



# HUST

**TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI**  
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

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HANOI UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

# LẬP TRÌNH ỨNG DỤNG DI ĐỘNG

## Mobile Application Programming

ET4710

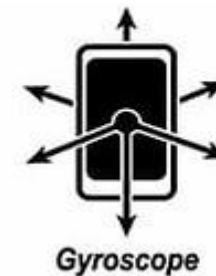
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## CHƯƠNG 8.

### Lập trình khai thác các cảm biến trên thiết bị di động (**Mobile sensors programming**)



## CHƯƠNG 8. Lập trình khai thác các cảm biến trên thiết bị di động (Mobile sensors programming)

8.1. Lập trình khai thác cảm biến chuyển động như gia tốc, con quay hồi chuyển, la bàn số... (Motion Sensors such as accelerometer, gyroscope, digital compass

Sensors Programming)

8.2 Lập trình các cảm biến khác như camera, microphone, GPS... (Other sensors programming)

8.3 Lập trình xác định cường độ tín hiệu vô tuyến RSS (RSS signal programming)

# Lập trình khai thác các cảm biến trên thiết bị di động - Sensors Programming



**Smartphone Sensors for Health and Wellness Mobile Apps**

# Lập trình khai thác các cảm biến trên thiết bị di động - Sensors Programming

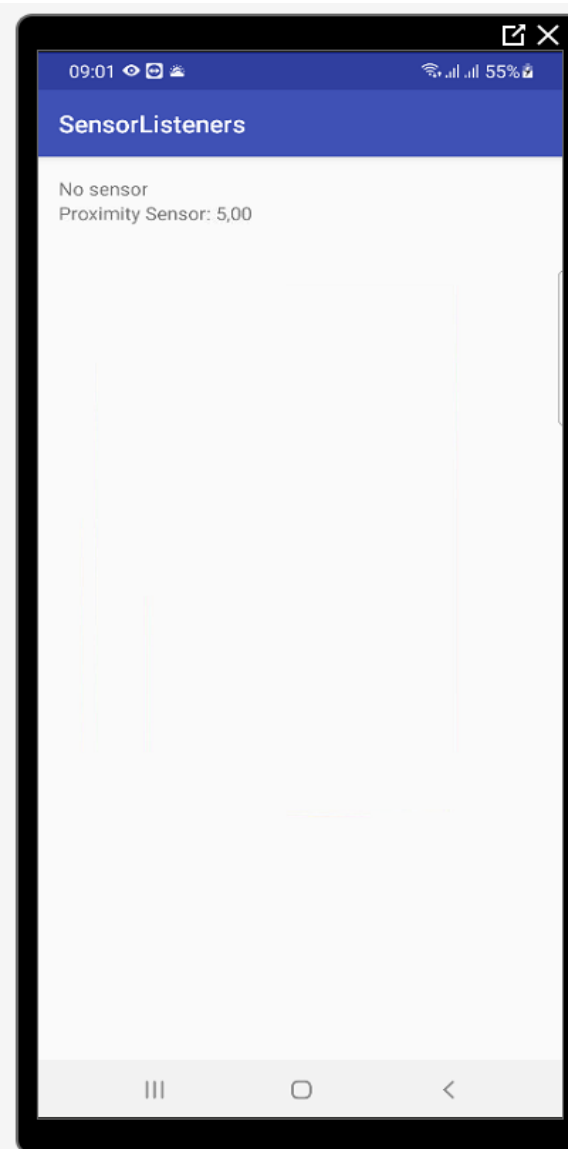
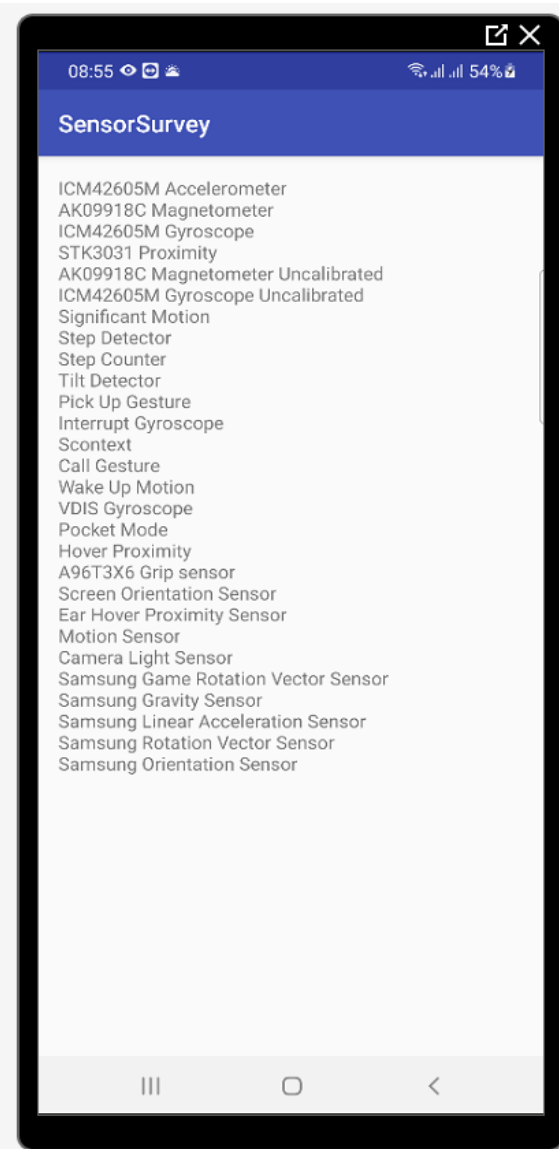




