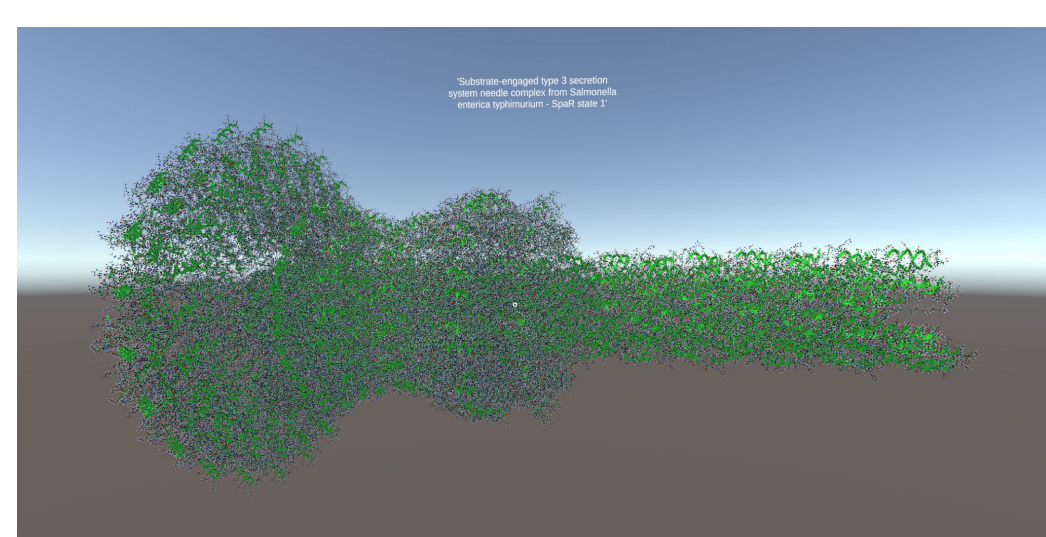
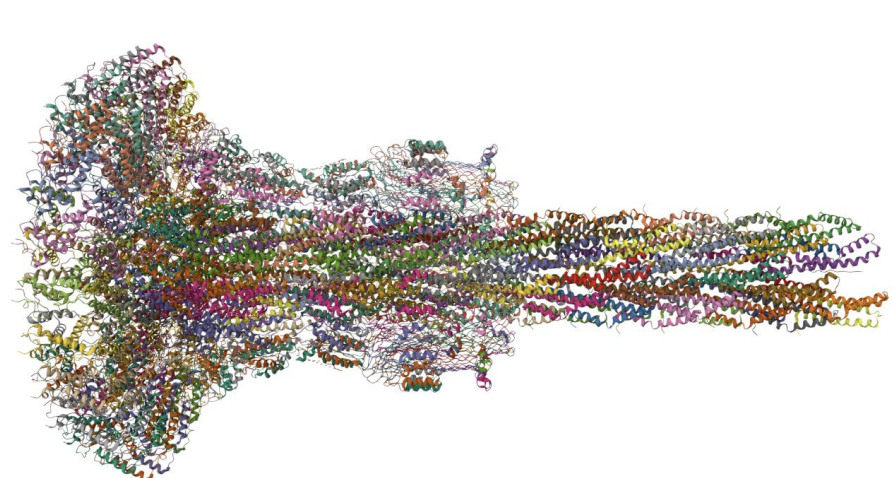




## Overview

The aim of this project was to develop a program within the Unity Game Engine that extracts protein data files from the RCSB Protein Data Bank and visualizes them in an immersive, augmented reality environment using the Microsoft HoloLens.



