Bilkent University
Department of Computer Engineering

Senior Design Project

Project short-name: Visp

Project Specifications Report

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1. Introduction

Since its emergence after the World Wide Web became mainstream, social media has been changing our lives in every imaginable way. In a short time span, countless social media platforms emerged and so many of them are still in use by many people of various demographics. As of 2020, it is estimated that 3.6 billion people use social media platforms worldwide [1]. Social media has become one of the most prominent ways in which people spend their time. It revolutionized the way we share information, ideas, memories and to this day, it still does. In addition to that, social media itself grows and evolves as new ideas and technologies emerge. One of the recent and exciting technologies that social media has not completely intertwined with is augmented reality. Augmented reality technology is an excellent way to enrich the environment around us to be used by people in interactive ways. Our aim in this project is to bring these two concepts together and integrate the perks of augmented reality to a platform of sharing and storing ideas. We are also very familiar with the idea of corporations using various technological platforms to engage with their audience and customers. Therefore we believe that augmented reality can also change how corporations and customers interact, bringing a new perspective to running advertisements. One of the promises of this project is creating a bridge between the digital world and real-life while allowing people to share an idea with others or save a memory related to a real-life object. We believe that introducing augmented reality to the interactivity amongst people will be the most innovative aspect of this project. A successful implementation would not only be a modern take on social media, but also influence various technologies to be evolved in similar fashion.

1.1 Description

The project will be a social media application based around Augmented Reality technology. People will be using this application to socialize with other people by attaching texts, animations, pictures, videos, sounds, and even some mini-apps to unique objects, products and places that they introduced to the app and also interact with the previously attached media using their phone cameras. People can save any

kind of attachment, photo or video to their phone's storage. Moreover, you can add your friends in the application and send them any attachment, photo or video you saved. If there are more than one attachment for one object or place, attachments will be displayed like a list which people can iterate through them. We believe that our location based idea will be prominently used in areas such as campuses, offices, shopping centers where people visit regularly.

Strongest aspect of our application will be its extensibility since its main source is the imagination of its users. We believe that the medium we provide to the users will enable them to find their own purposes of using this application. While the ability to attach any kind of media or connection to any object or place will primarily be useful for people; shop owners and businesses can also benefit from our features for a more interactive way of advertising their products.

Various use cases that come to our mind except the social media aspect:
- Assigning 3D graphics, objects, or small interactive applications to visuals on education books,
- Attaching to a physical location desired media file (like virtual graffiti)
- Companies and small businesses can benefit from interactive and different advertisements with mini games, 3D animations and more meaningful descriptions that are attached to products.

Here are some simple mockups for our project:

Scenario 1: Object scanned, content added by a person, and viewed by another person
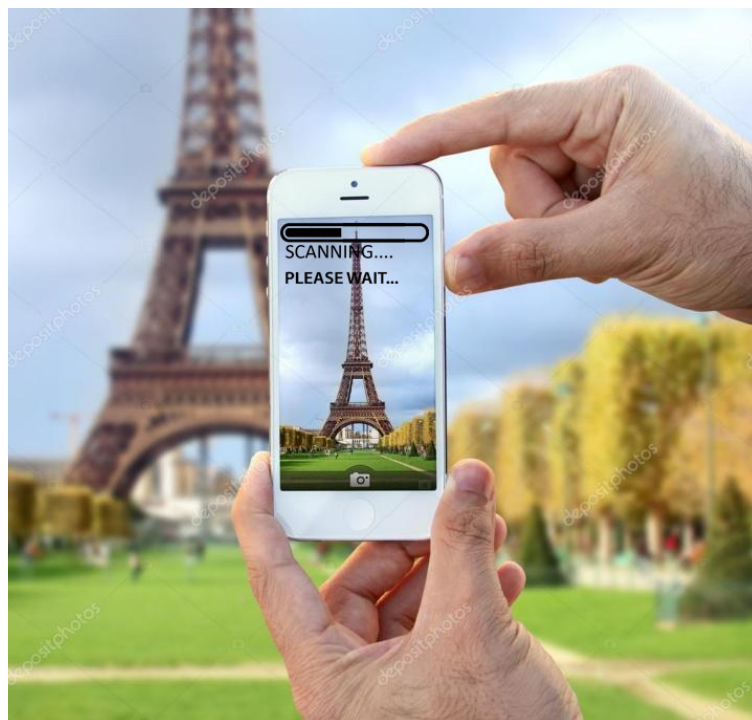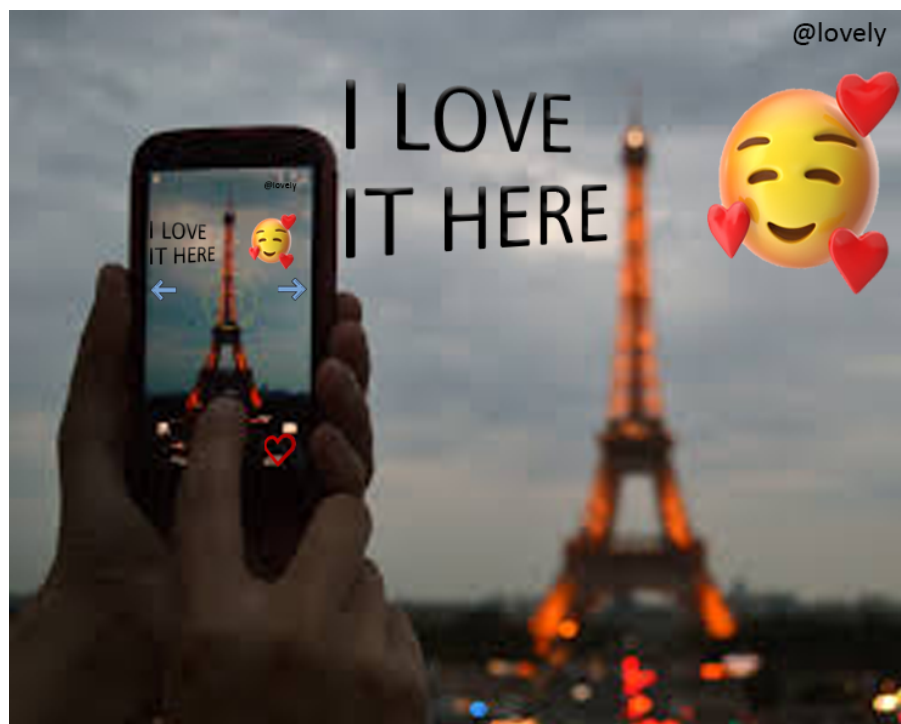

