The COVID-19 Pandemic: A Biological Insight Using Augmented Reality

Kaavish Report
presented to the academic faculty
by

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OVID-19 Pandemic: A Biological Insight Using Augmented I

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Dedication

TBD.

Acknowledgements

TBD.

Abstract

Abstract goes here

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1. Introduction

1.1 Problem Statement

Towards the end of 2019, a novel virus emerged and spread throughout the city of Wuhan in China. A few months later, on 11th March 2020, the World Health Organization (WHO) officially declared that the SARS-CoV-2 virus has caused a global pandemic. Nearly two years later, the Covid-19 virus still poses a threat to humanity despite the countless efforts to thwart its spread and eliminate the virus through vaccinations. To this day, our general understanding of viruses is quite limited as people fail to understand how viruses infect humans and how they could potentially cause epidemics and pandemics by spreading through infected individuals. In our project, we aim to educate students about what viruses are, how they infect humans and how they can cause epidemics and pandemics.

1.2 Proposed Solution

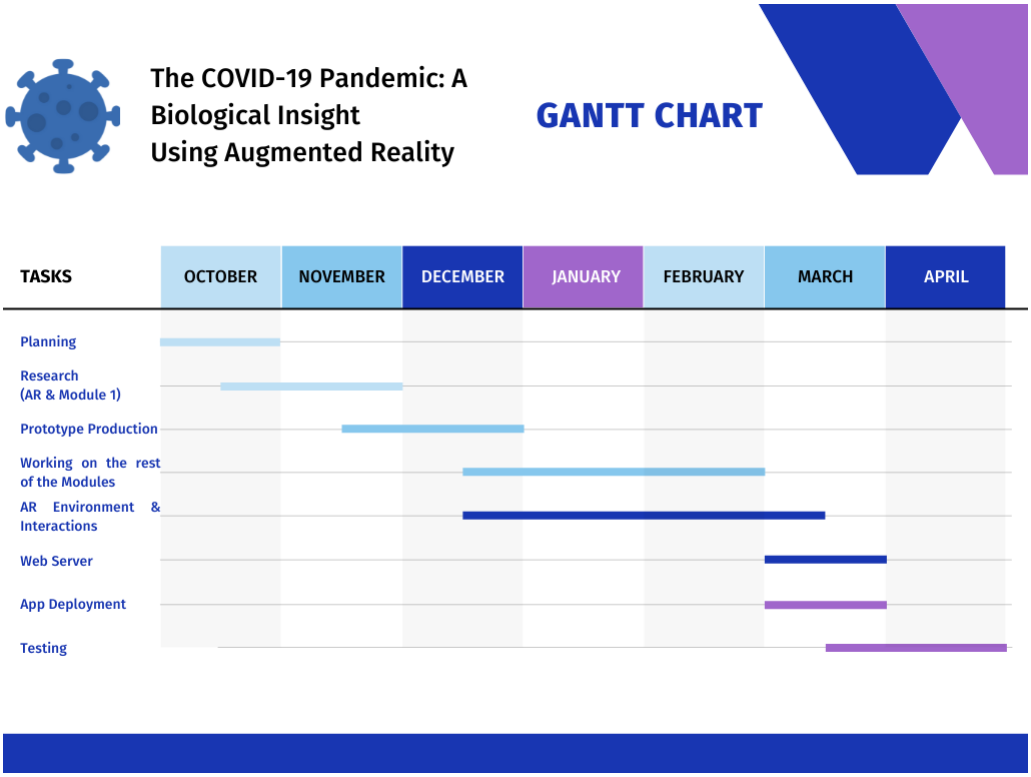
In order to understand the mechanisms of the SARS-CoV-2 virus and how to prepare ourselves for future epidemics/pandemics, we plan on educating the population, especially students, about what a virus is, how it works, how it spreads, and its ability to mutate to ensure its survival through an AR platform. This will be done using an ecosystem of interactive models, games, and simulations in AR to ensure that the students don't just learn for the sake of school but because their curiosity is peaked.

1.3 Intended User

Middle School and High School students who have access to a smartphone and internet.

1.4 Project gantt chart and deliverables

1.4.1 Gantt Chart



1.4.2 Deliverables

1. Physical booklet to access the content
2. Mobile application with all the AR games and simulations

1.5 Key Challenges

The main challenge for the team is to learn AR as it is something that we're new to. However, given the multiple resources available online, the team will be able to learn a sufficient amount on the subject for this project. Apart from this, our project will encounter certain hardware limitations. We currently do not possess any Apple

devices. Therefore the team has decided to first develop the app for Android and move on to iOS if time permits.

2. Literature Review

This chapter presents the current state of the art in the domain and talks about other similar work that has been done in this area. It also establishes the novelty of our work by highlighting the differences between the existing work and our work.

