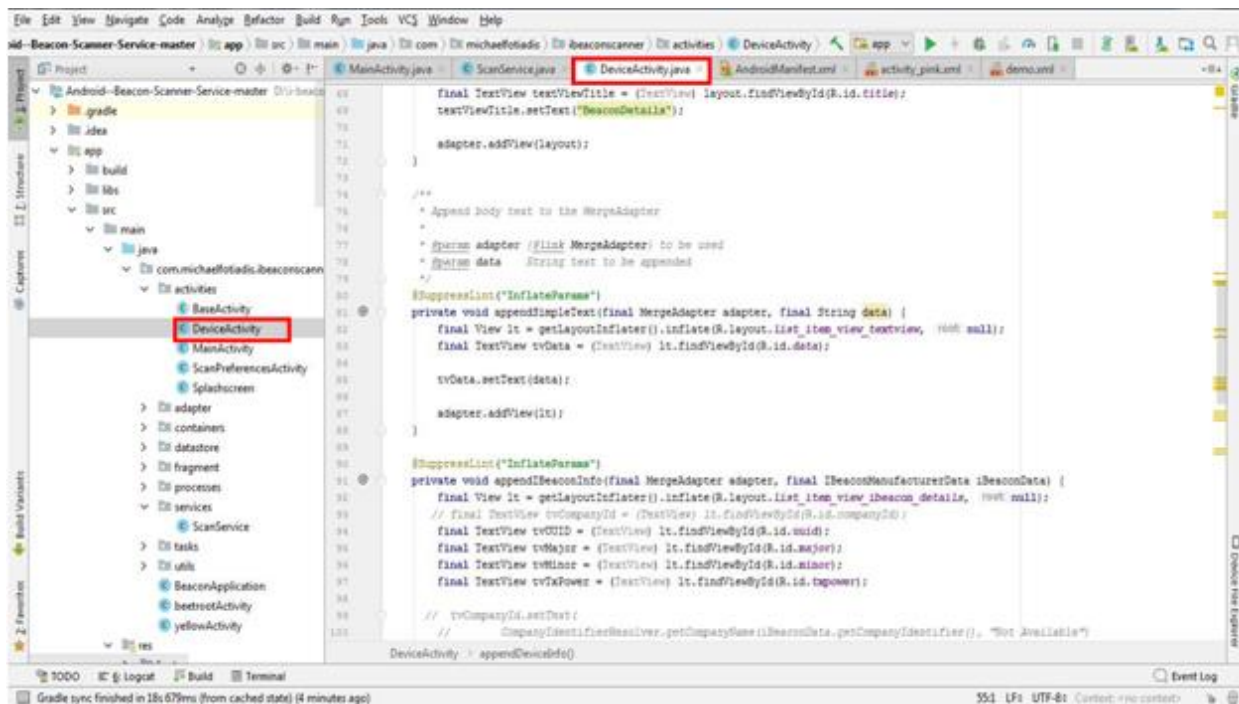


Step #3 | Beacon Monitoring Application

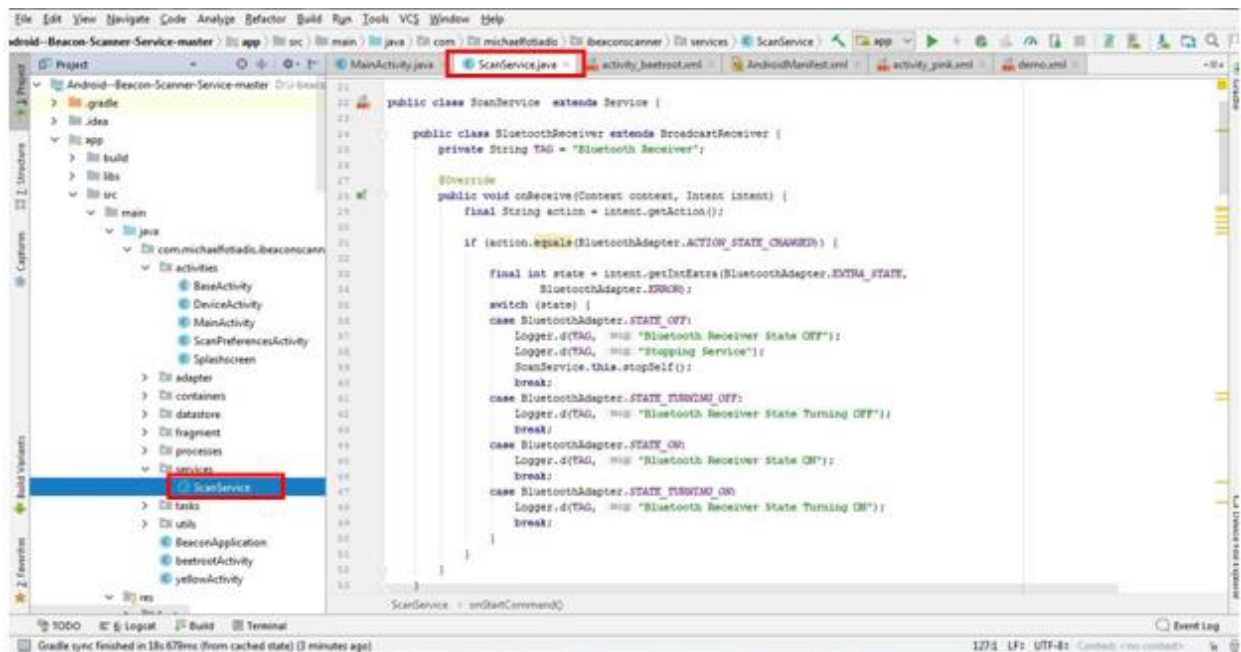
A **Beacon** is a small **Bluetooth** radio transmitter. It's kind of like a lighthouse. It repeatedly transmits a single signal that other devices can receive. Every Beacon has its own unique identifier in the form of **Major, Minor, MAC Address** but they have same **UUID**.

