

RAPID 3D SCENE RECONSTRUCTION FOR VIDEO GAMES

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Introduction

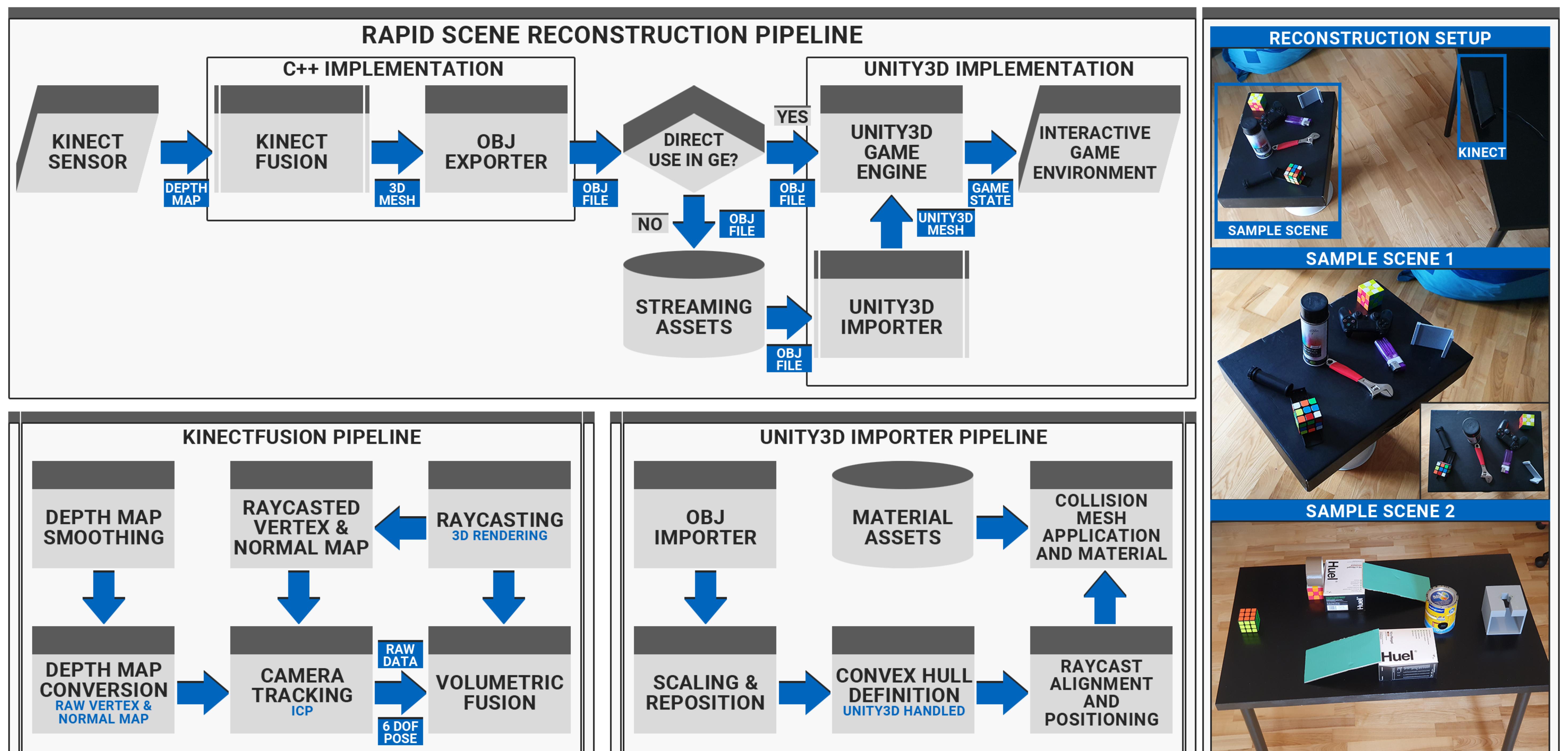
Video games have become a core part of modern entertainment and many of the techniques used in game developed have extended to applications in mixed reality for professional training and simulation. A key challenge in developing games is the creation of immersive scenes, which are usually hand-crafted by artists. This process is very time consuming. The availability of low cost commodity RGB-D sensors in the past years, such as the Microsoft Kinect, has made 3D reconstruction techniques increasingly accessible. Therefore, one approach is to use 3D reconstruction techniques to rapidly generate prototype scenes.