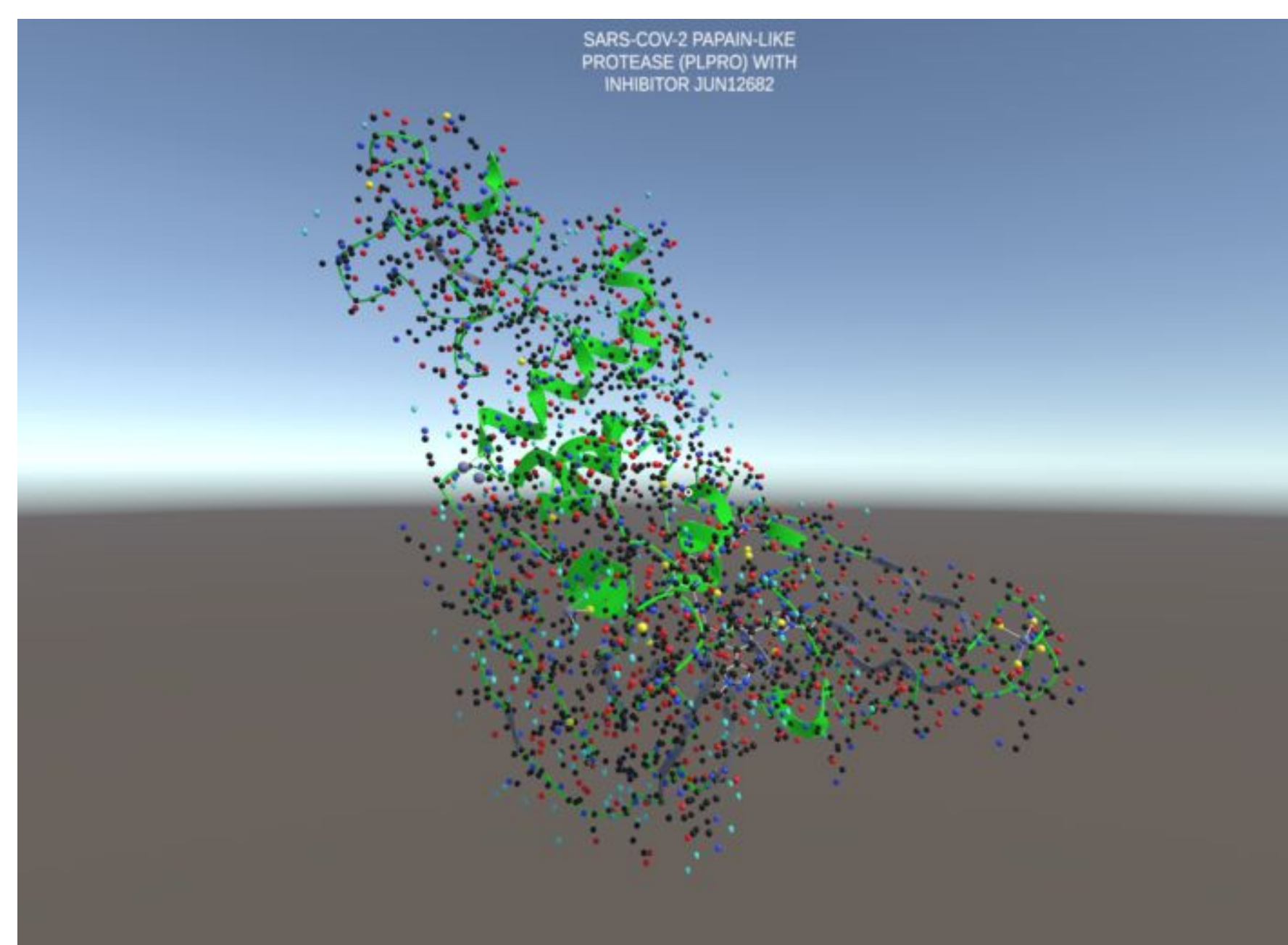
Injectisome as seen in the RCSB PDB (left) vs our Unity recreation (right)