Figure 1. Scanning a location [6]

Figure 2. Content viewed [7]

Scenario 2: Location scanned, content added by a person, same content viewed by another person
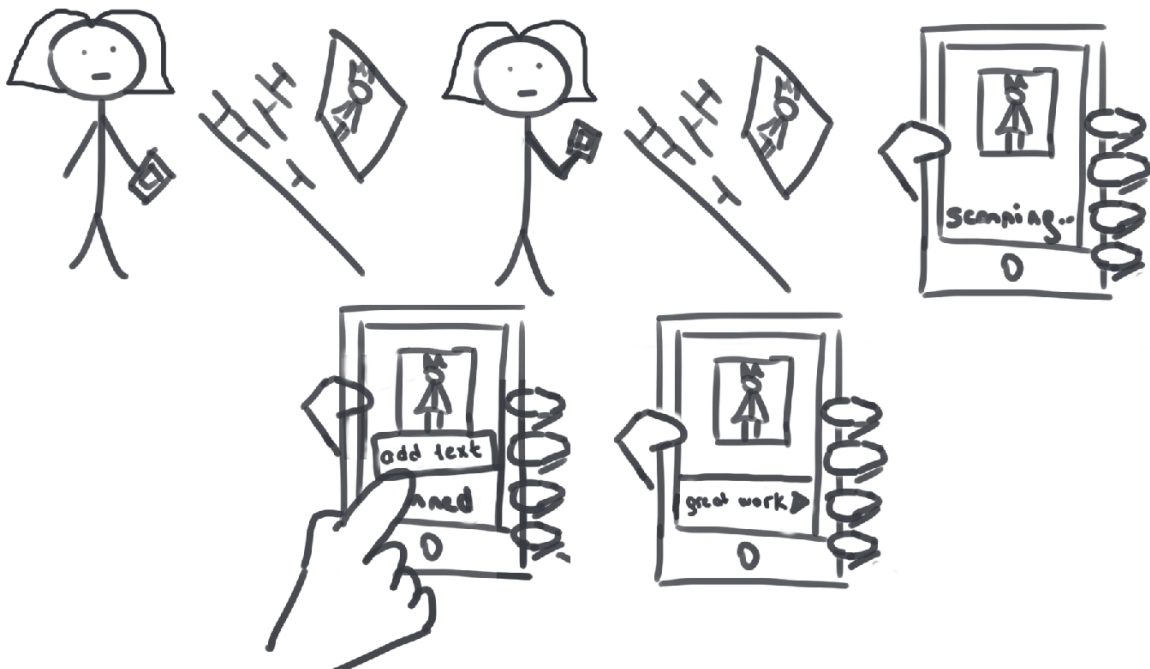

Figure 3. Object scanned and content added [8]

Figure 4. Content viewed [9]