We will keep updating this chapter (especially if our project is research-intensive) as our research proceeds and we come across more work related to our problem.

Of course, we take inspiration from [1] but wish the work was typeset in LaTeX[3], e.g. by taking help from [2].

3. Software Requirement Specification (SRS)

This chapter provides detailed specifications of the system under development.

3.1 Functional Requirements

- Authorization / Authentication:
  - To allow the user to sign up using the QR code provided in the booklet.
  - To allow the user to keep record of their progress to the cloud.
  - To allow the user to fetch progress data from the cloud each time the app starts.
- Augmented Reality:
  - To identify physical markers from the booklet.
  - To render 3D models, simulations, and games on top of the identified markers.
  - To take touch input as a means of interaction between the user and the simulations/models.

3.2 Non-functional Requirements

- Performance:
  - The app should be able to smoothly render 3D models and simulations, ideally, without lag.

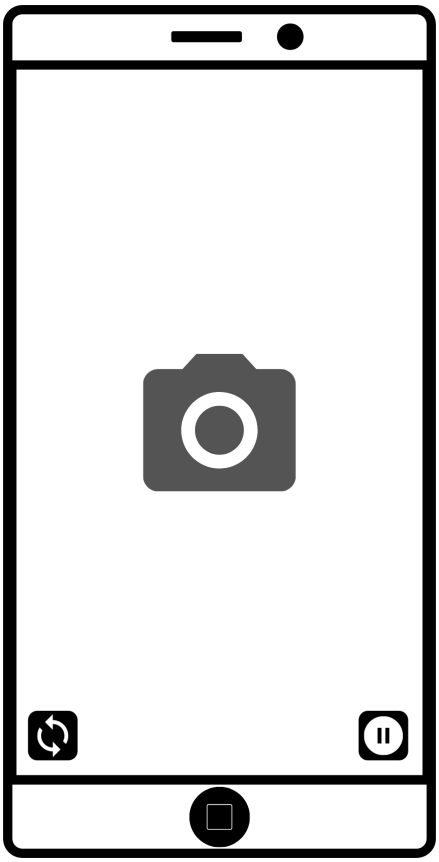
  - There should be minimal lag in the user interacting using touch and the model / simulation responding to it.

- Availability:
  - The app should be readily available on compatible platform-specific app store(s).

- Deployment:
  - The app should be deployed on an app store that ensures reliable public access.

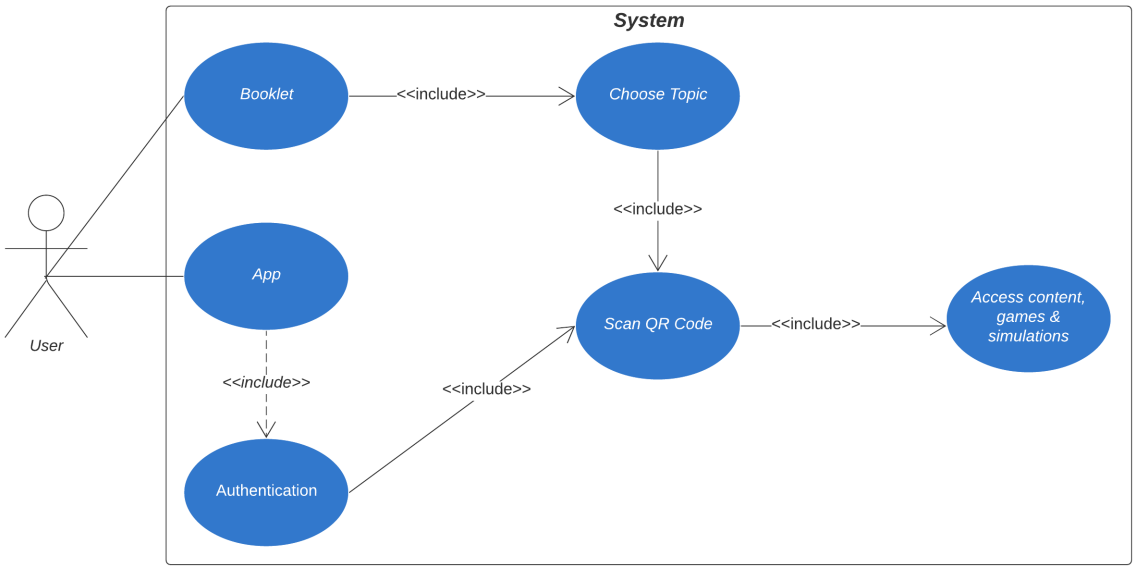
3.3 External Interfaces

3.3.1 User Interfaces



Our application will deliver all of its content through AR, therefore, the mockup can only depict what the AR viewport will look like.

