Real-Time Occlusion Between Real and Digital Objects in Augmented Reality

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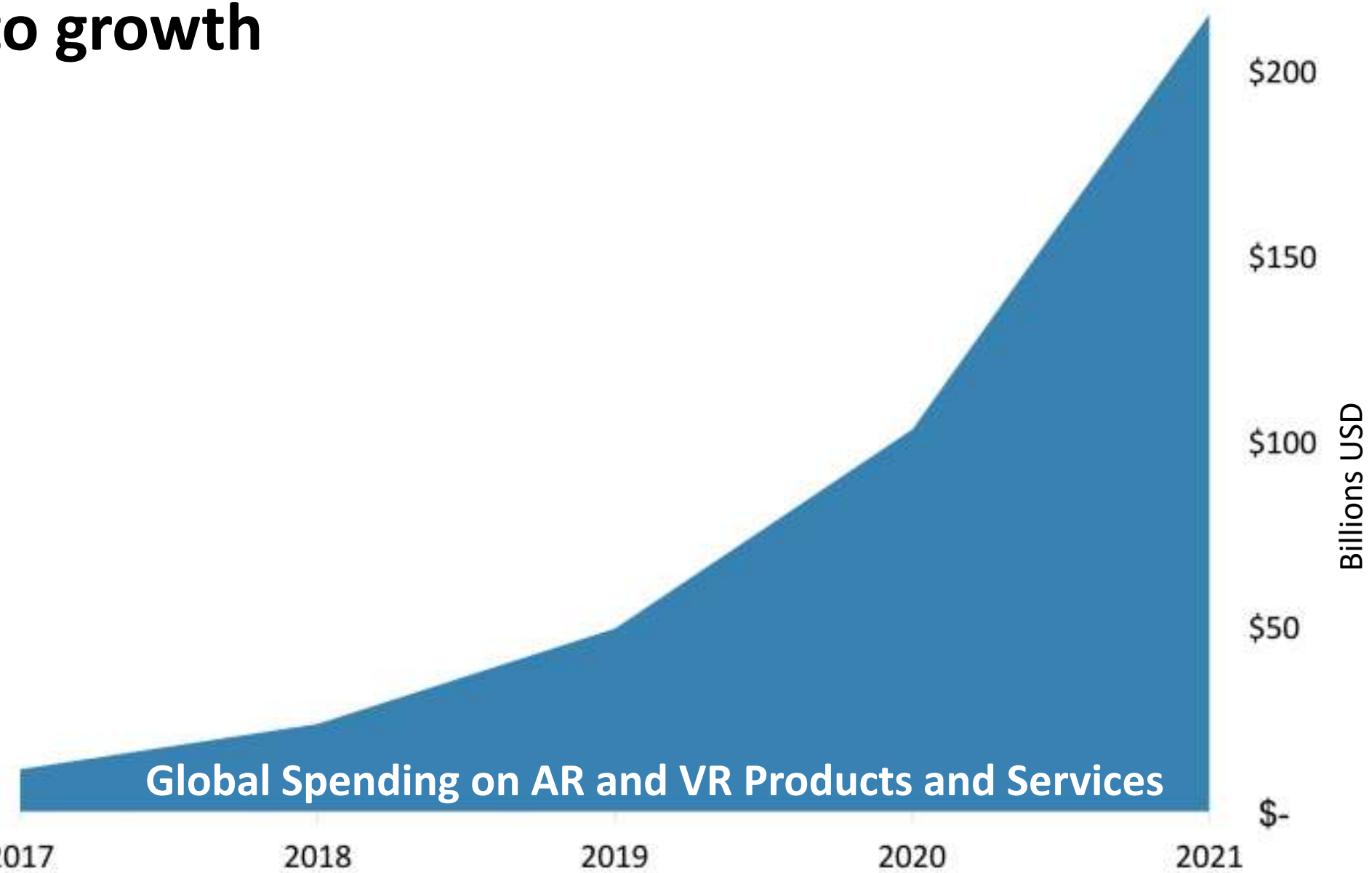
Virtual and Augmented Reality (AR) spending are expected to continue to growth



BI Intelligence, IDC 2017, businessinsider.com/ar-vr-2017-8

AR is being increasingly used during various stages of manufacturing and industrial processes

