



Bilkent University

Department of Computer

Senior Design Project

Project short-name: Augma

Project Specification Report

Project Group Member Ahmet Burak Şahin, Can Bayraktar, Çağdaş Yılmaz, Fırat Sivrikaya, Utku Oymak

Supervisor: Ercüment Çiçek

Jury Members: Bülent Özgüç, İbrahim Körpeoğlu

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1. Introduction

New tools and ideas emerge in the profession of computer science with advancements in technology. Some of these tools or ideas start to grow and become more popular over time. Augmented Reality is one of these emerging technologies which makes it possible to look at the world from a new perspective. Even though it is a relatively new technology, it holds many great possibilities like helping doctors in a surgery, a visual navigation that doesn't need for the driver to look away from the road, just to name a few. Unfortunately, being new also comes with many drawbacks like most users not willing to change what they are using or lack of tool kits and native platforms. Most AR applications today are designed to work on mobile devices like tablets or phones but true potential of this technology can only be unlocked with devices like Google Glass. We expect to see much more advanced AR applications as native AR platforms like Google Glass starts to become affordable by the general public and this can only happen if developers keep creating new and interesting Augmented Reality applications, further increasing the value of the technology and attracting more investors to the area.

Social media applications are the most used day-to-day mobile applications in the market. This is why we saw a need and a potential for a new kind of social media application in an augmented space. Augma creates a world where people can interact with each other in an exciting and creative way. Users will be able to post location based notes on anywhere in the world. Other people who are near one of these notes will be able see it using Augma like a scope, looking into another dimension from their phone's camera. With Augma, we aim to achieve a deeper level of empathy between the users than any other social media application today by putting the readers into the exact same environment where the post was written.

Further parts of this report will include a detailed description of Augma, explaining what it is and how it will be used, the constraints of the project, professional and

ethical issues followed by the requirements of the project under two subtitles: functional requirements and nonfunctional requirements.

1.1. Description

We are living in an era where conveying information is everything. The way you convey that information is just as important as the information itself. We felt like writing 120 characters or even posting a picture with a lengthy paragraph under it isn't enough. We wanted to add another dimension to our conversations. This is where Augma was born. Augma adds a new layer to our reality and lets our posts come to life.

Augma is a mobile-app which lets user leave location based notes that come to life with the power of Augmented Reality technology. Users can leave pretty much anything they want ranging from a plain text to drawn pictures. After users have left their note to a location, other people who look through their phone cameras will be able to see their creation. These notes will be time-limited and people who see these notes will be able to increase notes' time limits by up voting.

Users will have the choice to make their notes visible to all other people or just certain groups by using Augma's Circle system. Users can create their own small scale circles to leave private messages to their friends and family. Users will have the option to leave notes only they can see for personal use such as a reminder for an upcoming project. With the usage of the Circle system, users will be able to personalize their window to this new layer of reality. Augma will provide the option to see the notes that are only from the certain circles users have specified to filter the notes in the augmented world.

Augma will also feature a heat map in which users can see where the places with lots of notes are. When users get to a "Hot Zone" like this, they will receive a notification on their phones prompting them to have a look around even when the app is running in the background. If they have the map open and got close enough to a note, they will be able to see an indication and a small preview of the note. With this function they will be able to determine if there are notes they want look at without actually having to open their camera. If users have low battery, their phones aren't powerful enough or maybe they don't like having to turn around with their phone to actually see the Augma's world. They can click on these previews to see the notes like a picture taken from the perspective of their creators.

Another one of Augma's big features will be the Augma ads. Companies will be able to leave creative ads in the Augma's world for a much cheaper price than in real life. Think about seeing a giant yellow M on the moon when you look through your camera at night if you are near a McDonald's. This will allow for much more interesting ads and this way the big companies won't have to pollute the scenery with their giant ads.

1.2. Constraints

1.2.1. Implementation Constraints

- The application is targeted to Android mobile platform, however it can be extended to iOS as well.
- For configuration management purposes, we are going to use GitHub so that we will be able to contribute to the project collaboratively.
- The application will perform data transfers with third-party software such as Google Maps.
- The application will follow Object Oriented Programming approach.
- The application will require a cloud connection for database services and server needs.

1.2.2. Economic Constraints

- There is a one-time \$25 fee to be able to register for a Google Developer account [1].
- The application is open to corporate advertisements. The projected revenue of the application is based on Augma Ads.
- In the senior project release, it is not planned to put in-app purchases.
- Google provides unlimited free usage for Google Maps Android API and Google Maps SDK for iOS [2].
- If the use of Google Places API is needed, 1.000 free requests provided per day can be increased to 150.000 requests after identity verification [2].
- If the use of Google Maps Web Services is needed such as Google Maps Distance Matrix API, Google Maps Geolocation

API etc., 2.500 free requests provided per day can be increased after paying \$0.50 USD for an additional 1.000 requests [2].

- Budget needs to be adjusted for possible third-party applications that we might need to use during development.

1.2.3. Ethical Constraints

- The application will not share the user data with third-party companies, without the user's consent. Terms & Conditions of the application will be provided in order to inform the user about sharing his/her data.
- Profanity filter will be applied to the texts that are shared publicly.
- Politically or ethically disturbing posts need to be removed in order to maintain a respectful social environment. This will be achieved by the help of reporting functionality.