Copy the **MainActivity.java** from **cheatsheet.md** file and paste it in the hierarchy structure as follows,

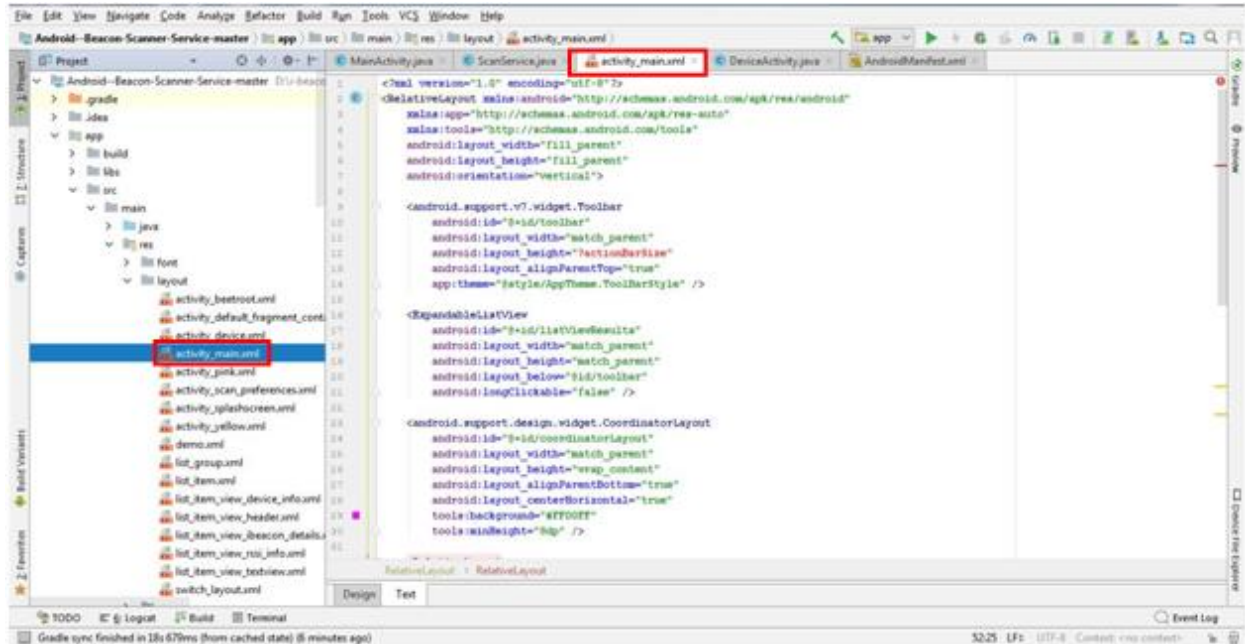
After taking all the required IDs, you need to place them in **DeviceActivity.java**. You will have snippet in the same **cheatsheet.md** file.