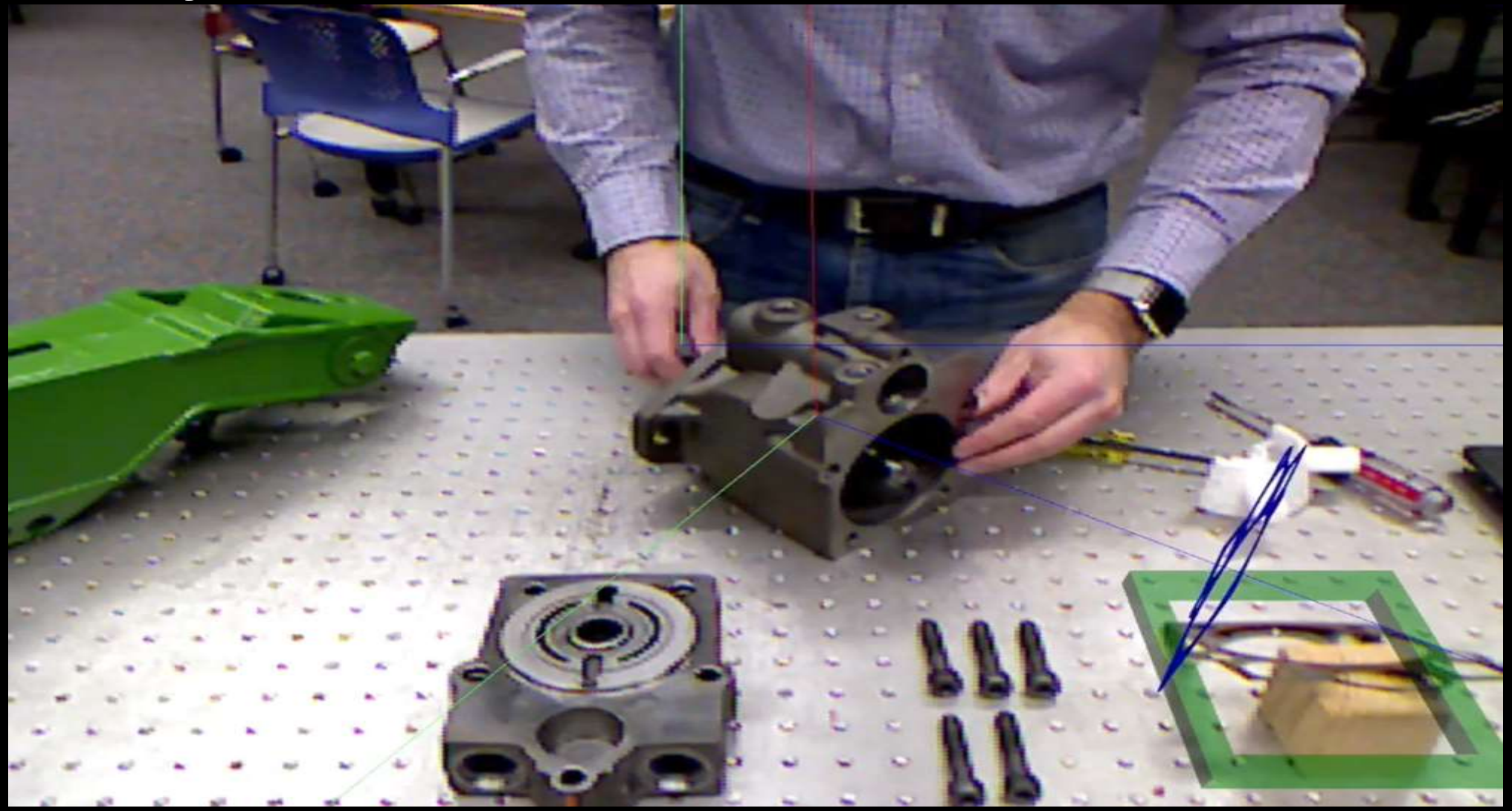
Design

Construction

Inspection

Industrial environments are highly dynamic with many moving parts

Augmented Reality has the potential to increase efficiency of assembly and construction tasks



The use of virtual objects in AR can create safety hazards in industrial environments

