

Standard Projects for ESP1617

Last modified: March 15, 2017.

Choose one of the following Android topics not presented during classroom, and

1. perform a bibliographic search about the topic,
2. write a report about the topic,
3. design one or more mockup apps illustrating the main points of your report.

Each topic can be selected by more than one group of students. However, collaboration among such groups is not allowed.

You can write the report in English or in Italian, as you prefer.

The report must include a bibliography listing the references for your work.

The report should not be based solely on one source (e.g., Goggle's official documentation, albeit such documentation is the best starting point).

Cut-and-pasting from your sources is not allowed: the report should be an original rework of the sources, not a summary or a verbatim copy.

As source material is overabundant for all the topics, you should perform a selection: you must decide what should be included in your report and what should be left out.

It is not required for L students to log the project activity on Facebook.

The following aspects will be considered in the grading of the report: clarity, completeness, terseness (the report should be complete without being verbose or bloated by trivial details), quality of the bibliography, correspondence between the information selected for the report and the information showcased by the app(s).

In your app(s), verbatim reuse of sample code you can find online is forbidden.

The followings aspects will be considered in the grading of the apps: lack of bugs and glitches, ease of use, adherence to Android specifications, quality of the source code (modularity, use of appropriate language constructs, generous presence of comments).

The report and the apps are regarded as equally important in the grading process.

ConstraintLayout

ConstraintLayout allows you to create large and complex layouts with a flat view hierarchy (no nested view groups).

To start your work:

<https://developer.android.com/training/constraint-layout/>

With your report, you should provide at least:

An app with responsive UI designed in a conventional way (i.e., with nested layouts).

The same app whose UI is designed with ConstraintLayout.

Java Code vs. Native Code

Compare the efficiency of Java code and native code in term of execution time.

To start your work:

<https://doi.org/10.1109/IBICA.2011.85>

<http://ieeexplore.ieee.org/abstract/document/6393447/>

http://compmus.ime.usp.br/sbcm/2013/pt/docs/pos_tec_4.pdf

With your report, you should provide at least:

An app that implements both CPU-bound algorithms (e.g., a primality test) and memory-bound algorithms (e.g., matrix multiplication for large matrices). Running times for several different inputs.

Alternatively: add an open-source library to your Android app and measure whether it is more efficient than the corresponding Android API.

Android Wear

Android Wear is a version of Android customized for smartwatches and other wearable devices. Wearable apps are similar to other apps that use the Android SDK, but differ in design and functionality.

To start your work:

<https://developer.android.com/wear/>

<https://developer.android.com/training/wearables/apps/>

<https://developer.android.com/training/building-wearables.html>

With your report, you should provide at least:

A wearable app showcasing the most significant differences with conventional Android apps.

Accessibility Features

The accessibility of a computer system to all people, regardless of any disability they may have, is an increasingly important topic. Android provides system-wide accessibility features, accessibility guidelines for designing your app, and specific APIs to create custom interactions targeting people with disabilities.

To start your work:

<https://developer.android.com/guide/topics/ui/accessibility/>

<https://developer.android.com/guide/topics/ui/accessibility/services.html>

https://developer.android.com/about/versions/nougat/android-7.0.html#accessibility_enhancements

With your report, you should provide at least:

An app conforming to the accessibility guidelines.

Alternatively, an app implementing an accessibility service.

VR for Android

Android provides a set of libraries and tools, named “Google VR SDK for Android”, for the development of virtual reality applications. The Google VR SDK for Android includes 1) a simple API used for creating apps inserted into Cardboard viewers, and 2) the more complex API for supporting Daydream-ready phones and the Daydream controller. Your work should target the simple API for Cardboard viewers.

To start your work:

<https://github.com/googlevr/gvr-android-sdk/>

<https://developers.google.com/vr/cardboard/overview>

<https://developers.google.com/vr/android/get-started>

<https://developers.google.com/vr/android/samples/treasure-hunt>

With your report, you should provide at least:

A modified version of the “Treasure Hunt” sample game. Modify either the environment or the game mechanics.

Vulkan

Vulkan is a low-overhead, cross-platform API for 3D graphics.

To start your work:

<http://www.khronos.org/vulkan>

<http://khr.io/vulkanlaunchoverview>

<https://developer.android.com/ndk/guides/graphics/index.html>

<https://github.com/googlesamples/vulkan-basic-samples>

<https://github.com/googlesamples/android-vulkan-tutorials>

With your report, you should provide at least:

An app displaying a cube; the cube can be made to spin by touching the screen

Notifications

To start your work

<http://developer.android.com/design/patterns/notifications.html>

<http://developer.android.com/preview/features/notification-updates.html>

<http://developer.android.com/training/notify-user/index.html>

<http://developer.android.com/guide/topics/ui/notifiers/notifications.html>

<https://developer.android.com/about/versions/nougat/android-7.0.html>

With your report, you should provide at least:

An app which periodically generates basic notifications (icon, title, message).

An app which periodically generates full-fledged notifications. Focus your work on the novelties introduced in Android 7.0 (updated notification templates, messaging style customizations, bundled notifications, direct reply, custom views).

Power-Saving Features in Android

To start your work:

<http://developer.android.com/training/monitoring-device-state/index.html>

<http://developer.android.com/training/monitoring-device-state/doze-standby.html>

<http://developer.android.com/tools/performance/batterystats-battery-historian/index.html>

With your report, you should provide at least:

An app and accompanying software that showcases Doze mode.