1.2.4. Sustainability Constraints

- To make the application sustainable, application will rely on the profit that is made from in-app advertisements.
- Feedbacks coming from the users are absolutely crucial for both development of new features and improvement of existing ones. As the feedbacks will be used to enhance the user experience, there will be a separate section where the feedback for application will be collected.
- Usage data will be collected in order to understand strong and weak features of our application and draw conclusions to enhance user experience and make the application more sustainable.

1.2.5. Social Constraints

- There is a high chance that some of the users may abuse the application by posting notes that contain inappropriate, spam content as the application is open to social interactions. These kinds of situations will be handled carefully. Reports coming

from the users will be reviewed and appropriate measures will be taken.

- Ability to down vote notes will not be implemented as this functionality can be abused by some users for a note that does not deserve extensive down votes.

1.3. Professional & Ethical Issues

- The main functionality of the application requires to collect location data from end-users continuously. Collecting this data might worry the users about their privacy, because by using this data, an individual would technically be able to track a user's geolocation based on the inputs coming from user's device. Application will make sure location data collected from users will be secure and kept in a cloud service and not distributed to third-parties. Users will be prompted if they want to share their location and users that choose not to share this information will not use location based functionalities of the application.
- Augmented Reality technology needs users to look at their phones during application usage. Users will be mainly on foot during the usage of Augma and they might be unaware of their surroundings, because of functionalities such as searching for notes and viewing them by looking at their phones. This may result in injuries or accidents as first witnessed in another application that uses Augmented Reality that is Pokemon GO [3]. We foresee the possibility that similar events might likewise happen in Augma and the application will warn users about possible dangers which might occur during the use of application outdoors.
- Digitalization in most of social media applications is an ethical issue and needs to be considered in Augma since users will be leaving notes, reading the notes left by other users and interact with these notes. Although these actions might make users feel more socialized, but in truth they become more disconnected from real world. Users will be constantly looking at their phones instead of observing the environment with their own eyes while walking the streets. Thus, people will be separated from reality because of the layer between the real world and the virtual environment they put in front of their eyes.

Augma will try to raise awareness by posting its own notes on real life socialization suggesting to see the real world without their phones.

2. Requirements

2.1. Functional Requirements

2.1.1. Leaving Notes

- The user should be able to leave a note by using the device's camera and fill the content of the note.
- The user should be able to specify the privacy level of a note that he/she is going to leave; private, Circle-specific or public.
- The system should bind a note to the location it is left.

2.1.2. Reading Notes

- The system should provide previews of the notes in heat map.
- The user should be able to access a note left by another user providing he's in the note's location radius and the user meets privacy criteria for the note.
- The user should be able to read the note in AR mode using the device camera.

2.1.3. Deleting notes

- The user should be able to delete a note which he left providing the note did not expire.
- The system should automatically remove notes whose time duration expired.

2.1.4. Interacting with Notes

- The user should be able to up vote on other user's notes, providing the user meets the privacy criteria of the note.
- The system should display a heat map of notes with a user interface by integrating with Google Maps.
- The user should be able to report a note.

2.1.5. Augma Ads

- The system should support creation of Augma Ads that are placed by developers.

2.1.6. AR Functionalities

- The system should properly display a note on a suitable surface by using third-party AR library.
- The system should support displaying multiple notes with AR at the same time, providing all the notes are in location scope.
- The system should also support disabling AR option, for the device owners whose devices do not support AR or who do not want to use the application in AR mode.

2.1.7. User Network

- The user should be able to register to system successfully, providing required registration information is entered properly.
- The user should be able to create groups and send group invitation to another user.
- The user should be able to join groups by accepting an invitation sent by another user.
- The user should be able to update the user information as required.
- The user should be able to upload a profile picture to demonstrate in necessary areas of the application.

2.2. Non-Functional Requirements

2.2.1. Usability

- The system should have a user-friendly UI.
- The system should display in-app assets in an understandable fashion. Users should be able to distinguish notes, pictures and other in-app assets from one another.
- Users should be able to use Augma without the real time AR function if their phones aren't compatible with AR.
- The system should obey the Usability standards (ISO 9241-11) as much as possible.

- The application should support as many Android devices as possible to increase the accessibility.

2.2.2. Extensibility

- The system should be easily extended to support new functionalities.

2.2.3. Reliability

- The system should persist uploaded user notes. It should be able to keep user notes without corrupting any of it.
- The system should load and display the same note to multiple clients consistently.
- The system should not drop frames while refreshing UI.

2.2.4. Efficiency

- Data exchange between the client and the database for the notes should be fast enough to allow users to walk around while using AR without major buffering issues.
- Application boot up time period should be unnoticeably slim.

3. References

- [1] How to use the Play console. <https://support.google.com/googleplay/android-developer/answer/6112435?hl=en> [Accessed 07.10.2017].
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- [3] G. Richard, "Has Pokemon Go made us antisocial? Viral smartphone game is blamed for rising cases of pavement rage." , Daily Mail, 2016. [Online]. Available: <http://www.dailymail.co.uk/sciencetech/article-3793050/Don-t-Pokemon-drive-110-000-road-accidents-caused-game-just-10-days.html>. [Accessed: 08.10.2017]