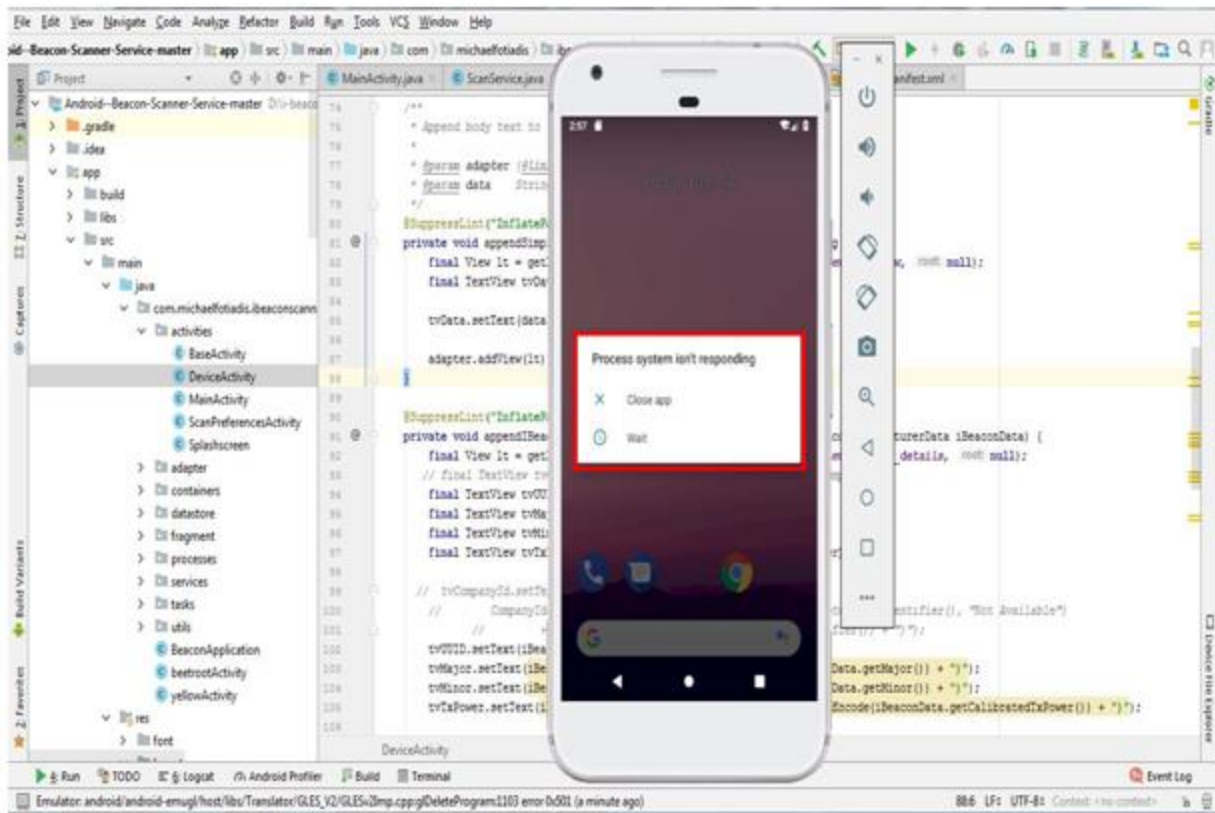
Finally, enable your **Bluetooth** and **Location Manager** in your app for detecting nearby available beacon. Copy the **ScanService.java**.



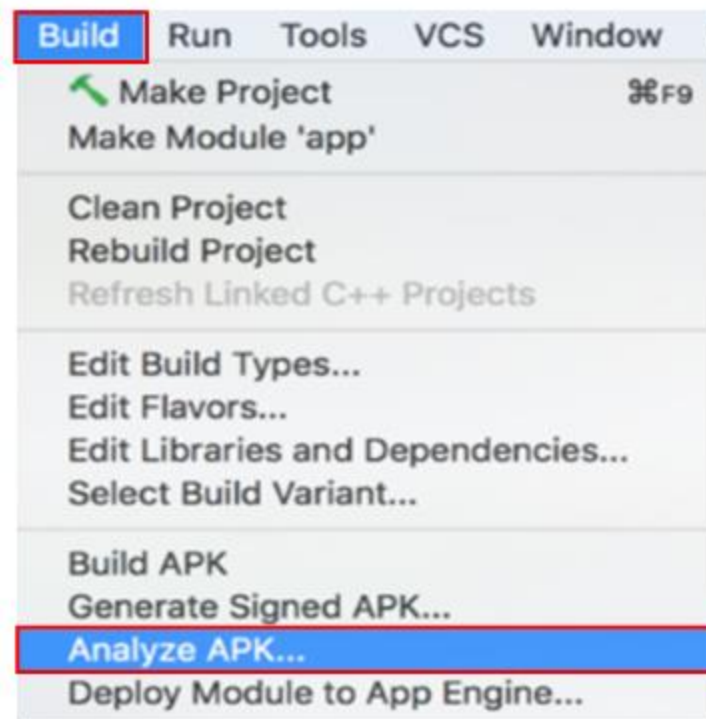
The UI related code will be present in **activity_main.xml**



