

Collaborative Program Comprehension in Extended Reality

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Abstract: This contribution has been published in the journal *Information and Software Technology* (Elsevier) in 2022 [KHH22], <https://doi.org/10.1016/j.infsof.2022.107007>.

Keywords: Program Comprehension; Software Visualization; City Metaphor; Extended Reality; Virtual Reality; Augmented Reality

1 Introduction

In software visualization research, various approaches strive to create immersive environments by employing extended reality devices. In that context, only few research has been conducted on the effect of collaborative, i.e., multi-user, extended reality environments. ExplorViz's multi-user modes are our approach to enable heterogeneous collaborative software visualizations. Unlike related work, we approach the latter by introducing a multi-user augmented reality environment for software visualizations based on off-the-shelf mobile devices.

In this paper [KHH22], we present our journey toward a web-based approach to enable (location-independent) collaborative program comprehension using desktop [Fi13], virtual reality [FKH15b], physical 3D Models [FKH15a], and mobile augmented reality devices [KHH21]. We designed and implemented a device-heterogenous multi-user mode in our web-based live trace visualization tool ExplorViz [FKH17; HKZ20]. Users can employ desktop, mobile, and virtual reality devices to collaboratively explore software visualizations. We conducted user studies for common program comprehension tasks [Fi15; FKH15c; KBH22; KHH22]. In this context, we also investigate the scalable implementation and deployment of ExplorViz in the cloud [KH22].

2 Data Availability

A supplementary data package is available at Zenodo (<https://doi.org/10.5281/zenodo.5790175>). The source code is available at GitHub (<https://github.com/ExplorViz>) and the software documentation at <https://explorviz.dev/>.

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