Spatialist

Post-its got smarter, now in MR

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1 What is SpatiaList?

SpatiaList is a Hololens2 application that allows multiple users to create spatially consistent post-its attached to the real world. Users can share information in MR and collaborate in real-time across devices. A web interface is implemented for user-friendly post-it creation and retrieval.

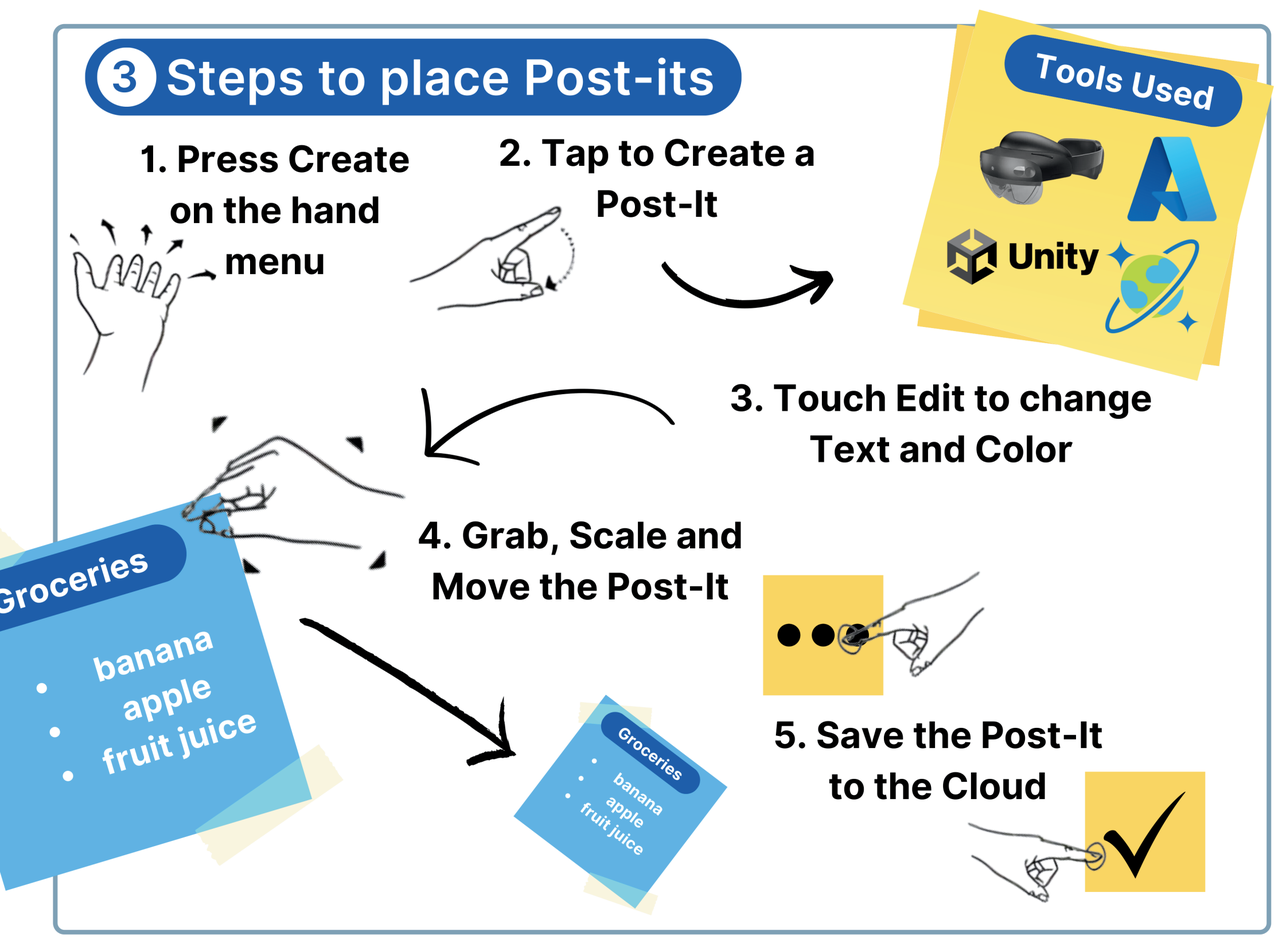
Features

Spatially-consistent | Multi-user | Multi-room | Customize post-its | Swipe from phone | See all notes in dashboard | Mixed reality

