Mobile HCI: Team Assessed Coursework Report

Team 12

Laura Moreby 2167714M
Frances Ramirez 2168154R
Matthew Biggins 2135573B
Adrian (Chun) Wong 2177498W

Contents

Introduction: Overview of Design Task

This exercise involves a scenario where our team have been hired as consultants to generate a compelling usage scenario for a translation tool, and then propose and develop an application for mobile devices which supports this useful, everyday task in a foreign language or country by supporting the user and the person they are interacting with. We were able to use Google Cloud services for translation of text from words captured by the mobile device. This report shows the design process of the app, the stages of implementation and the evaluations we did at both the design stages and once the app had been implemented. Finally we reflect on the project and suggest how it may be improved for the future.

Idea Stage: Context and User Needs

When thinking of an idea for a mobile app that would address the problem of interacting with people in foreign languages, we tried to think of everyday activities that people may struggle with whilst in an unfamiliar environment such as another country. We decided to build an app that would help travellers with the task of paying for products and services in other currencies; specifically the problems of being unfamiliar with the currency in terms of what the coins and notes look like, the conversion rate between the foreign and native currencies, and the language barrier when communicating with locals.

The reason why a mobile application is suitable is because when people are travelling, quite often the only device they will carry with them is their mobile phone, and because mobile phones are always carried in hands, pockets are bags they are always very easy to access when needed. Furthermore, in the case that our app will require internet to work, a mobile phone is much more likely to have internet connection compared to a tablet or a laptop. Our target users will be people travelling in foreign countries, for both business and pleasure. It will be simple and intuitive to use so that people of all ages, from young to old, will be able to grasp how to use it. Input will be given through tapping buttons and scrolling.

The social context will vary dramatically. The physical and social environment will be constantly changing for our users of the app and we will need to cater for all of these conditions. Some possible examples of when people would use this app are: to help pay for a taxi by helping to count how much money you have in your hand, in shops, for example to ask questions in foreign languages to shop assistants, and in restaurants, for example to see what is good value for money by converting prices to your native currency. Users may also want to use the app whilst walking and carrying baggage, hence only have one hand free.

Whist the social context will vary dramatically, the needs of all of these users will be very similar. The needs of the users are immediate so the app needs to be quick to use; a further benefit of this is that it will not hinder battery life, as people may not have had a chance to charge their phone if they have been travelling. It must be simple to use at a glance, with screens that are not complicated and overcrowded, and be able to be operated with one hand, not only because of the scenarios users will be using the app in, but also because it needs to be easy for all users to grasp. We will try to get the app to work without internet, so that if people do not have data overseas this will not be a problem (we do not know if this will be possible yet, depending on the APIs we decide to use). All users share the same needs - an app which is quick

and easy to use to allow the user to get the information they need without hindering their productivity or speed to get things done.

Idea Stage: App Definition, Functionality/Features and App Identity

To summarise, our users will be users of all ages, who will be travelling for business or pleasure. They will have immediate needs and require an app which is quick and simple to use.

The core functionality will be three-fold:

1. Translation tool and common phrases to help when buying goods and services in foreign countries. The common phrases will include sentences such as “Can I buy this please?”, “How much is this?”, “Can I have the bill?”
2. Currency converter and images of the currency so you know the value of each coin if you are unfamiliar with them
3. A currency counter tool to add up how many of each coin you have and give you the sum of your money. We would also like to implement an image recognition coin counter which can analyse images of money in your hand and count it up for you, but this may be slightly more challenging

Initially, we are only going to implement the app in a small number of currencies and languages. This can then be expanded as the app progresses.

Our app will be called **‘CurrencyCrunch**’.
We created a simple logo using Affinity Designer:

Design Stage: User Stories

Here are some of the user stories we decided upon to give an idea of the the type of users who will use the app and their reasons for doing so:

- As a frequent traveller, I want to check the exchange rate, so that I understand the currency when purchases goods and services abroad.
- As a businesswomen, I want to communicate with local people in cafes and restaurants, so that I can get food quickly and easily on my lunch break.
- As an infrequent holiday-goer, I want to quickly count up how much foreign currency I have in my purse, so that I can pay for items in shops quickly.
- As a documentary producer, I want to communicate with local people, so that they are aware that we respect their community and language.
- As a pilot, I want to quickly get accustomed to each currency and language, to allow for efficiency in each country that I land in.

