

Navigating and Sharing Augmented Reality Indoor Spaces

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In Augmented Reality (AR) sharing and collaborating on content requires the capability to store and resume previous AR sessions. Mobile AR applications have to retain state and virtual content needs to keep its position. This requires the re-registration of an AR session to anchor information from previous sessions. This work presents a cloud-based approach for the asynchronous sharing of user-generated AR content within indoor spaces for social AR experiences.

Introduction

With the recent launches of Apple's ARKit and Google's ARCore, developers started experimenting with mobile Augmented Reality. These toolkits calculate the position of the mobile device as it moves by applying visual-inertial odometry and motion tracking. This enables placing virtual 3D objects on top of the camera's video stream generating the illusion that virtual content is part of the real world. In order to create shareable and social AR experiences, it is necessary to persistently connect digital content with the real world at the same exact physical place.



Shared room in ARchi VR with spot, picture, zone and object augmentations

Results

We present a cloud-based approach for the asynchronous sharing of user-generated AR content within indoor spaces. The room capturing app «ARchi VR» has been enabled to reopen and share rooms as Augmented Reality sessions including virtual markers, zones, and 3D items that can persistently be pinned and overlaid to real-world objects. Room elements and its augmentation items are stored as serialized objects in JSON and have a small data footprint of a few kilobytes. But the feature point maps can have sizes upwards of several hundred kilobytes. Assets such as images, audio and 3D files may require multiple megabytes of data. Storing and sharing AR spaces therefore involves the exchange of large amounts of data. Incremental downloads and data caching are used to address typical limitations of mobile devices, such as data transfer over slow or costly mobile telecommunication networks. A framework has been developed for sharing AR content on iOS supporting different sharing scopes and privacy levels. As an AR database the framework covers features of the AR Cloud concept. Navigation through multiple rooms is facilitated by the room merge functionality provided in «ARchi VR».

Conclusion

With today's AR toolkits for mobile devices it is possible to provide sharable AR content. Sharing over the cloud can be implemented on top of state-of-the-art mobile backend as a service (MBaaS) platforms. The exchange of large data amounts involved in sharing AR content needs to be handled with «on device» caching strategies. Multi room applications can be implemented by loading and re-registering AR sessions on demand while a user moves from one room to another. Based on these AR techniques social AR experiences have the potential to transform a variety of different industries.



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