## Sensors Overview

- Most Android-powered devices have built-in sensors that measure motion, orientation, and various environmental conditions.
- These sensors are capable of providing raw data with high precision and accuracy, and are useful if you want to monitor three-dimensional device movement or positioning, or you want to monitor changes in the ambient environment near a device.
- A game app track readings from a device's gravity sensor to infer complex user gestures and motions, such as tilt, shake, rotation, or swing.
- A weather app use a device's temperature sensor and humidity sensor to calculate and report the dewpoint, or a travel application might use the geomagnetic field sensor and accelerometer to report a compass bearing.

# Lập trình khai thác các cảm biến trên thiết bị di động - Sensors Programming





# Lập trình khai thác các cảm biến trên thiết bị di động - Sensors Programming

The screenshot displays the Android Studio IDE for a project named "SensorSurvey". The top toolbar shows standard Android Studio icons. The left sidebar contains the "Project" view, showing the project structure with folders like "manifests", "java", "res", and "Gradle Scripts". The main editor area shows the "README.md" file, which contains the following content:

```
1 SensorSurvey (Solution Code)
2 =====
3
4 SensorSurvey displays a list of the available sensors in a scrollable textview.
5
6 Pre-requisites
7 -----
8
9 For this app you should be familiar with:
10 * Creating, building, and running apps in Android Studio.
11 * Running and testing apps with the Android emulator.
12
13 Getting Started
14 -----
15
16 1. Download and open this sample in Android Studio.
17
18 License
19 -----
20
21 Copyright 2017 Google, Inc.
22
23 Licensed to the Apache Software Foundation (ASF) under one or more contributor
24 license agreements. See the NOTICE file distributed with this work for
25 additional information regarding copyright ownership. The ASF licenses this
26 file to you under the Apache License, Version 2.0 (the "License"); you may not
27 use this file except in compliance with the License. You may obtain a copy of
28 the License at
29
```

The bottom panel shows the "Build" tab, indicating a successful build at 21/05/2021 8:53 AM. The build output lists the following tasks:

- Task :app:processDebugManifestForPackage
- Task :app:processDebugResources
- Task :app:compileDebugJavaWithJavac
- Task :app:compileDebugSources
- Task :app:dexBuilderDebug
- Task :app:mergeExtDexDebug
- Task :app:mergeProjectDexDebug
- Task :app:packageDebug
- Task :app:assembleDebug

The build was successful in 16s, with 25 actionable tasks executed. The bottom status bar shows "Success: Operation succeeded (16 minutes ago)".

# Lập trình khai thác các cảm biến trên thiết bị di động - Sensors Programming

The screenshot displays the Android Studio environment for a project named 'SensorListeners'. The main editor shows the 'README.md' file, which provides instructions and details about the application. The 'Pre-requisites' section lists the skills needed to run the app. The 'Getting Started' section includes a step to download and open the sample. The 'License' section mentions the Apache Software Foundation (ASF) license. The bottom panel shows the build process, indicating that the build was successful and completed in 5 seconds. The 'Run' tab shows the app running on a virtual device (Samsung SM-M307F).

**README.md Content:**

```
1 SensorListeners (Solution Code)
2 =====
3
4 SensorListeners gets data from the ambient light and proximity sensors, and
5 displays that data. It demonstrates registering listeners for sensor data,
6 and handling changes to that data in the onSensorChanged() method.
7
8 Pre-requisites
9 -----
10
11 For this app you should be familiar with:
12 * Creating, building, and running apps in Android Studio.
13 * Running and testing apps with the Android emulator.
14 * Gaining access to the sensor manager.
15
16 Getting Started
17 -----
18
19 1. Download and open this sample in Android Studio.
20
21 License
22 -----
23
24 Copyright 2017 Google, Inc.
25
26 Licensed to the Apache Software Foundation (ASF) under one or more contributor
27 license agreements. See the NOTICE file distributed with this work for
28 additional information regarding copyright ownership. The ASF licenses this
29 file to you under the Apache License, Version 2.0 (the "License"); you may not
```

**Build Output:**

```
> Task :app:compileDebugSources
> Task :app:dexBuilderDebug
> Task :app:mergeDebugNativeLibs
> Task :app:stripDebugDebugSymbols NO-SOURCE
> Task :app:mergeDebugJavaResource
> Task :app:mergeLibDexDebug
> Task :app:mergeProjectDexDebug
> Task :app:packageDebug
> Task :app:assembleDebug

BUILD SUCCESSFUL in 5s
25 actionable tasks: 25 executed

Build Analyzer results available
```

# Lập trình khai thác các cảm biến trên thiết bị di động - Sensors Programming

## Lập trình xác định cường độ tín hiệu vô tuyến RSS



Excellent

> -50 dBm



Good

-50 to -60 dBm



Fair

-60 to -70 dBm



Weak

< -70 dBm

<https://developer.android.com/reference/android/telephony/SignalStrength>

S  
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F



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D  
Y



**HUST**

**THANK YOU !**

# Lập trình ứng dụng di động

## Mobile Application Programming

### ET4710

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