Goals

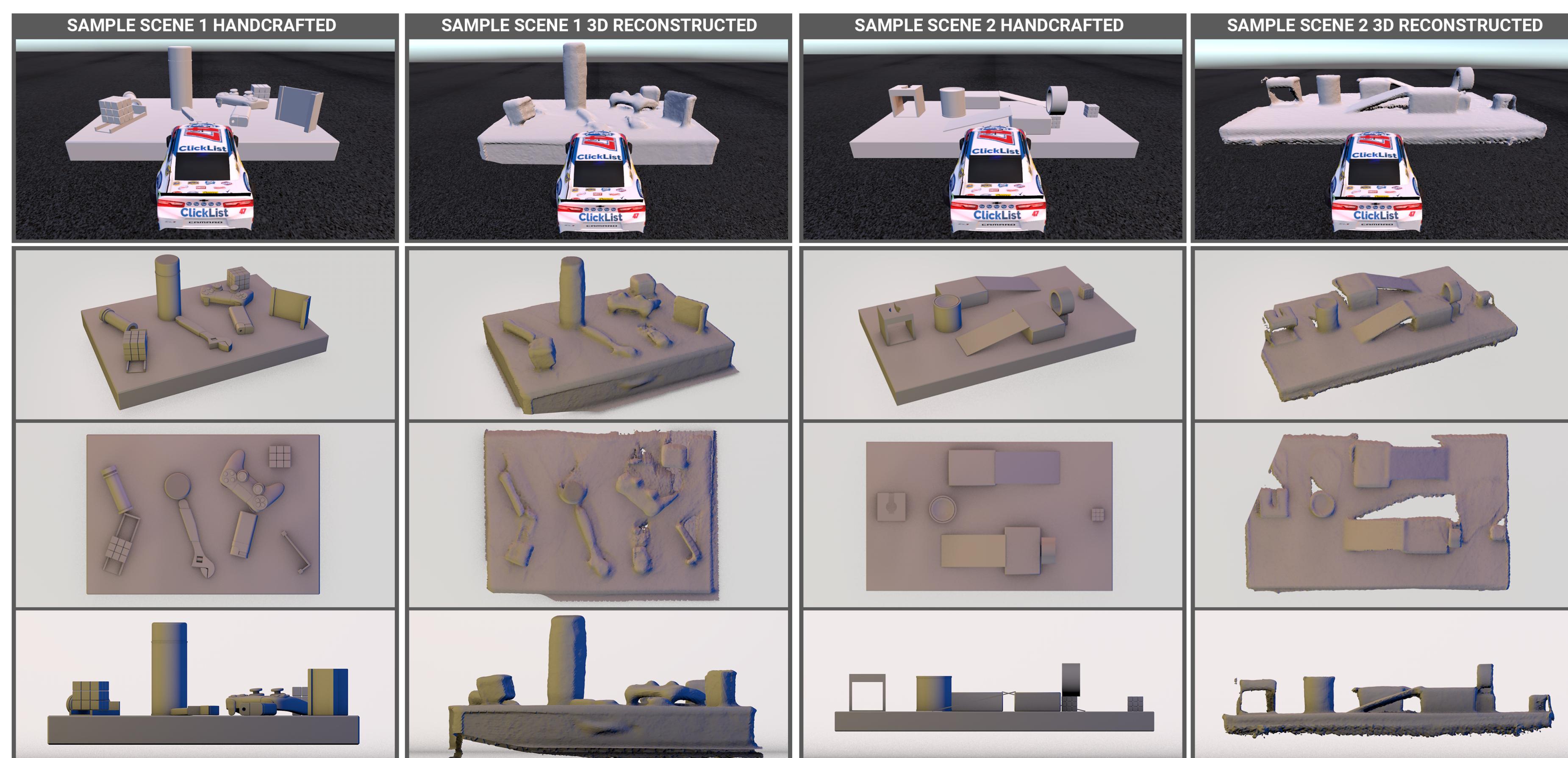
The goals of this research project focused on evaluating the performance of 3D scene reconstructed scenes compared to hand crafted scenes in video games. To evaluate both methods, a custom racing game was developed to test the following parameters:

1. Runtime performance of handcrafted and scanned environment measured in frames per second.
2. Time taken to create the same scene measured in minutes, with a focus on the amount of time spent by the user to create the scenes.

