Sketching in AR with the ability to add 3D Model support

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1 ELEVATOR PITCH

The project will be to create a mobile AR App that allows users to import avatars and modify them by sketching or drawing. The main technical challenges consist of developing . Attendees using this application will be able to bring up a 3D modelling avatar in AR and manually set its pose to use as reference in their sketching. They will be able to draw on their AR device.

2 EXTENDED OVERVIEW

https://www.youtube.com/watch?v=pdRpCJ5acrA

Augmented reality gives the ability to recreate real life scenes and modify them, such as by changing the environment or adding objects. One of the most popular tools, ARCore, provides ways to create mobile apps that make use of the advantages of Augmented Reality. ARCore has many tools that are useful for apps, such as image detection, rendering objects in scenes, environmental lighting, and more. Being able to import avatars such as people, and to modify them by sketching, would likely be a more efficient version of photoshopping photos, but there are many challenges in attempting to create an application that can do this.

In particular, because an imported avatar comes from a different image, it is very likely that the avatar will not look appropriate in the Augmented Reality scene and look very artificially photoshopped. In addition, it may prove to be difficult to allow the user to sketch and change the avatar that was added to the scene while maintaining a natural look in the scene. Despite these challenges, it appears that there are many tools to help mitigate these issues. Features such as ARCore's Environmental HDR allow for the 3D content to have lighting that matches the surroundings, and the Scene Viewer tool allows for 3D models to be added into a scene. However, it still will likely prove to be a challenge to maintain realism despite these tools, and we anticipate needing to implement parts of algorithms such as lighting to ensure a realistic feel. A final challenge is that implementing drawing and sketching into Augmented Reality may not be as simple as it appears. While users may draw and move the avatars around, getting drawing to feel realistic in 3D has more degrees of freedom than in 2D such as on a digital screen, and thus implementing many of the features available on 2D drawing software in 3D will likely also prove to be a worthwhile challenge.

2.1 Technical Challenges

- Loading in the avatar with the ability to adjust its pose.
- Lighting to make the avatar look realistic in the scene.
- Implementing drawing/sketching over the scene

2.2 Key Risks and Mitigations

- Unfamiliarity with ARCore/ARKit and the possible features. The mitigation is that we may be able to migrate to more familiar software such as Unity, which are similar to ARCore/ARKit.
- It may be difficult to implement shading and the adjustment of some avatar in an AR App. The mitigation is that we may turn down its scope with merely offering models that with a fixed pose, only letting users adjust its position and rotation. This reduction in scope does not detract from the proof of concept of having 3D models for reference in AR

3 HARDWARE AND SOFTWARE

- [Personal] Android Phone, IPhone
- [Personal] ARCore/ARKit development environment (Android Studio, Unity, etc.)

4 TEAM RESPONSIBILITIES

Jacky Mooc: Responsible for:
(1) Implementing the importing and in-app pose adjustment of a 3D avatar into the scene
(2) Implementing user interface
(3) Contributing to final project report

Anthony Lu: Responsible for:
(1) Sketching implementation
(2) Doing research and implementing lighting
(3) Contributing to final project report

5 DEVELOPMENT PLAN

Final projects should be completed over three weeks (i.e., February 29 through March 19). Students are encouraged, but not expected, to start earlier. To assist in assessing the complexity of your project, please provide a high-level development plan, including major milestones (i.e., dates that significant hardware or software features will be tested or completed). Include time for writing your final project report and preparing for the final project demo session.

- March 5: Have functionality such as loading in an avatar and being able to brush stroke
- March 11: Add lighting or other details to put avatars in the scene, and start testing
- March 17: Finish testing and the final report/demo

REFERENCES

https://next.reality.news/news/googles-arcore-updates-bring-scene-viewer-for-ar-web-search-improvements-image-recognition-ambient-lighting-0197232/

https://sketchar.tech/