1.2 Constraints

- We plan to develop the application for both Android and iOS, therefore we will use a hybrid codebase.
- Server-side of the application, where the machine learning part will run, is expected to be written mostly in Python to make use of Python libraries.
- We will be using Github in order to keep our codes clean and compatible with each other so there is no desynchronization between coders.
- For animations and mini-game that will be displayed with AR, we will use Unity3D. In Unity we will use C#.
- The application will use GPS along with user info in order to keep track of the AR media that is left. Therefore users need a good internet connection for GPS to properly work.
- For this app to function properly in outdoor areas, users need to have a decent cellular connection since public Wi-Fi may not be present everywhere.
- The objects should be static while getting recognized by the app. Moving objects such as cars could prove difficulties.
- We plan to use open source libraries.
- For cloud computing we will make use of Google Collab since we are familiar with Google Collab from our machine learning courses, and they offer free GPU usage which is enough for building the prototype of our app.
- The language of the application interface will be English. However, since the application content is mostly created by users, we will have no control over the content language.

1.3 Professional and Ethical Issues

- The app will not save any user data except the ones they choose to save, such as AR animations, texts.
- Explicit content will not be allowed.
- There will be a report option for users to report any inappropriate content.
- The app will remain closed and will not process information as long as it's closed.

- We'll make sure to not use any copyrighted content without owner's permission.
- The app will comply with the Code of Ethics [2].

1.4 Similar Products and Technologies

The social aspect of our project has similarities with other products such as Instagram or Facebook as users are able to share their ideas, opinions or any kind of media with other people. We differ from these products due to our usage of Augmented Reality technology heavily in our application because our users will be creating content outside, in real life which we believe is going to boost the creativity of our users.

In terms of AR technology, there exist many applications that utilize AR to help customers with payment or allow them to create artistic products using their cameras. One example application is Artivive. Artivive allows art creators to scan their creations and attach some digital content so that they can display their art in a more meaningful way in museums [3]. Artivive allows only the scanning of paintings. There is no feature to scan 3D art, any other objects or locations. It is not a general purpose application. Another application called Snaappy tries to give users the ability to place media files to locations [4]. It only works with locations, not objects. There is no scanning process to connect with real-life objects. Sketchfab is an application in which the users can view pre-created 3D models on real life surfaces using their cameras [5]. This app only allows viewing 3D models, not saving them. It does not have a social aspect. We aim to combine these features, complete their missing parts in a single application where we will allow the mixture of these features with real life objects, locations and buildings and create a virtually interactive social world.

2. Requirements

2.1 Functional Requirements

2.1.1 Scanning Mode Functionalities

- Application is able to recognize objects and places that are previously registered into the system.
- Application displays related attachments of recognized objects.
- Application displays a list of attachments if there are more than one for a specified object.
- Application allows users to share videos and photos from the application to share in other social media platforms(Instagram, whatsapp, etc).
- Application can scan QR codes.

2.1.2 Registration Mode Functionalities

- In registration mode, new objects can be introduced to the system.
- In registration mode, new places can be introduced to the system alongside with their GPS information.
- System gives positive or negative feedback about the registration process to users.

2.1.3 User Functionalities

- Users can save the media files or moments from recognized objects to their phone storage.
- Users can attach media files(video, sound, image ,gifs), texts, links to the objects or places.
- Users can take a picture or video of any moment in the scan mode.
- Users can swipe between attached files if there is more than one for an object.
- Users can add their friends to their friends list inside application

- Users can send any attachment or file from our application to their friends from friend list
- Users can see nearby memories if their gps is active.
- Users can open the application without authentication.
- Users can only use scan mode without authentication.
- Users can like other people's attachments to objects or places.

2.1.4 Server Functionalities

- Server tries to recognize scanned objects by application and return a positive or negative message. If the server recognizes the object or place it will send attached items to application.
- Server saves new registered objects to the database, and also sends positive or negative feedback according to the registration process' success. If a place registered and registration process is successful, servers will save also gps data to the database.
- Server saves attached all types of files to the database.

2.2 Non-Functional Requirements

2.2.1 Performance

- The application should not consume the battery so the processes that require high computing power should be done in the server side.
- The application should be able to display the attached media within 3 seconds.
- The user should be able to display and interact media without any interruption so the content to be displayed should be downloaded and displayed.

2.2.2 Scalability

- The prototype of the application should be able to handle 10.000 users and 500 concurrent users.

2.2.3 Usability

- The interface of the application should be easy to adapt and use in 2 minutes for a new user.

2.2.4 Security

- The sensitive information of the user such as passwords should be sent to stored in the encrypted format.
- The ordering products process should be secure.

2.2.5 Availability

- The system should be available 24 hours 7 days and 365 days in a year.

2.2.6 Modifiability

- Further implementations should be added without a difficulty to the current system if needed. For that the project should be modular.

2.2.6 Legal and Regulatory Requirements

- The terms of service and privacy should be accepted by the user before the usage of the application.

2.2.7 Accessibility

- The application should be accessible in at least 60% of Android and Apple devices.

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