2 Background

Post-its are conventionally used in teamwork settings for brainstorming and ideation sessions. Mixed Reality (MR) can strengthen interactions between teams [1] by enhancing the classical post-it in many ways: improved customizability, personalization, and cross-device sharing. To ensure a natural experience and productive teamwork sessions, holographic post-its should be spatially consistent The ASA documentation explains the importance of spatial relationships in enhancing mixed reality experiences [2].

3 Steps to place Post-its



4 Web Dashboard UI

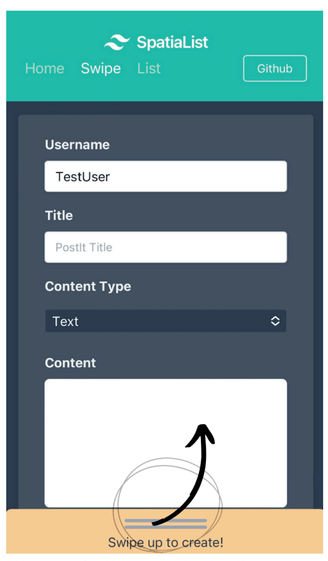


Figure 1: Swipe Web-Page

Go to the Swipe web-page.

↓

Enter your username and text content.

↓

Swipe it! You will see your new note in the HoloLens!

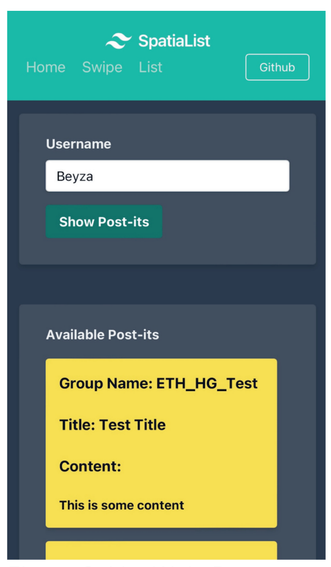


Figure 2: List Web-Page

SCAN ME

Go to List page.

↓

Enter your username.