Design Stage: User Personas and Scenarios

We created some user personas and appropriate scenarios to envisage some of the users who would benefit from our app:

Michelle Biggins, 32

Michelle is a business woman working for the financial industry, and her role involves travelling to her firm's numerous offices around the world to host meetings and meet clients. Many of the countries she has to visit she has never been to before and so she is unfamiliar with the language. She always has her mobile device to hand and is competent in using it so she would like an app which is quick and easy to use and makes it easier for her to communicate with locals.

Scenario: Michelle is currently working in Germany and usually only gets about half an hour for her lunch break so needs to be quick to nip out of the office and grab some food. She gets out the app and navigates to the Home screen to choose her preferences for the language conversion. She then goes onto the Phrases screen because she wants to make use of some of the default sentences. She picks up a sandwich from a bakery and uses the phrases "How much is this item?" and "Keep the change" in the French language so that the person serving her could understand. It was much quicker to use the app in this way than to have to manually type in the sentences into this app or a different app to translate it that way.

Mr and Mrs Smith, 65 and 67

Mr and Mrs Smith are a retired couple who love to travel. They frequently go on cruises where they can visit multiple countries in one holiday. Whilst they love experiencing different cultures, they often struggle with getting accustomed to the different currencies and languages. They have both recently gotten smart phones for the first time and are still learning how to use it. They want an app that they would be able to use, despite their little experience with technology.

Scenario: The couple are on cruise about to stop off in Barcelona. They get out the app whilst on the boat to get accustomed to it before docking at the port. They find the initial carousel screen really useful to learn all the functionality of the app. They navigate to the Home screen and put in their language preferences. They want to see how many Euros they have at the moment so navigate to the coin counter screen and put in how many coins they have. The app calculates they have 7.30$, just enough to get some lunch when in the city.

Design Stage: Interviewing Real Users

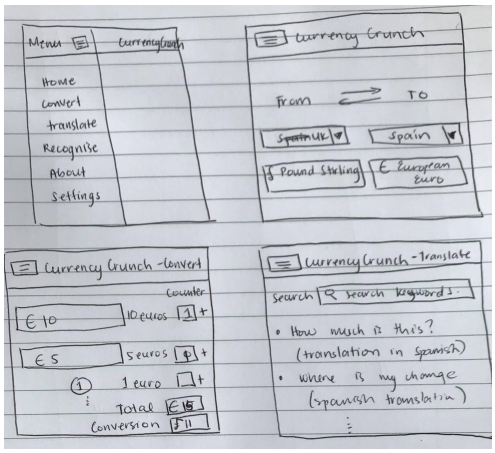
In order to get some real-world insight into how actual users would use this app, we found some friends and family that would benefit from it, and asked them some questions on their lifestyle whilst abroad.

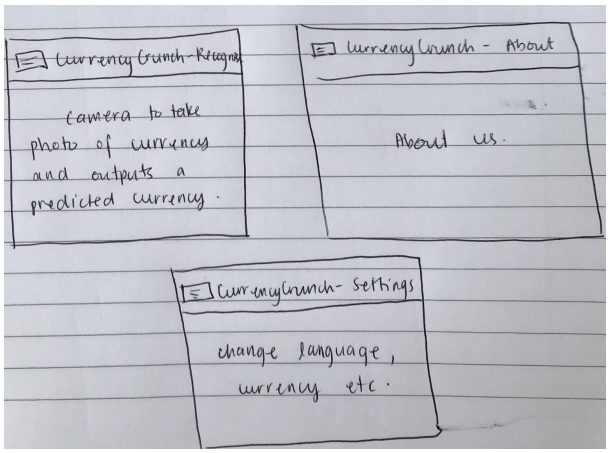
James, 15 - James is the brother of one of our team members 15 year old who plays chess around the world. He attends a lot of tournaments worldwide, and pointed out that quite a lot of the countries and cities he visits are not touristy areas, for example Romania, and so comes across a lot of people who do not speak English, hence the importance of knowing some common phrases when talking to local people. He agrees with the idea of the app and thinks he would find it useful, especially when using currency that he is not familiar with.

Louise, 22 - Louise is the friend of one of our team members and has been taking a gap year, travelling to different countries in Europe. When talking to her, she said one of the most challenging aspects of her trip is the fact that the currencies and languages are changing all the time, and would have found an app like ours very useful in getting accustomed to each country. Additionally, she is not very good at maths and counting, and so really liked the counter part of the app which will count your coins for you.