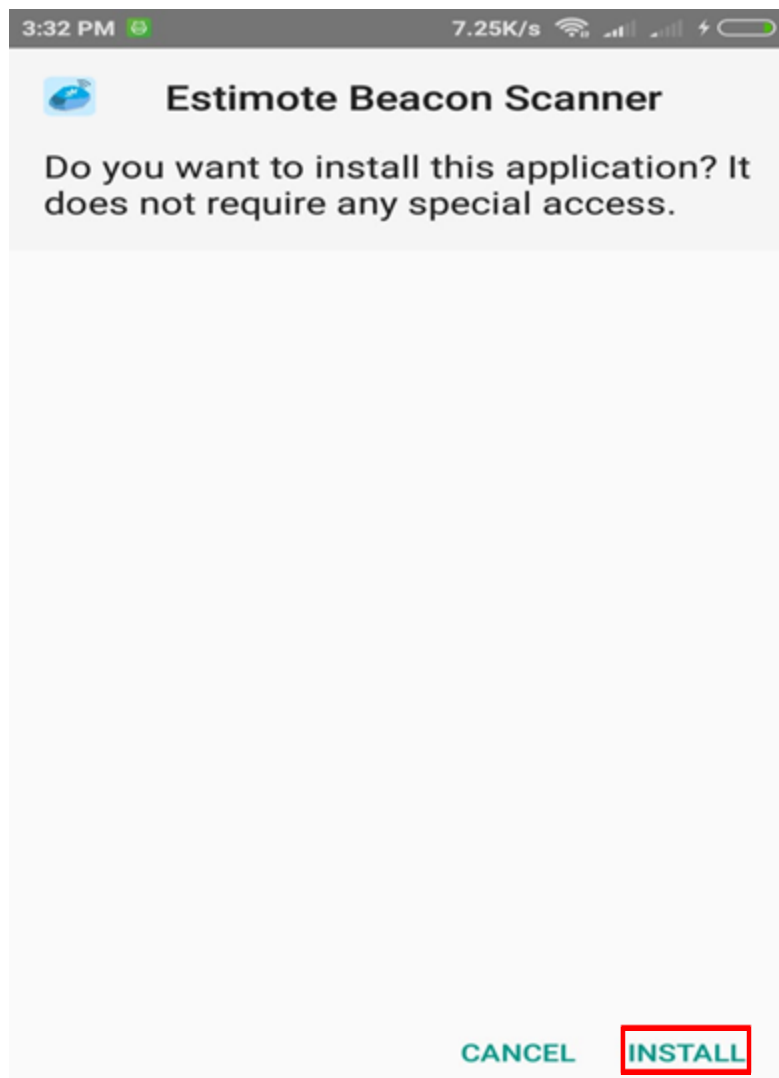
To **run** the android application, click the run icon on the toolbar or simply press **Shift + F10**. Select the Virtual Device and **Emulator** will launch within couple of minutes. Here in **Virtual Device**, there is no in-built Bluetooth and Location Manager services. So your app will not work in **Emulator**.



Click on **Build** and go to **Analyze APK**.