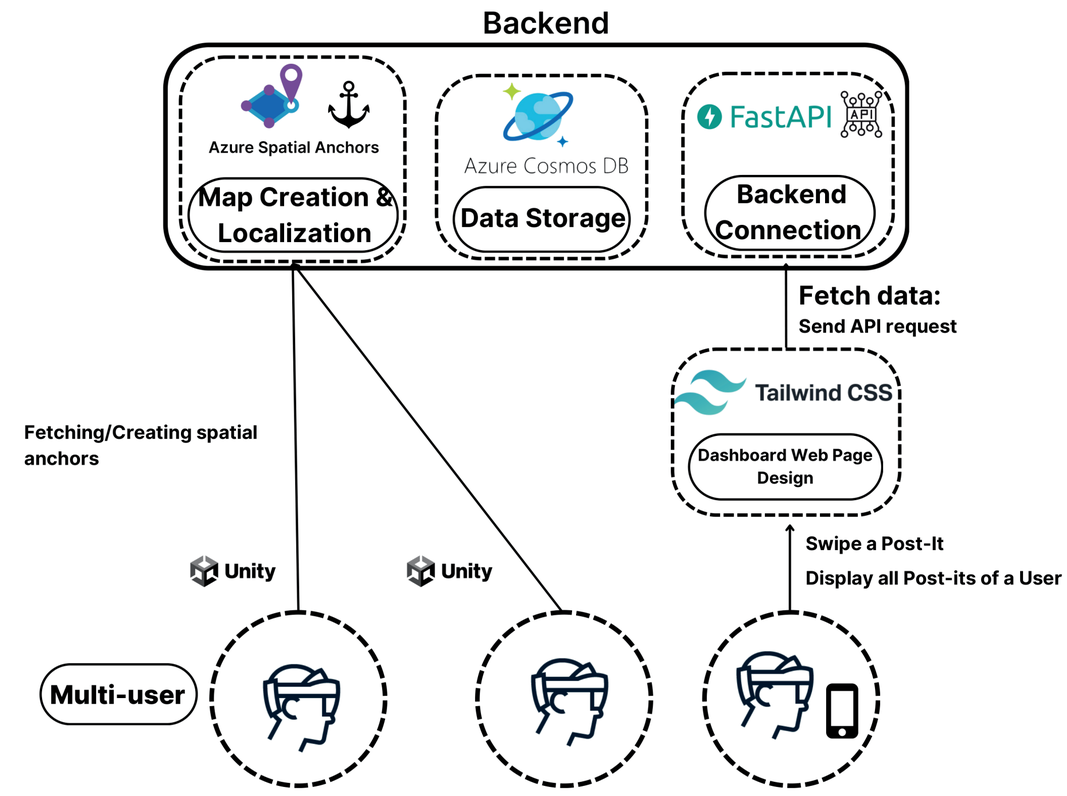
↓

See all of your available post-its.

5 Method Overview

We used **Azure Spatial Anchors (ASA)** to establish spacially persistent anchors [2], which we use in our manual mapping process to create different scenes (e.g. rooms). Post-its are placed relative to the closest anchor, making them spatially consistent. Saving post-its and anchor IDs in the **Cosmos DB (real-time database)** allows session consistency. This approach allows us to display post-its precisely where they exist in the real world. To enhance user experience, we implemented a web interface.

6 System Architecture



7 Key Results

- Integrated Azure Spatial Anchors (ASA) and Unity to establish **persistent spatial anchors** for digital post-its within the mixed-reality environment.
- Ensured **efficient storage and information retrieval** of post-its, utilizing CosmosDB as the primary data repository.
- Implemented FastAPI for the backend, providing essential **CRUD functionalities** for post-it management while emphasizing system simplicity.
- Developed a **user-friendly web interface** enabling seamless creation and visualization of post-its, allowing effortless swiping from the web to MR environments via smartphones, enhancing cross-device accessibility and collaboration.

Figure 3: Post-it Design

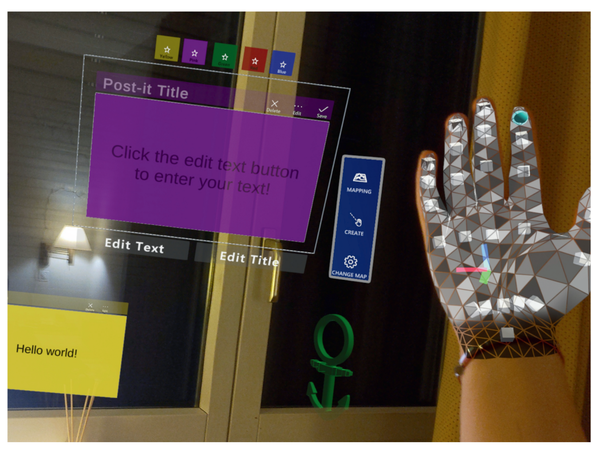


Figure 4: Example Application Usage

8 Future Work

- Adding support for rich content on the post-its.
- Enabling multi-platform note sharing.
- Implementing more robust security measures for data access.
- Adding voice commands to make the application more accessible.

9 Conclusion

Overall, our application showcases the potential of mixed-reality technology to enable real-time collaboration and information sharing, in both the digital and physical space. Through spatially persistent object placement (Azure Spatial Anchors), multi-session support (cosmos DB) and a user-friendly web interface, SpatiaList makes classical post-its smarter! According to the user studies, we have identified that the user experience can be further improved. Future work might include the addition of rich content to the post-its, enabling multi-platform note sharing and implementing more robust security measures. Adding voice aided commands could make the application more accessible.

References |

1. Papadopoulos, T., Evangelidis, K., Kaskalis, T. H., Evangelidis, G., Sylaiou, S. (2021). Interactions in augmented and mixed reality: An overview. Applied Sciences, 11(18), 8752.
2. Anchor Relationships and Wayfinding, Microsoft Azure Spatial Anchors Documentation, https://learn.microsoft.com/en-us/azure/spatial-anchors.