Design Stage: Wireframes

These are our initial hand drawn wireframes for the app:



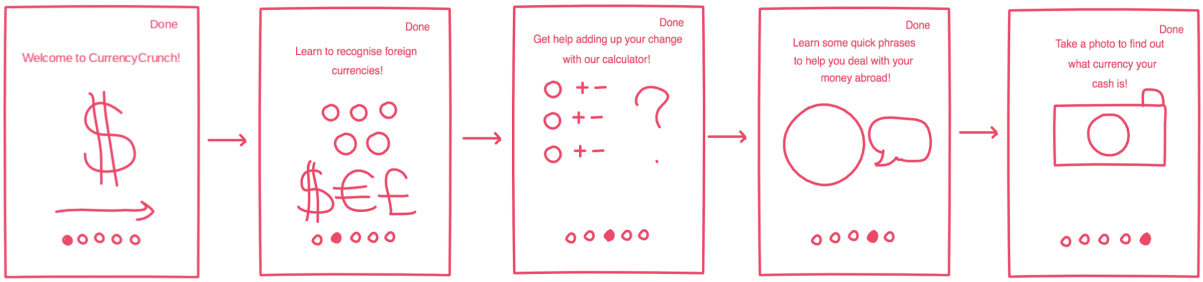


Rationale behind design: We believe that beauty and usability come from simplicity, so we are trying to design with the mobile user in mind from the start, and keeping our screens simple. This is why we are using a menu bar which is selected by clicking the little icon at the top right, and this will cause it to show up. This is better than the menu bar taking up space on the screen all the time. We are having a different screen for every main functionality, so that screens do not become overcrowded and confusing, whilst making good use of the space available. To further allow simplicity, we are keeping the hierarchies shallow and only have one main menu, which users go back to when wanting to navigate to a different screen. This allows for quick navigation, which again keeps the users and their priorities in mind.

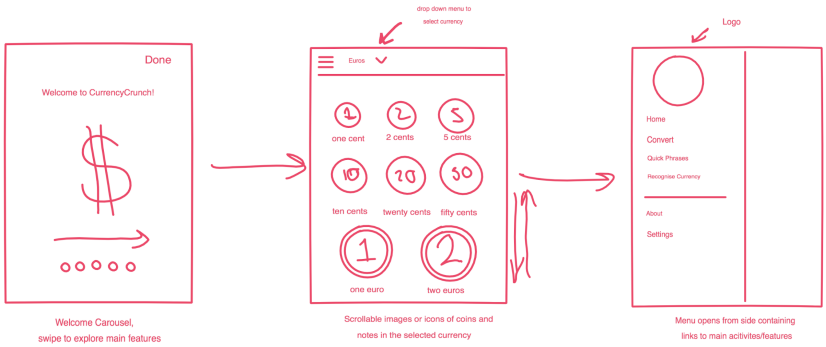
Design Stage: Paper Prototypes in InvisionApp

Paper prototypes are important to lay out the main views and controls, and map the flow between screens. It allows users to feedback on parts where the user experience is too complicated, and allows us to focus on observing behaviour instead of opinions. After we had drawn out an idea of what we expect it to look like, we used InvisionApp to create "paper prototypes" because it was easy to use and allowed us to create "interactive" prototypes as opposed to wireframes that were simply drawn onto paper.

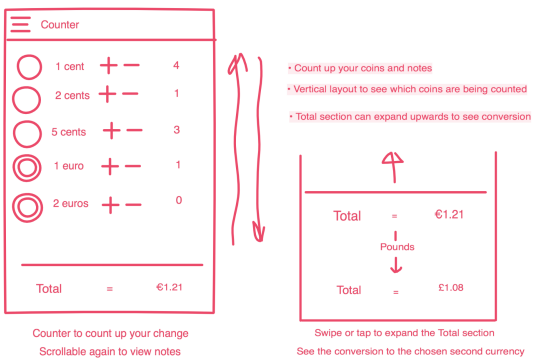
We decided to include a 'Welcome Carousel' that the user would swipe through when the open the app for the very first time to familiarise them with the functionality:



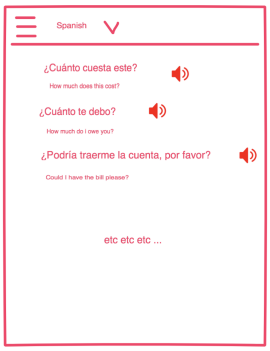
Here is a walkthrough if the user wanted to open the app for the first time and then view the screen showing the different coins in the currency they are interested in. The wireframe on the right shows the main menu:



Here is the currency counter tool where users can sum their change:

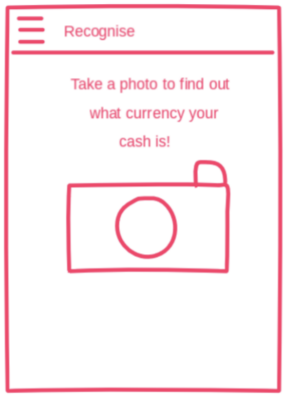


Here is the translation tool:



Common phrases about money are given in the chosen language. Pressing the speaker icon will let you hear the proper pronunciation.

Here is the currency recognition tool:



Evaluation Stage 1: Usability Evaluation on Paper Prototypes and Resulting Changes Made

Usability evaluation at this stage is important because it allows designers and developers of an app to see if it achieves the goals that it was set out to do in the early stages of designing and development, and gain useful feedback on what appears to be good and/or bad, before the implementing actually begins. We gained some useful feedback as a result of the paper prototypes, and made some changes to the design and functionality of the app as a result.

The first comment we received is one saying that they liked the idea of the coin recognition feature but they were not sure how difficult it would be to do. We thought about how we would implement this, and agreed that it may be too difficult to do given the short duration of the project. Therefore we decided that we would concentrate solely on the translation feature, common phrases, currency conversion and the coin counter. Another tester liked the idea of the coin counter and asked if we would have a feature where a user could put in a miscellaneous value and have the app convert it. We had initially planned to implement this but realised we hadn't made that function clear on the paper prototypes. In any case it was useful to get the feedback that this feature would be useful to potential users. Finally, we received some positive feedback on showing the images of the coins as one user said that in their own experience they had trouble dealing with coins when they first came to the UK. It was good to know that this feature would benefit users in reality.

We also asked friends and family to look at the paper prototypes to get some more feedback and made some more changes to the design as a result. Everyone seemed to like the general appearance of the app and the structure of each page, and comments included "each page has a clear feature" and "the pages have the right amount of content on them so that they are not too overcrowded or too sparse".

Implementation Stage: Technologies Used

Throughout the project, we used a variety of technologies which are listed below. Some we had used before and were familiar with, for example GitHub and Java as a programming language, but some we had to do a lot of practising and research to become competent in whilst working on the project, such as Android Studio and the APIs:

- We are using Android Studio to develop the app and a Samsung tablet and Samsung S8 Plus to test out the app. We used these devices because we wanted to cater for different aspect ratios - specifically the Samsung S8 Plus was useful because it has a different aspect ratio to most Android devices because it is taller, and sometimes app developers do not consider these devices when developing apps.
- We are using GitHub for version control and to make sure everyone had the latest version when working on the app
- We are using Java and XML within Android Studio to code the app
- We are using Google Translate API for the translation functionality
- We are using the open source Fixer.io API for the currency conversion functionality (http://fixer.io), as Google did not have a suitable currency conversion one we could use. However implementing this API was similar to the implementing the previous Google Translate API
- We used Affinity Designer to create the logo
- We used InvisionApp (https://www.invisionapp.com) to create and gain feedback on the paper prototypes

Implementation Stage: Approach and Process

Our rough approach when implementing the app was as follows: we set everything up on Android Studio and then used a template from Android Studio to base the app off, which allowed the menu bar to work, and meant that the app looked clean and consistent from the offset. We had to do a lot of research on APIs and how they work, and then got the Google Translate API working for the generic translation part of the app. The startup carousel was then implemented by one of our team members, and then used the second API (fixer.io) to get the currency conversion part of the app working. Then the Home Page was implemented where you can select your preference of language/country/currency, and common phrases added too. We then worked on the currency counter part of the app, which was challenging as one of our team members had to download an image of each coin in order to implement this.

Miscellaneous points:

- In terms of internet usage, the app does require internet access for the generic translation part, and also to change and save preferences. Once you have saved your preference of a language, the common phrases will be able for you to access even without internet connection, as they are saved on the SharedPreferences part of Android Studio, which is similar to a database but stores key-value pairs.
- We are not incorporating any sound feedback into the app as users will frequently be in busy, noisy environments where sound will not be necessary or useful.