## Functionality

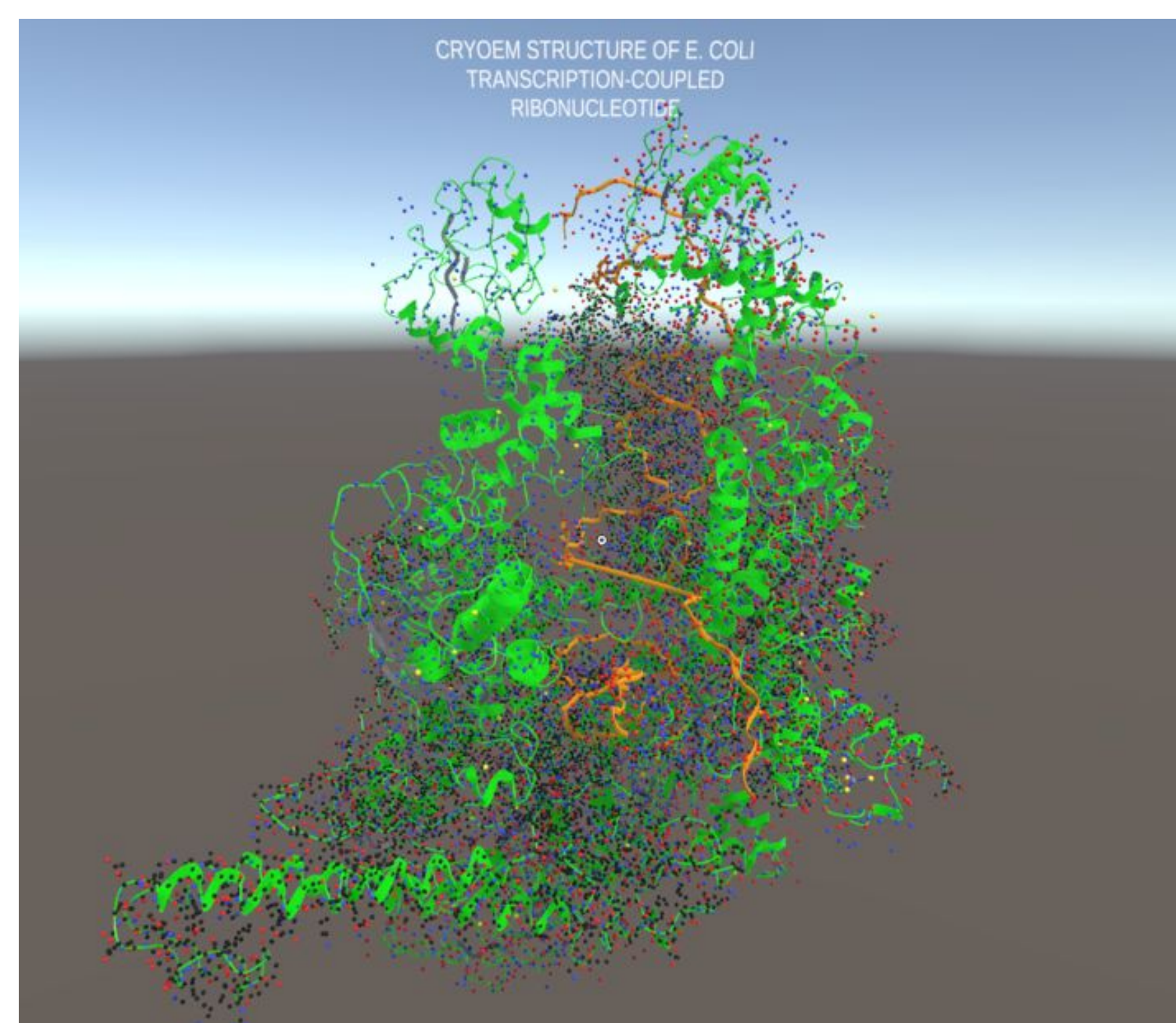
- The user enters the 4 character code of the protein they want to view
- A PDB file is fetched from the Protein Data Bank website (or a CIF file if a PDB file is not found) and converted into a CSV file that contains only relevant data features
- The CSV file is read → atoms, helices, beta sheets, etc. are generated accordingly
- Structures with similar properties are combined into a single mesh to improve performance
- The user can use voice commands to isolate certain structures, highlight certain elements, and scale the models

## Protein Examples

SARS-CoV-2 Protein:



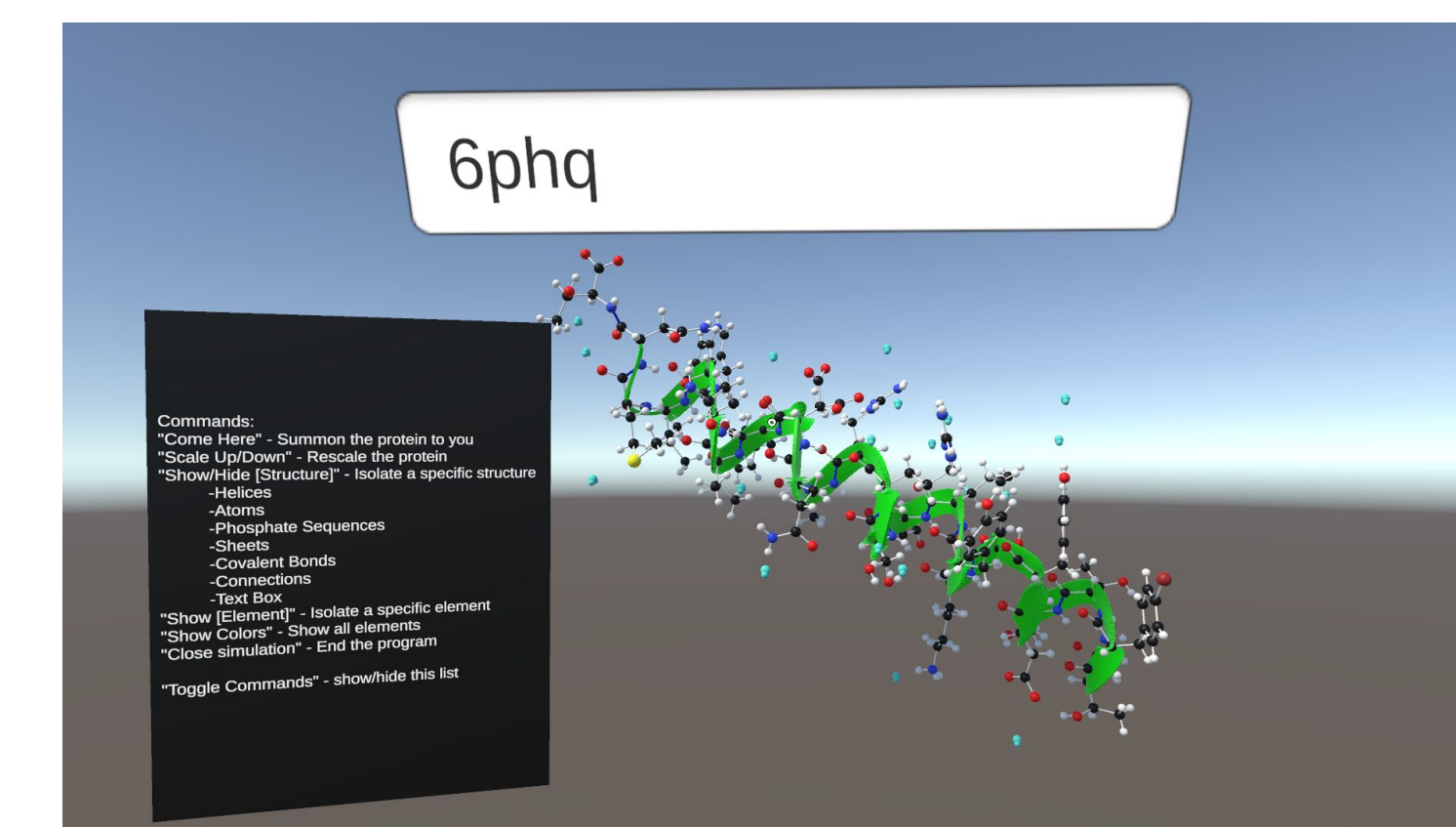
CryoEM Structure of E.Coli:



## Challenges

- No pre-existing curved models in Unity, had to model curved structures using splines
- User interface required creating an easy to use keyboard
- Performance issues when loading proteins with high number of atoms

## Future Applications



Further Improvements:

- Greater detail in RNA and Beta-Sheets implementation
- Optimized rendering for large proteins
- Faster 3D model generation and loading time of proteins
- Deploy visualizations to a mobile application

## Conclusion

This project allows users to interact with and explore complex molecular structures. This work will enhance the understanding and analysis of protein structures, supporting valuable research insights and academic instruction.

## Acknowledgements

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