User Manuals

Team 37

1. Overview of software

1.1 Introduction

AR Geographical model application is an educational tool in the form of visual simulation, designed to help you learn fundamental knowledge of geography system. A number of functions are provided for you to interact with simulated natural geographical environment. You will obtain preliminary understanding on normal geography phenomenon through dynamic changes of the models built by Augmented Reality technology.

1.2 Function

The user interface can present the real-time background that be captured from camera to support AR model generation through seizing feature points. This application possesses two models, a water cycle model, and a wind cycle model. User could move down or up the device to inspect the AR model from diverse angle of view. It is available for user to zoom in and zoom on the model to observe the details or cycles. User can tap the screen to display the animations. Each time the procedure of animation is executed, a caption that describes each process of cycle will be appeared on the screen for users to read and learn. The application also have function to present the description of each model which would be helpful for user to understand the AR model. User can touch on the model deletion button to delete the presented model, if they have completed learning.

1.3 Performance

All the geography information displayed in the application referenced from verified geography knowledge, which ensures correctness and accuracy.

The application was rigorously tested according to specification. Error hints will be provided in case where errors are not caught, which ensures robustness and dependability.

2. Hardware requirements

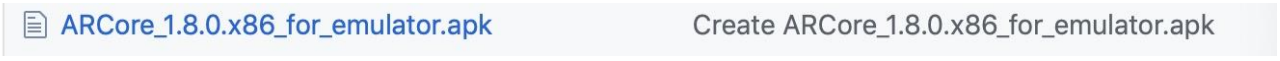
The application is supported by Android devices with version higher than Android 8.0.
For more information, you could go to the website :
https://developers.google.cn/ar/discover/supported-devices

The application requires access to the camera. For properly working, please authorize camera usage before using the application.

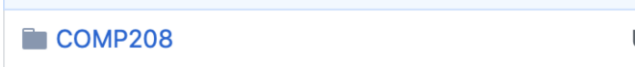
3. Usage guidance

3.1 Install the application

You can download it from the website : https://github.com/ning-mz/Geographical-ARTeach-APP
First, download the zip. Then unzip the zip file and install ARCore_1.8.0.x86_for_emulator.apk file first.



After all, unzip the COMP208 file and download it to mobile device with Android system.



3.2 How to run

How to run on an Android device:

Pre-request:

1. Android Devices with system version equal or higher than level 24 (Android 8.0).
2. The device should also be supported by ARCore platform.

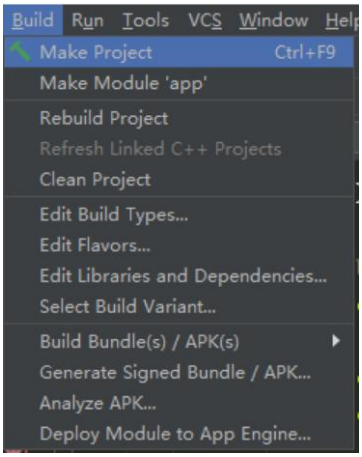
Run:

1. Install ARCore from Google Play market.
2. Copy the apk package called “COMP208” of project into the device memory and locate the package by using file managing application that is in your device.
3. Click apk file to install apk package into device. You may need to set your device to install unknown resource application by following step: Enter the “Settings”; Select the “Security” option; Find the "Unknown sources" option; Activate the "Allow installation of apps from sources other than the Play Store" option.
4. Start run the application that had been installed to your device.
5. If application request the camera access permission, please allow it.

How to run on a virtual machine:

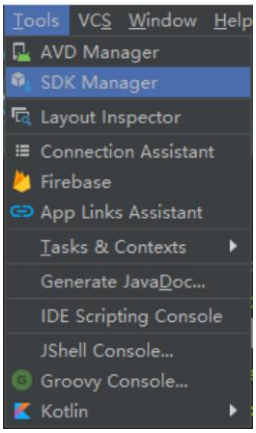
Pre-request: Android Studio, Android development SDK, Virtual Machine

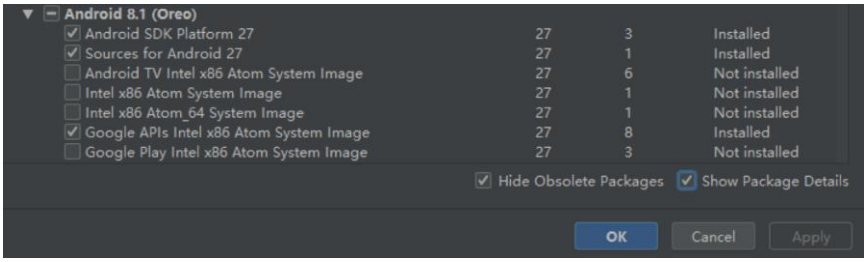
1. Run Android Studio and open the project from file system.
2. Build the project to run :”Build” - “Make projects” (Ctrl + F9 on windows)