Evaluation Stage 2: Usability Evaluation on Product and Resulting Changes Made

Methodology: For the second usability evaluation, we decided to hold a number of informal individual interviews with a variety of testers who were happy to participate, as it is important to get a variety of perspectives and opinions. We selected people who we thought would match the intended audience and would benefit from the app in real life. We managed to do a total of six interviews. All users gave consent at the beginning of the interview to participate and for their feedback to be used. The structure of the interview was as follows: one of our team members began by giving a basic description of what the app is supposed to do, followed by the user testing the code on their own with as little instruction given as possible, so that we could see how intuitive our app was to users who had never used it before. Users were encouraged to comment aloud as they used the app and together with the questions we asked at the end, it provided a large range of qualitative and descriptive information which was useful when improving the app afterwards. Once the users had explored the app as much as they wanted, they were asked some open ended questions, so as to not get biased opinions. The users were asked what they liked the most and least about the app, and if they could change or improve any existing features, what those changes would be. Finally they were asked if there were any other features they would find useful in the app.

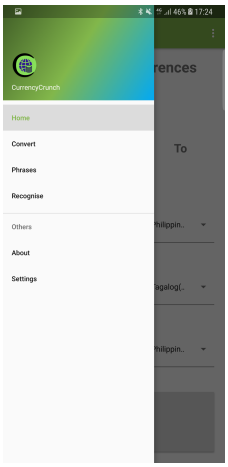
After holding the interviews, we studied the responses in more detail and based on what we learnt, we decided what changes we wanted to make to the design and features. Below is a summary of the feedback we received and the changes we made as a result. We have split the feedback into two groups, that to do with appearance of the app and that to do with functionality.

Results and Changes:

Appearance Feedback

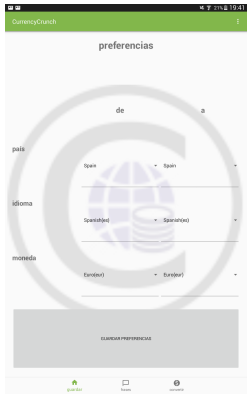
One of the biggest pieces of feedback we received about the app and was in fact mentioned by half of our testers was the menu bar on the left - users found it annoying to have to press the button at the top rights to bring up the menu every time they wanted to change page. Users liked the Instagram-style menu bar instead which is located at the bottom of the page and you can access from wherever you are in the app. We decided to change this as we agreed it would make the user experience better.

Before:



After:

Because we had the logo on the menu bar and this was disappearing, we decided to make the logo appear as a watermark on each page, as it would also add a bit of personality to the pages on the app, especially on the tablet version of the app as there seemed to be more empty space. The tablet home screen is shown on the right.



Another piece of feedback received was that the Welcome Carousel was great, but it wasn't accessible to the user after they had already viewed it the first time they launched the app. As a result, we added a button in the top right corner that the users can click if they want to read the Welcome Carousel again to be reminded of the functionality of the app. This is demonstrated in our video.

One user also said that it would be helpful to have a loading icon come up whilst data was being loaded, so that the user would know that the app was working immediately to fulfil their request, and so we added this in.

There were no other negative feedback about the appearance of the app. Several users commented on the fact that the green was a nice appropriate colour, as it has connotations to do with money and travel. Once we had made changes in accordance with the above feedback, we showed it to the testers again and they liked the changes that we made.

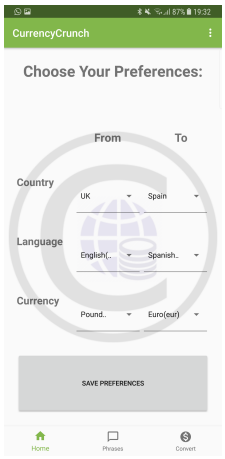
Functionality Feedback

The main piece of feedback we received was that the app was running quite slow when carrying out operations. As a result, we found a way to make the app much faster. The reason why it was running slow was because it was processing a lot of data at the same time and translating all the languages simultaneously. We decided to change the app slightly so that the user can save their preference and then the app saves the translation of the common phrases into the "database" and then just pulls out the data that the user wants. This also means that the phrases would be available when the user did not have internet, as they have been saved.