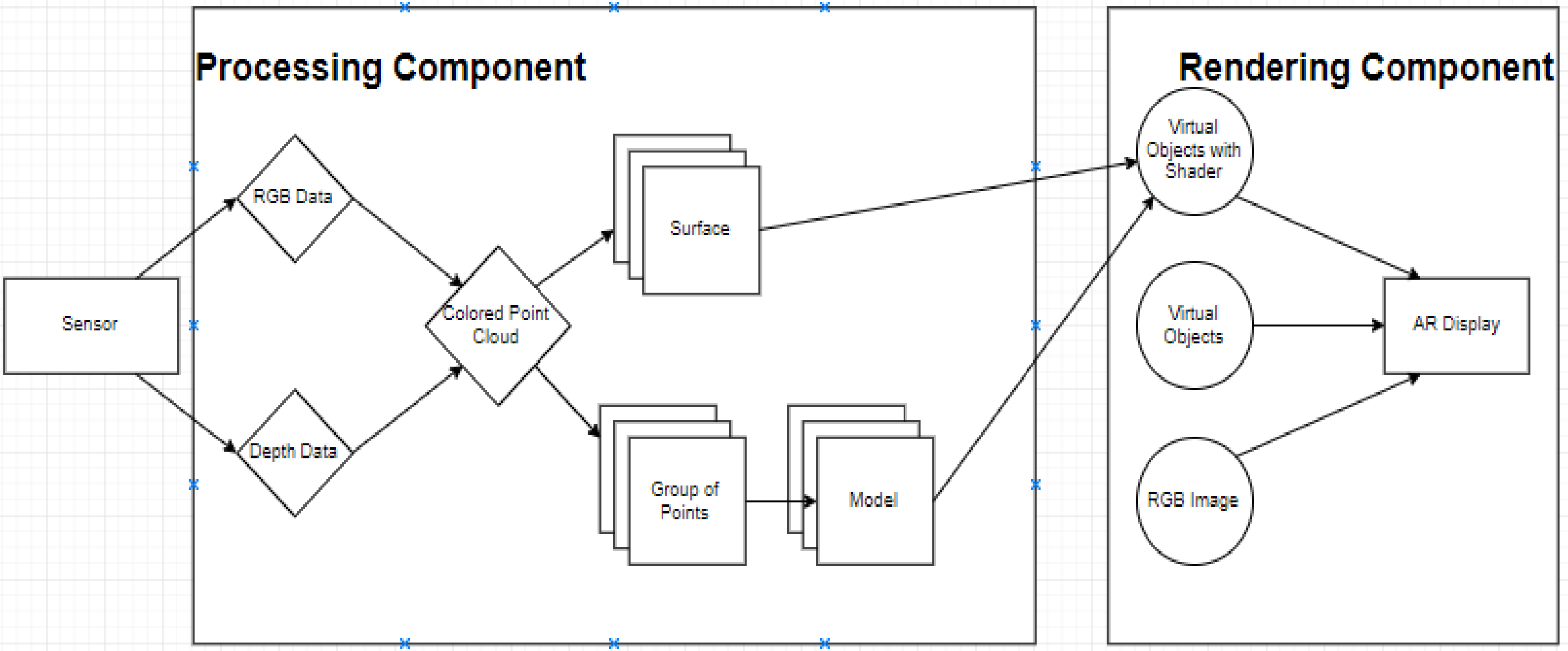
Hazards could be created from incorrect occlusion between real and virtual objects

Without proper occlusion, tools, machinery and structure could pose a risk to workers

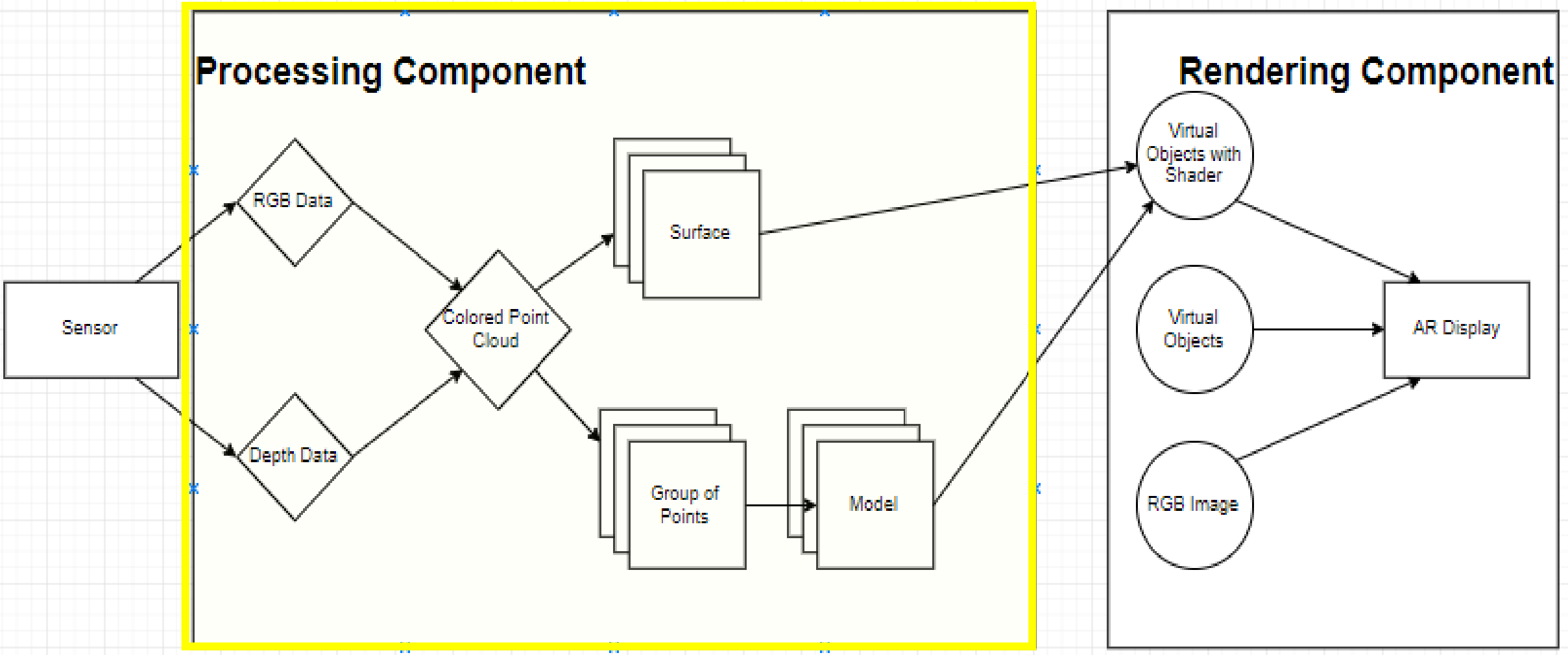
Research is being done to make Augmented Reality applications both safe and effective