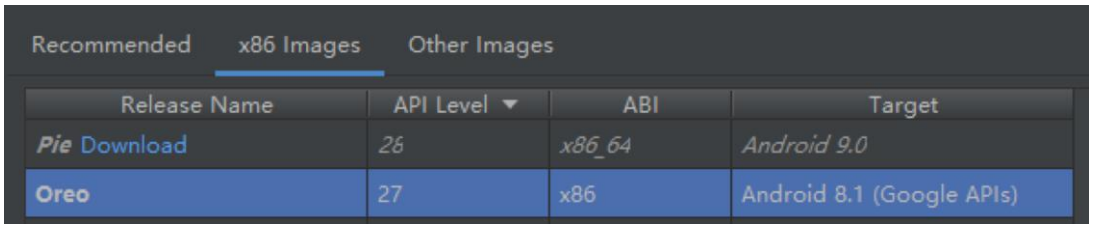
3. Set up SDK: “Tools” – “SDK Manager” – Click “Show Package Details” – “Android 8.1 (Oreo)”. Then check “Android SDK Platform 27”, “Sources for Android 27”, “Google APIs Intel x86 Atom System Image”.

Apply the SDK setting.

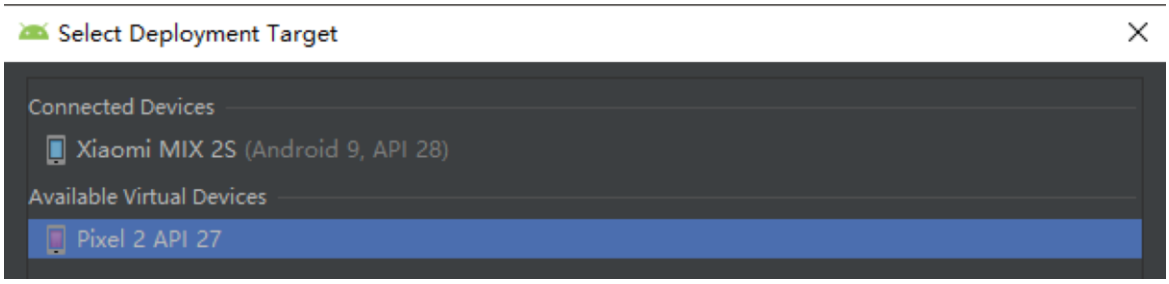




4. Set up virtual machine : "Tools " - "AVD Manager" - "Create Virtual Device"
Choose Pixel 2 and click Next , change page to "x86 images" and choose "Oreo 27x86 Android 8.1(Google APIS)", click next then finish.



5. Run virtual machine throw the AVD Manager. Finish setting guide of device. Drag the ARCore APK provided in coursework folder and drop into the screen of virtual machine to install ARCore.
6. Click on the "More" button (The button on the bottom of function bar that near the virtual machine screen). "Settings" – "Advanced" – "OpenGL ES API level". Choose "Renderer maximum (up to OpenGL ES 3.1)". Close the window and restart virtual machine.
7. Run the project (Shift + F10 on Windows) and choose the virtual machine the be set previously. Wait for build and install process.



8. If install succeeded, the application will start run on virtual machine automatically and you can follow the instruction that how to control virtual device camera to use application.

If you want to install the application to device by computer, you can turn on the USB Debugging function that is in the developer options. Connect device to computer and trust computer by click related pop-up window that will show on your Android device. Then run the project and choose your device from "Select Deployment Target" window and the application will install to your device.

3.3 How to use

Step 1: When you enter the application, a sign with a hand holding a phone will show on the screen. The application need some environmental information to place model. Find a small plane around you where you want to place the model. Move the phone from side to side until a series of white dots appear on the screen.

Step 2: Tap the white dots, and the default model will be placed where the white dots are.

Step 3: You can adjust the model, such as moving, rotating, zooming in or zooming out, by touching the screen with two fingers.

3.4 Quit the application

You can close the application when you back to the Android home menu.

4. Button list

	Model selection button	When touching on this button, the name of water cycle and wind cycle will appear on the screen. You can choose the model you want to learn by tapping one the name of the model.
	Model deletion button	When touching on this button, the current presented model will be deleted.
	Model description button	When touching on this button, several text that describes the knowledge of the model and a link to NASA will be appeared at the top of screen.
	Menu button	You can use this button to hide or present the navigation bar.
	Play button	When touching on this button, animation which shows dynamic changes of geographical environment will be displayed.
	Hint button	When touching on this button, several guidance for using this application will appear on the screen.

5. Appendix: Signatures

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