One user had the idea that users could click on the common phrases to bring up a pop up showing the foreign phrase in larger letters, so that if a user did not know how to pronounce something in a foreign language, they could show the screen to the person they are communicating with to communicate that way. This is demonstrated in our video.

One user suggested the idea of automatically selecting the language of the app based on the mobile device's default language. So for example if a French user downloaded the app, then when they launched it all of the text in the strings.xml file is translated to the user's native language - this would include things like the text on the Welcome Carousel, the headings of the

pages and the text on the menu bar. We managed to implement this in response to this feedback. Again, this is demonstrated in our video.



Two users found it confusing that you could only change the language in the settings, and one user thought this would be annoying for bilingual people to have to keep going into the settings to change the language or currency, if you wanted to interact with it a lot. Therefore we got rid of the settings page and have incorporated this into the Home Page to allow a user to change their language or currency more easily. The Home Page is shown on the right.

The rest of the feedback was positive, and users found all of the functions useful and something that they would use whilst abroad.

Evaluation Stage 3: Reflection on App and Improvements for Future

Overall, we were happy with the app and the functionality that we managed to implement. The app worked well and users who tested it found the features very useful. If we had a significant development and marketing budget and a large team of researchers and developers, there are a lot more opportunities and we have a few ideas of more functionality that could be added to the app . In terms of the design process, we would have been able to conduct more large scale market research to get a better idea of what users would want from the app. We still like the idea of using the mobile phone's built in camera to take a picture of coins and be able to calculate the amount of money that was there, and this would be useful for people who weren't familiar with certain currencies, but also to help people count money quickly as they wouldn't have to do it themselves. We also had an idea to use the GPS within the mobile device to automatically select the country you were in, and the appropriate language and currency, so that the user did not have to change their preferences every time they went to a new country. It would also be great for the app to fully work without internet, as people still may not have constant internet connection in foreign countries, as it can be very expensive. However we are not sure how easy this would be to implement without taking up a lot of storage space on the phone which is another issue app developers have to consider. We would repeat the "Bill Buxton cycle" of elaboration (generating as many ideas as possible) and reduction (narrowing the ideas down and carefully refining it) and then continually test the product and evaluate with users as well.

In addition to the opportunities that would be created with a large budget and team, risks might be created as well. With more people using the app, it would have to incorporate more and more languages and currencies to cater for the larger user base. Additionally, if the translations don't work perfectly, this can cause more problems than it creates as it may cause confusion between

interacting people, and any negative experience had with the app would probably stop a user from continuing to use it. The app would have to keep being updated and developed, because if it ever had problems users would simply find alternatives on the App Store to use instead, as there is so much choice nowadays and this will no doubt continue to grow.

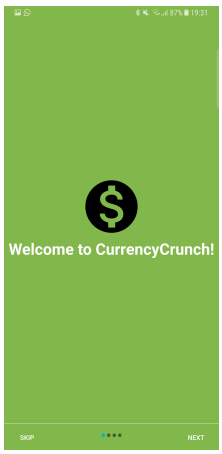
To summarise what we would have changed if we had more time during this project, we would have gotten more feedback from potential users and tested the app in a variety of settings. For example it would have been great to actually take the app abroad and test it in action, or simply tested it whilst users were walking or outdoors, in a way similar to how the app would have been used in real life. It is challenging when doing this in a university setting as there are health and safety issues involved. Additionally, we would further test the system to catch any bugs that we may not have caught, possibly by writing test cases in addition to regular tests of the use cases, and identify any potential risks and opportunities by continually testing it with users to get their feedback and see if there were any features that could be useful that we had not thought of. We would have liked to go back over paper prototypes and further improved these before starting implementation, and would have ideally gotten more users to test the app with once we had implemented it, which we could not do because of time constraints. In any case, it has been very interesting to reflect on our app and think about opportunities for the future, but also has reminded us that the software lifecycle never really ends as new features can always be added, repeatedly requiring more testing and usability evaluations, as well as the maintenance of the older features too.