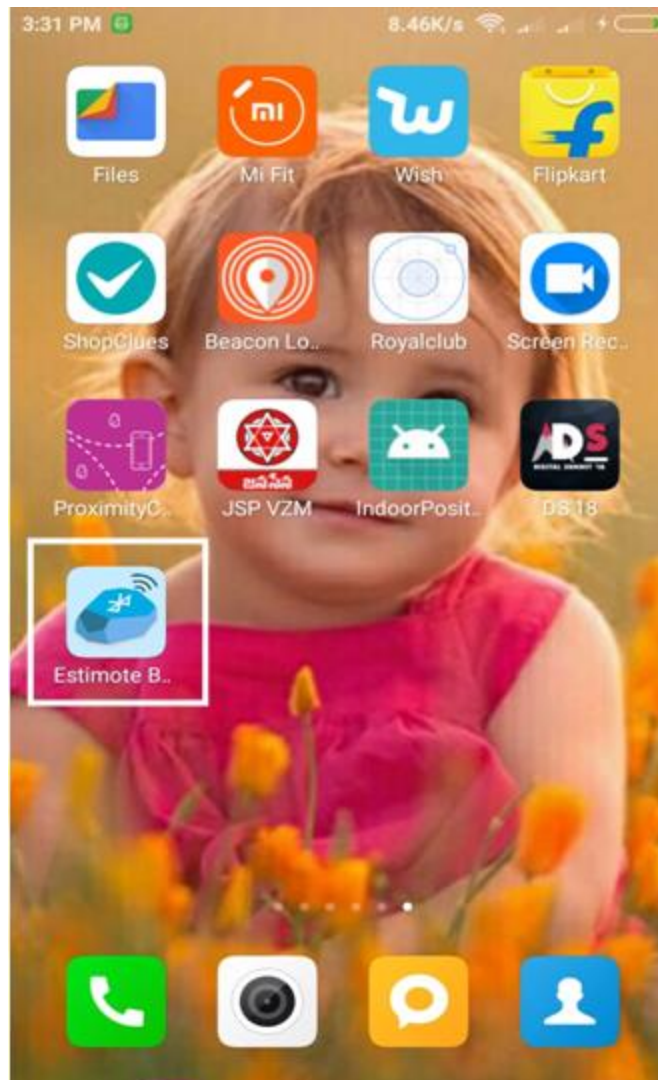


After building of your .apk, copy it into your device. Open it and click on **INSTALL**.



Step #4 | Application Testing

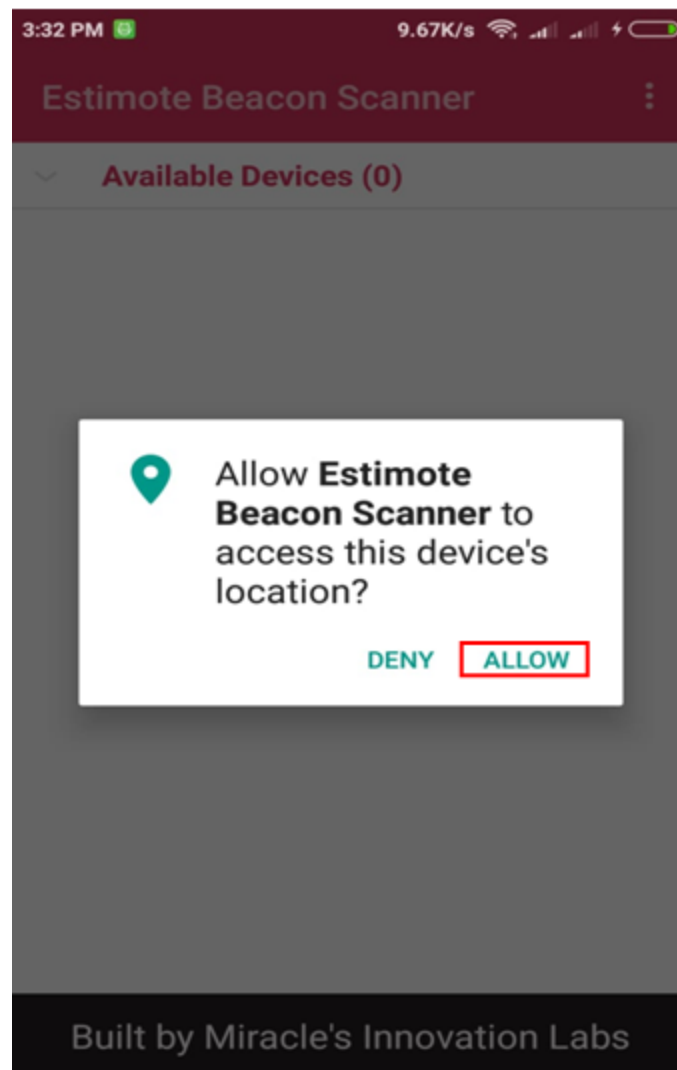
After installing your app, click on the app icon which looks like below,



