COMP4801 FYP Project Plan

VR/AR GAMIFICATION APP FOR THE ELDERLY

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4.10.2020
Background & Objectives

Elderlies nowadays like to participate in different activities. They like to move around and learn new things. However, due to the COVID-19 situation, most of them are limited to staying in homes. Hence, we aim to develop an AR gamification app called vocabulARy. It is an interactive app that allows elderlies to self-learn English vocabularies at home. The app teaches players by letting them match English vocabularies with AR objects. They collect AR objects and could use them to set up their own scenes at home.

VocabulARy aims to teach elderlies English vocabularies, let them move around in their homes and enhance their creativity.
The AR Gamification App

**Methodology**

English vocabularies are divided into categories, each with a few levels. Players learn by finding and matching AR objects with vocabularies. Upon completing a category, players unlock a set of AR objects in the vocabulary library.

In the main learning game, the application detects surfaces of the environment. Random AR objects will be generated throughout the space. Players holding the AR-supported device have to physically move around and find AR objects matching different vocabularies. In case of a mismatch, the English label will show up for a while as a hint. In higher levels, time limit for each match will be tightened. Allowances for mismatches will also be decreased.

After completing a category, players collect a corresponding set of AR objects. Players can use them to virtually decorate their room and take photos with them. It is similar to having
snapshots with Pokémon in the famous AR game Pokémon Go. But unlike Pokémon Go, players in this game have to correctly type the English vocabulary of the object before placing them out.

**Metrics**

The application will record vocabularies that are frequently mismatched or take a long time to match. They will appear more frequently in higher levels.

Players are encouraged to revise on the learnt vocabularies. If a category isn’t being played for the past 14 days, the corresponding AR objects will be locked. Players have to play that category to recollect them.

**Why AR?**

If this is a normal 3D computer game, elderlies will have to spend more time learning the controls and views. It may also be hard for them to picture the virtual 3D environment. These problems do not exist when using AR. Controls are intuitive. Players do not need to explore a virtual environment, they can focus more on learning the vocabularies.
Methodology

Software

We would use react-native-arcore as the AR libraries. It is a wrapper for native code.

For the 3D objects of the app, we would search in the Unity assets to find the suitable objects. The 3D objects would be used for the users to answer the question asked in the mini game.

Vuforia Engine

Vuforia is an AR SDK for mobile apps that allow the developers creating AR applications. Computer vision technology would be used to track and recognize the 3D objects and also the planar images in real time. This allows the developers to orient and to position the virtual objects like 3D models in relation to the objects in the reality.

We would save the reality background images that the 3D objects will be added into the database of the vuforia engine. (banknote is the reality background images. Once, the banknote is detected by the app, the 3D objects would be added on the banknotes.)
Backend: Express NodeJS

VocabularY would use Express framework for the backend development. It is a flexible Node.js application framework, which is for the purpose of creating mobile app. Express has a huge amount of plugins.

Also, VocabularY would be deployed in IOS and Android.
# Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Progress</th>
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<tbody>
<tr>
<td>4 Sept</td>
<td>First meeting with Dr. Choi</td>
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| 4 Oct         | - Detailed project plan  
- Project webpage                                                      |
| 4-31 Oct      | Learning Unity & ARkit                                                  |
| 1 Nov - 31 Jan| Start implementing the main learning game part  
- Being able to generate AR objects  
- Implement game logic                                                   |
| 11-15 Nov     | First Presentation                                                       |
| 24 Jan        | Detailed interim report                                                 |
| 1 Feb - 1 Mar | Start implementing the part where players can use AR objects to virtually decorate their rooms |
| 1 Mar - 18 Apr| Start implementing the part where players can use AR objects to virtually decorate their rooms |
| 18 Apr        | - Final report  
- The mobile app                                                         |
| 19 -23 Apr    | Final presentation                                                       |
| 4 May         | Project exhibition                                                       |