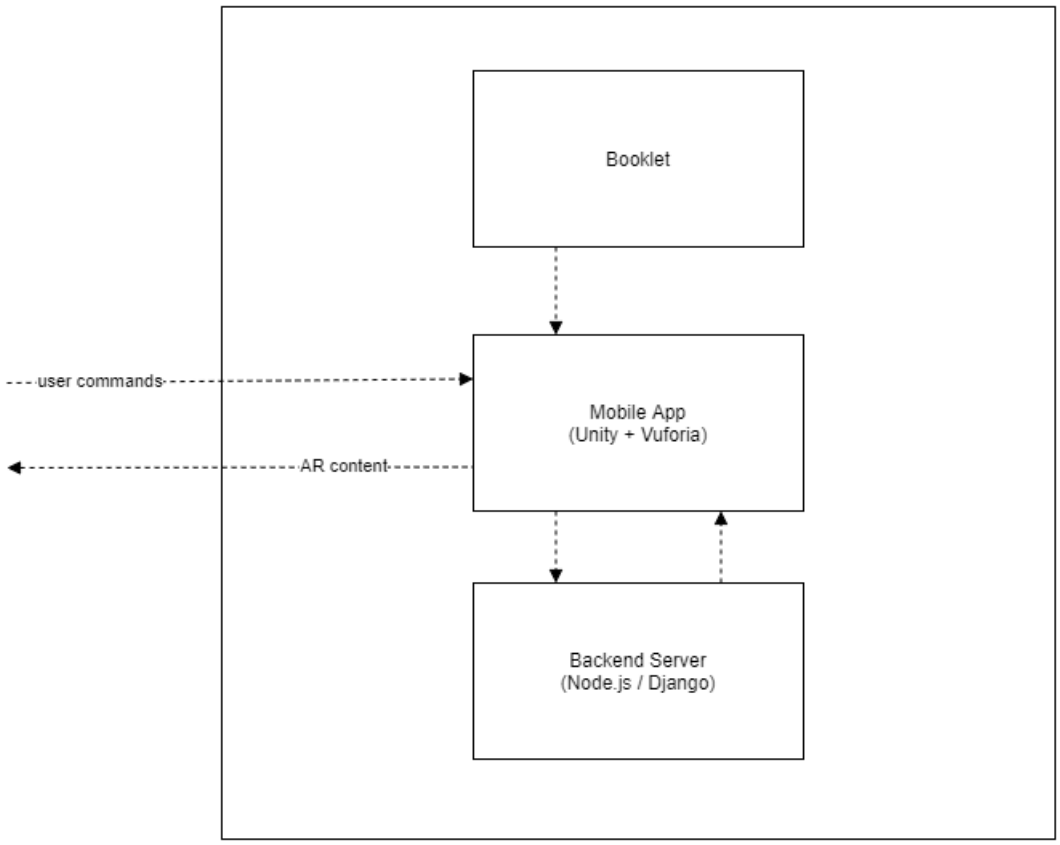
3.4 Use Cases



3.5 Datasets

Not Applicable.

3.6 System Diagram



4. Software Design Specification (SDS)

This chapter provides important artifacts related to design of our project.

4.1 Software Design

This section presents the UML class diagram and gives a brief description of each class in our system. Attributes and methods of each class and relationship among classes are clearly presented.

4.2 Data Design

This section presents the structure of our database that caters to persistent data storage in our project. The structure is shown as a normalized data model for relational databases. It clearly shows entities, attributes, relationships with their cardinalities, and primary and foreign keys. We have used DB designer (or any other similar data modeling tool) to build our data model.

4.3 Technical Details

Our project does not have persistent data so we have no ERD. Instead we exaplin here the technical details of the algortihsm we use. These include the inputs and the outputs, how and where these algorothms fit in our tool chain, the techniques used in these algorithms, etc.

5. Experiments and Results

We did many experiments and got the best results.

6. Conclusion and Future Work

Our work is awesome. We would write more but we need to catch the flight to collect our Turing Award.

Appendix A. More Math

Here, we describe the background math for the techniques used in the text.

Appendix B. Data

Here is a dump of our 2TB data set. Enjoy!

Appendix C. Code

Here is our code.

```
print('Hello World!')
print('Computing true random number.')
print('Capturing interstellar radiation.')
print('This will take time!')
import random
import time
time.sleep(3600*random.randint(1,10))
print(4)
```

Our code can be found at `https://github.com/habib-university/Kaavish-Template`.

References

[1] Albert Einstein. "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]". In: *Annalen der Physik* 322.10 (1905), pp. 891–921. DOI: http://dx.doi.org/10.1002/andp.19053221004.

[2] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The LaTeX Companion*. Reading, Massachusetts: Addison-Wesley, 1993.

[3] Donald Knuth. *Knuth: Computers and Typesetting*. 1984. URL: http://www-cs-faculty.stanford.edu/~uno/abcde.html.