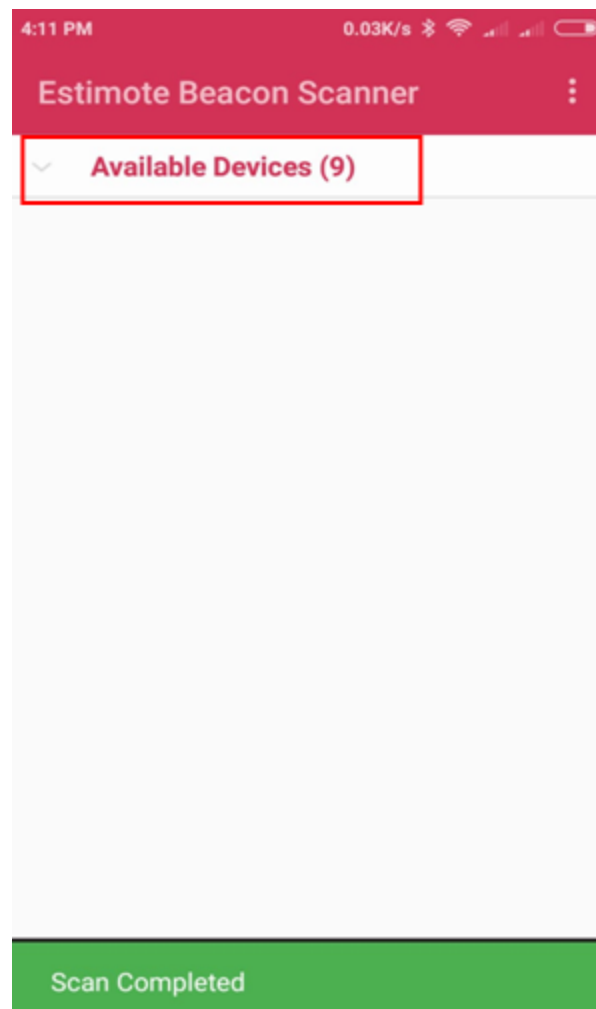
This is how the splash screen of the app looks like,



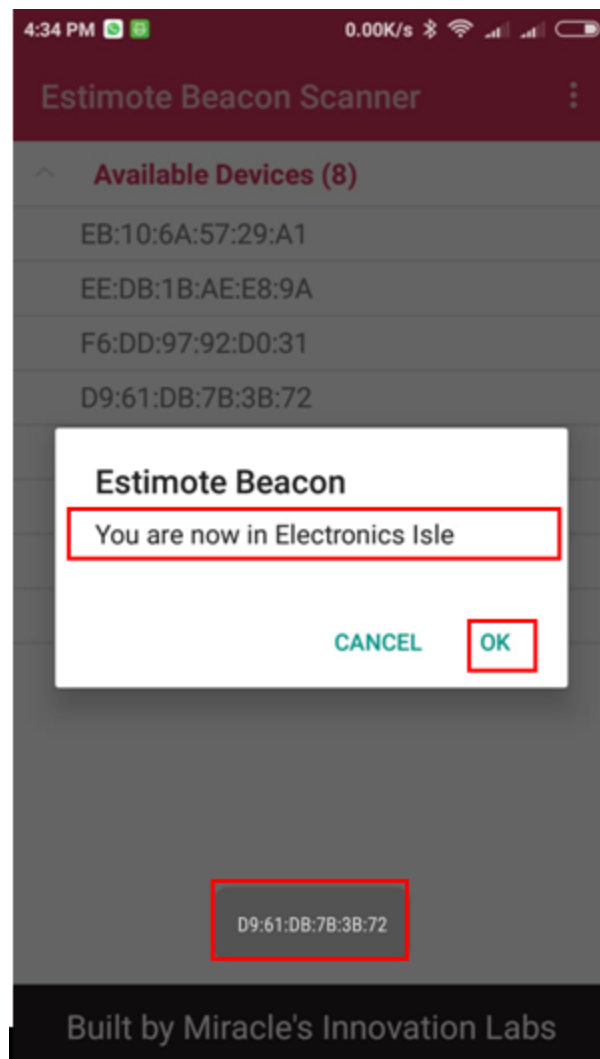
It will ask to enable **Bluetooth** and **Location** permissions. Click on **ALLOW**.