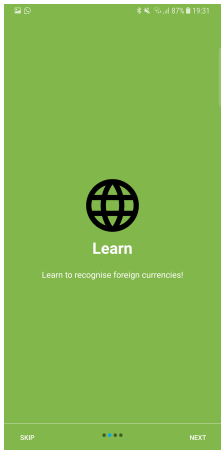
Conclusion

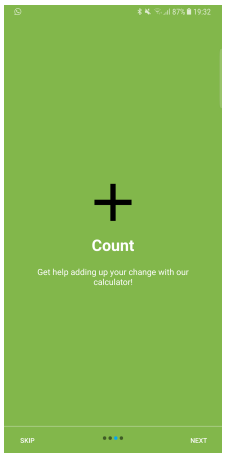
To conclude this report, we thoroughly enjoyed developing this mobile app and think it has been successful. Not only did it give us an introduction to using Android Studio, but also allowed us to think about what the process of designing an application looks like, and how you have to adapt the usual software lifecycle to fit your needs based on the evaluation stage and the feedback you receive. We aimed to come up with an app which had a reasonable scope and was feasible to design, implement and evaluate throughout the course of the semester, and we received detailed feedback which allowed us to improve it further, by adapting the functionality and making it more user friendly. We identified every team member's strengths and weaknesses at the beginning of the project, which was vital in allowing us to be as productive as possible. We are very happy with the end result and we hope you enjoy reviewing it.

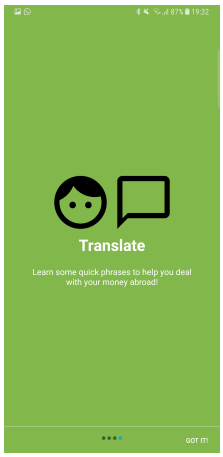
Appendix A: Screenshots of the Completed App

Welcome Carousel



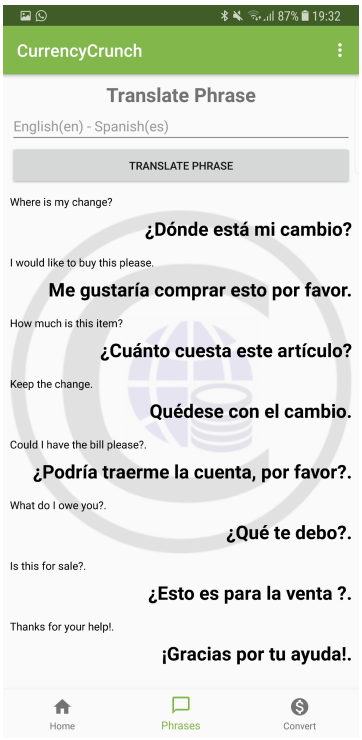




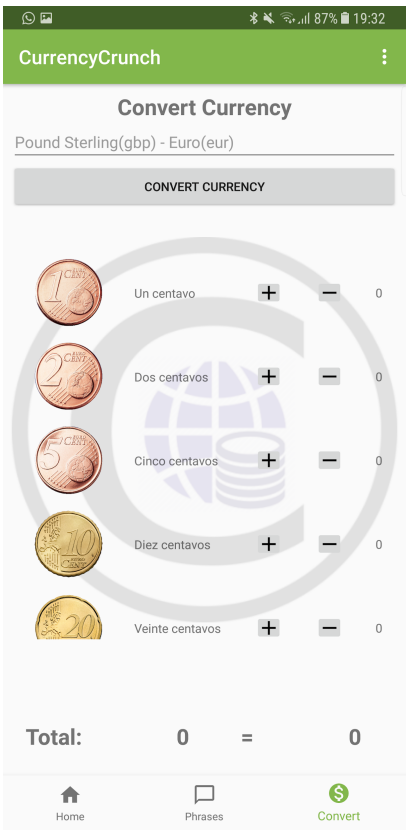


Home Screen

Translation and Phrases



Currency Conversion and Coin Counter



Here you can see that the application has calculated how much money the user has and it has also converted this to the user's native currency.

Appendix B: Team Member Contribution

Here are the main contributions made by each team member:

- **Laura** wrote this report, coordinating with the team at all times. She decided the methodology for each evaluation stage, gathered feedback for the app, and communicated the feedback with the team to ensure feedback was being addressed.
- **Frances** drew the initial wireframes and implemented the app, setting it up with the template and doing the necessary research in APIs before getting both APIs to work. She implemented the translator and the Home Page, amongst other things.
- **Matthew** did the paper prototypes on InvisionApp and implemented the app, including the Welcome Carousel, the currency counter (including sourcing the images of the coins which was a big job!) and the conversions, and the user interface of the app, amongst other things.
- **Adrian** added the functionality to change the language of the app to match the default language settings of the user's device and did research on other potential functionality which ended up being too difficult to implement in the time we had.