**Mobile Application Project**

**Project Name**: ML Worbo

**Goal of Application**:

* This is an app for English speakers who want to translate foreign languages.
* Users take a picture of any text using the camera function in the app.
* The app recognizes the language of the text and translates it into English.
* Users can save the word’s information in a words list.

**Description of Application Details**:

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|  | Main activity – CardView  There are four card views you can click on.   * Take Photo -> Goes to the Camera Activity * Translate -> Goes to the OCR & Translation Activity * Word List -> Goes to the Word list Activity * Help -> Goes to the Help Activity   Help page describes this app briefly and informs you of the  link for the ML Worbo’s website. (But it is not real.) |
|  | Camera Activity – CameraX, Android-Image-Cropper   * You can take a photo using the camera x function and then it automatically takes you to crop the image. * Cropper has Rotate, Flip horizontally and Flip vertically functions. * If you push Crop button, the photo is saved in your device. * You can go back to main by pushing < button on your device. |
|  | OCR & Translation Activity - NestedScrollView   * If you push the ‘Translate’ card view, you can see the photo you recently saved. * The app recognizes the text on the image and shows what the word is and what language it’s in. * If the app successfully identifies the language, it starts downloading the translation model and the Translate button would be enabled. (It takes a little time.) * If you push the Translate button, you can see the result in English. * You can save the word’s information to the word list. * After you save the word, you’ll be back in main and the word won’t be displayed on this activity anymore. * But if the app cannot identify the language or fails to download the model, ‘Sorry translation failed’ will be shown. * If you don’t save the photo, ‘NO IMAGE’ image will be displayed when you open this activity. |
|  | Word List Activity – RecyclerView & CardView   * The current entries in the word list are displayed in individual CardViews showing the image and the source word. * You can click the card to open the Word Activity. |
|  | Word Activity – NestedScrollView   * You can see the details of the selected word entry. * Image, Source word from the image, Language of the source word and translated word * You can remove the word from the list. |

**Uniqueness:**

This app is good for finding the meaning of words in English easily even if the user does not input the text themselves.

Users can take a picture and crop the part of the text they want to translate.

Users can save the picture they took, the OCR decoded word and the meaning in English into a word list to see afterwards.

**Technologies Used:**

* ML Kit
* Text recognition: com.google.android.gms:play-services-mlkit-text-recognition:16.1.1
* Identify Languages: implementation 'com.google.mlkit:language-id:16.1.1'
* Translate Text: implementation 'com.google.mlkit:translate:16.1.1'
* CameraX: Jetpack support library
* CameraX core library using camera2: androidx.camera:camera-camera2: 1.0.0-beta07
* CameraX Lifecycle Library: androidx.camera:camera-lifecycle: 1.0.0-beta07
* CameraX View class: androidx.camera:camera-view:1.0.0-alpha14
* <https://developer.android.com/jetpack/androidx/releases/camera>
* ArthurHub/Android-Image-Cropper: Third party library for image cropping
* com.theartofdev.edmodo:android-image-cropper:2.8.+
* <https://github.com/ArthurHub/Android-Image-Cropper>

**Interesting facts I learned:**

Learning new technologies is always interesting and I realized there are a lot of open-source libraries out there to create a mobile application. I used the Google Developers site, Android Developers site and a third-party library’s GitHub. They also provide Codelabs, which explain the detail of the technologies, so I could understand well and study it in depth. CameraX is said to be relatively the latest technology and it helps you make camera app development much easier compared to previous camera libraries such as Camera2. This library was much simpler to use and more powerful so I am satisfied with having used it.

**Difficulties I encountered:**

Initially, I wanted to make this app for English speakers who are learning foreign languages. More specifically, non-Latin languages where it can be difficult to type the characters using their phone. However, the on-device version of the ML Kit OCR can only recognize text in a Latin-based character set. I could have used the Google cloud vision API but it was a little difficult at this moment since I had to agree with their policy about price etc. I will probably try to use the cloud vision API to improve the app to cover non-Latin languages as well in the future.