Game Engine Integration Pipeline and Testing Setup



Results



Scenes	Performance [Frames/s]			Throughput Time [min]		Vertices	Faces
	Min	Max	Avg	Total	User Time		
Baseline (Plane)	36	120	108	NA	NA	4	2
Sample Scene 1 (H)	51	122	107	144	144	38092	38296
Sample Scene 1 (K)	43	121	104	30	10	759114	253038
Sample Scene 2 (H)	56	123	105	42	42	2206	2230
Sample Scene 2 (K)	53	122	105	30	10	97336	194170

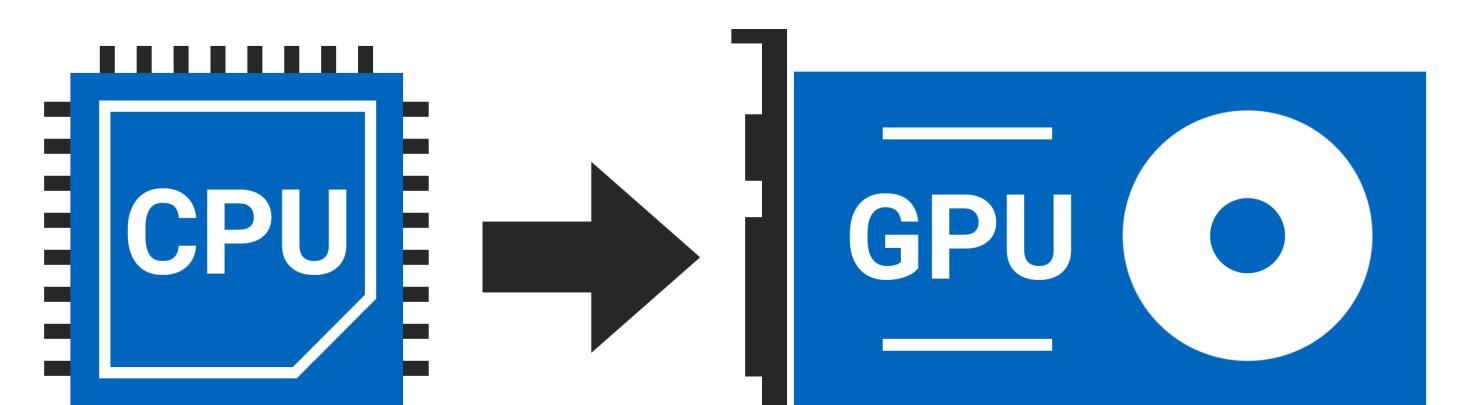
Testing Hardware
GTX 1080Ti
AMD Ryzen 1700X

Conclusion and Outlook

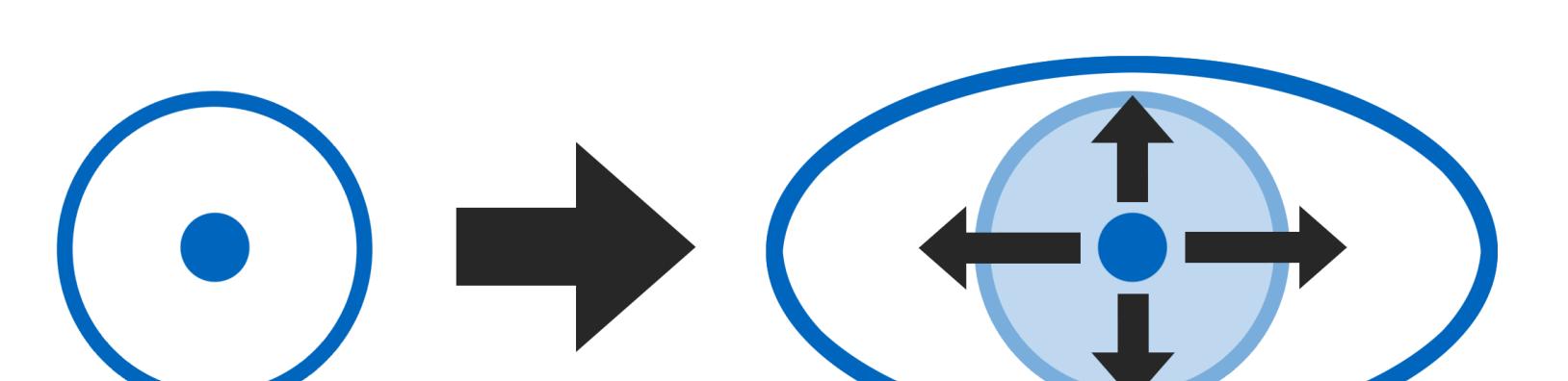
Throughput time of 3d reconstructed scenes better than handcrafted scenes. However, at a cost of scene quality and accuracy compared with the ground truth scene and increase in the number of vertices and faces. However, our tests show that the higher vertex and triangle count does not impact game performance. Current use case in video games for custom user map generation.

Future improvements for the pipeline:

1. Improve performance



2. Improve scanning range.



3. Scene texturing with RGB-Data.