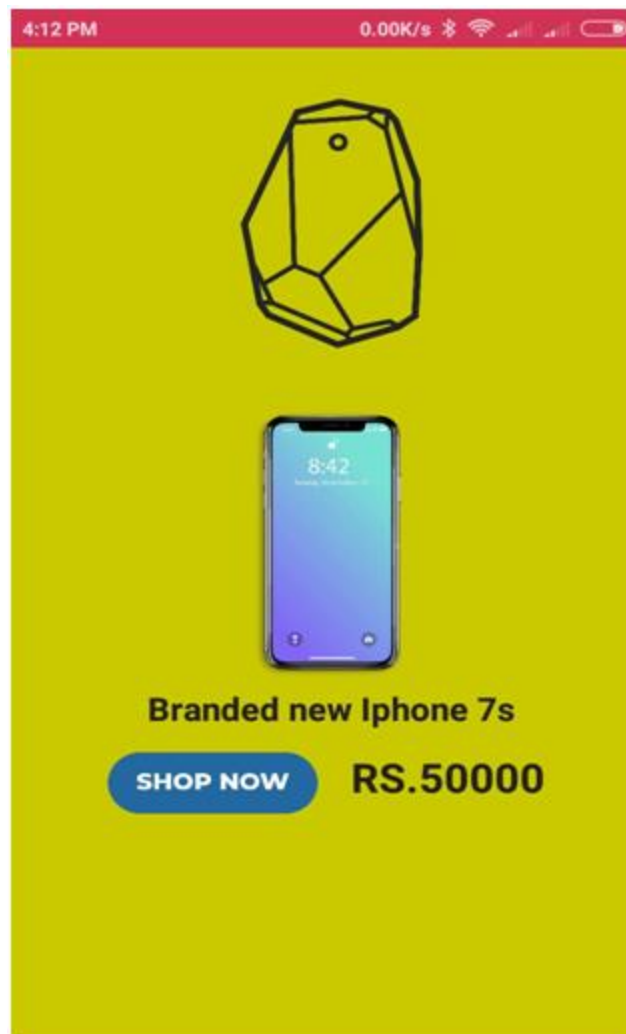
After scanning is completed, you can find all the nearby Beacons displayed in Available Devices. Click on the drop down arrow. It will list the beacons which are identified during the scan.



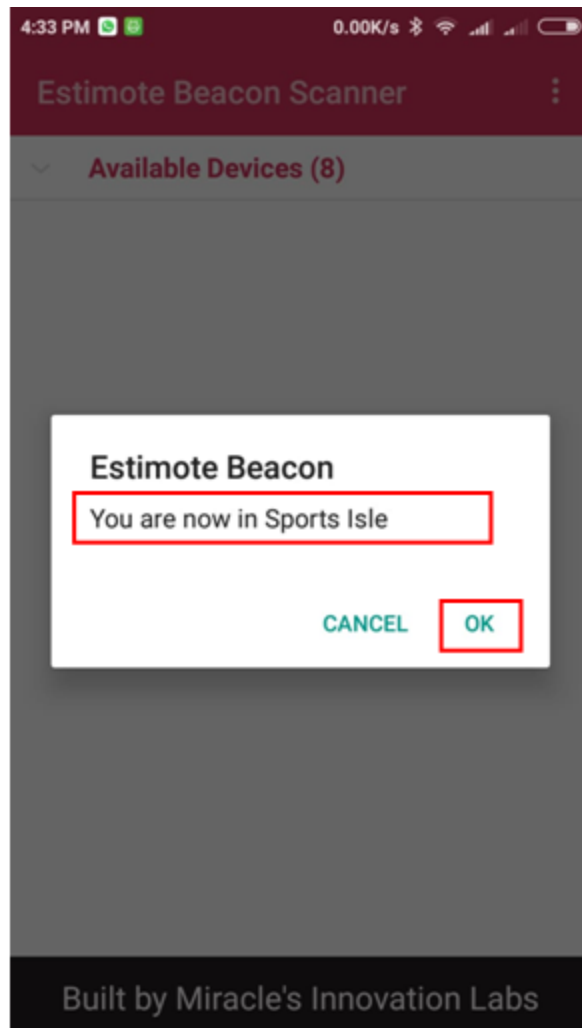
It will show you Beacons MAC Address. For this Beacon, it is **D9:61:DB:7B:3B:72**. It will show an alert message on what type of activity is being done by this Beacon. Here it states **You are in Electronic Isle**. Then click on **Ok**.



The output screen for this beacon will look like this,



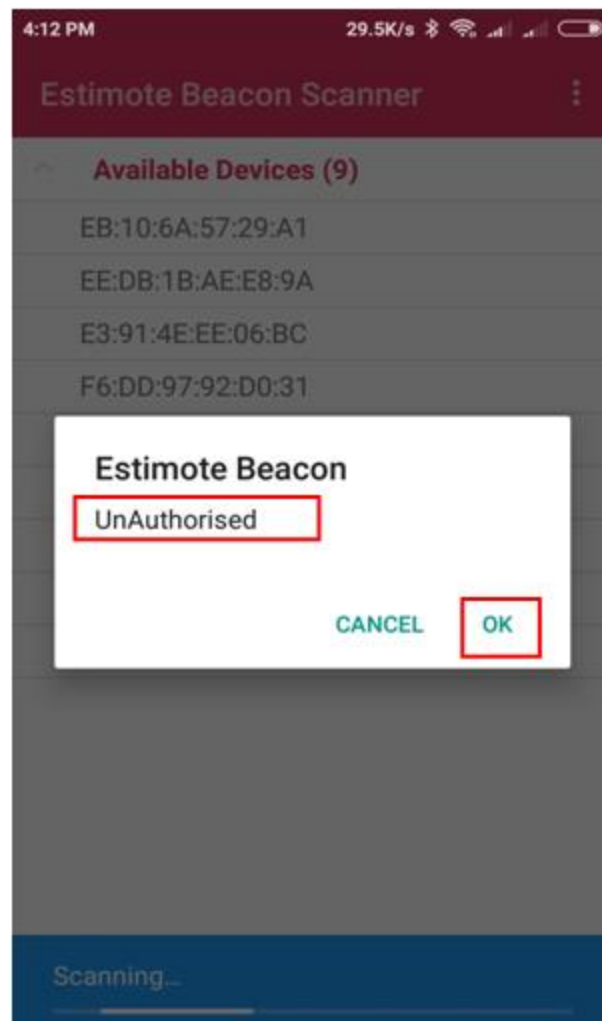
If you select the second beacon, it will show an alert message on what type of activity is being done by this Beacon. Here it states **You are in Sports Isle**. Then click on **Ok**.



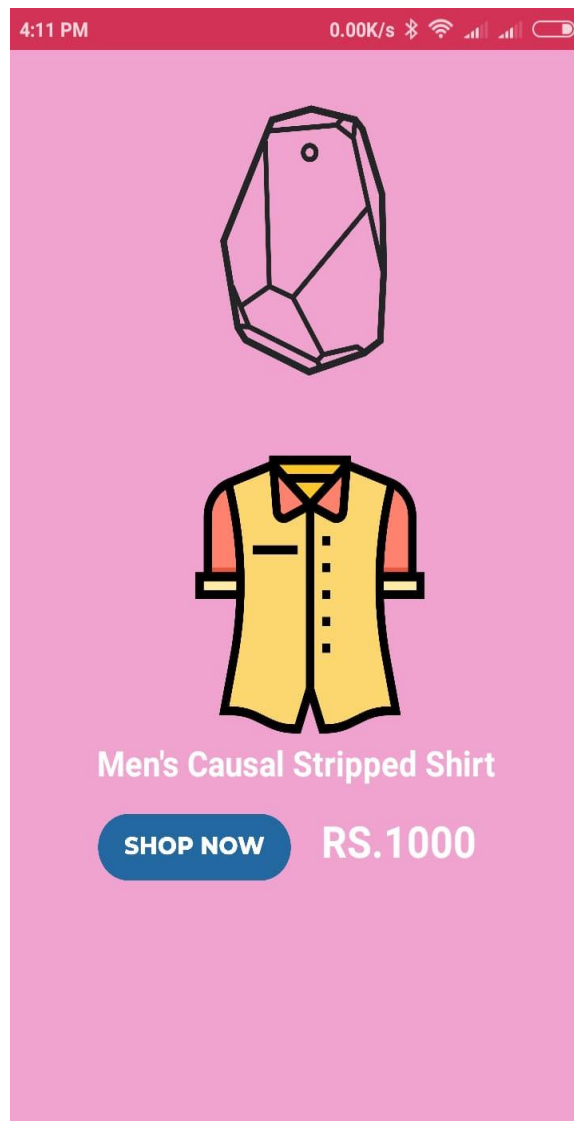
The output screen for this beacon will look like this,



If you select the third beacon, it will show an alert message that this beacon is **UnAuthorised**. Then click on **Ok**.



The output screen for this beacon will look like this,



For any questions regarding the lab please feel free to reach out to innovation@miraclesoft.com. We hope you enjoyed this!