	Features					
	Marker Based Tracking	Representation of Virtual Objects	RGB-D Data Usage	Real-Time Occlusion	Primitive Models from RGB-D Data	Model Permanence
ARToolkit (2007)						
Wilson and Benko (2017)						
Tian et al. (2015)						
Young and Smith (2016)						
This Work						

This works presents a method to capture, process, and render real-world data into a virtual space



RGB-D sensors provide the data needed to fit primitive models to the real-world.



Points Cloud data of real-world objects is captured by the RGB-D sensor.

Primitive models are fit to the point cloud data for ease of manipulation and rendering.

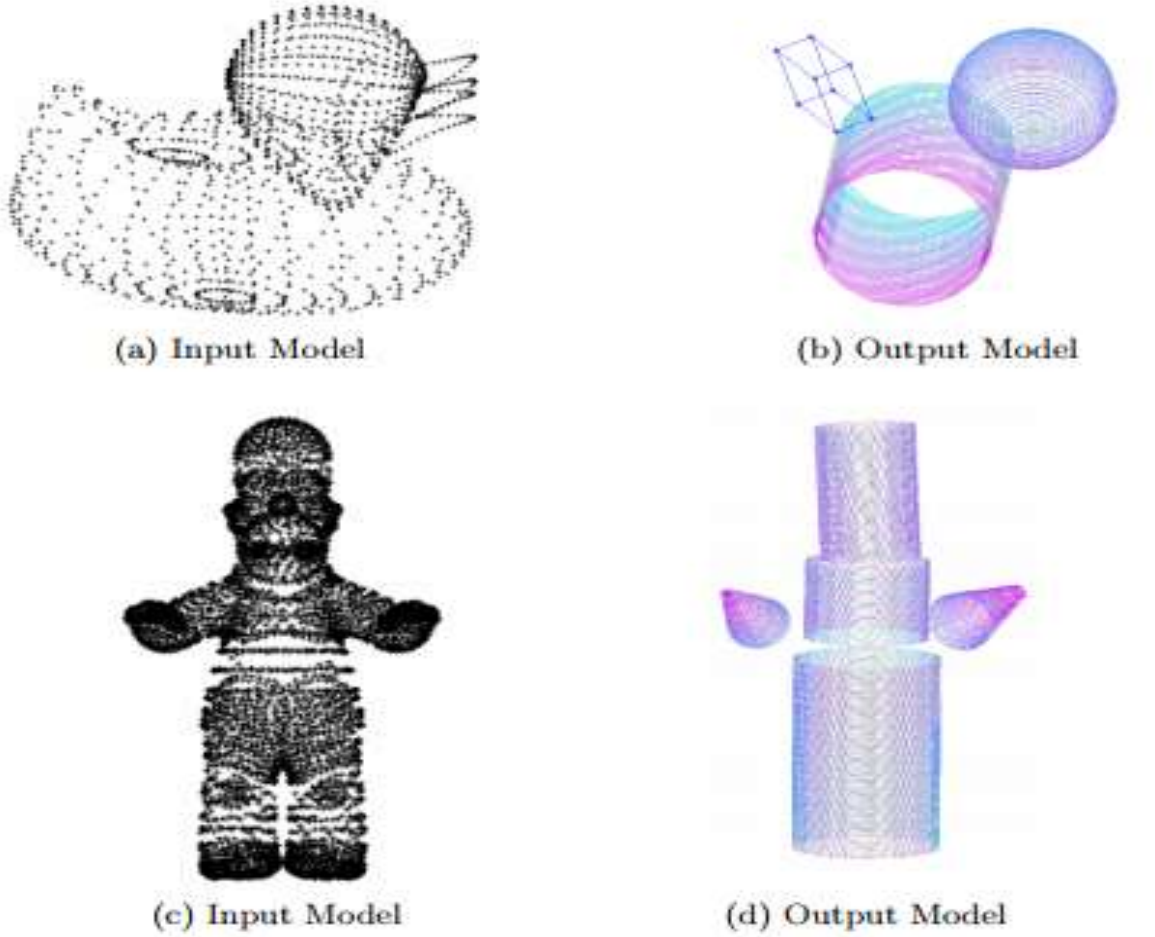
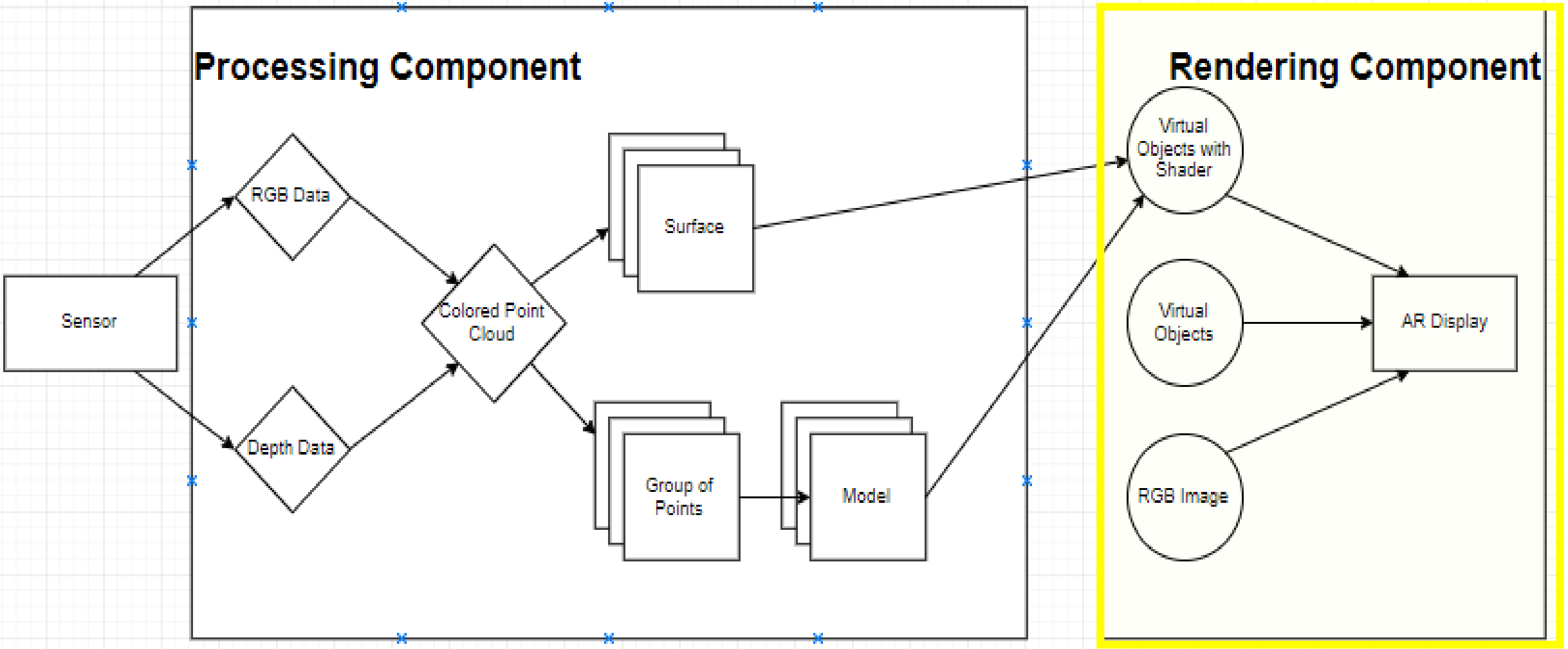


Figure 5.6: The Primitive Shape Decomposition Algorithm

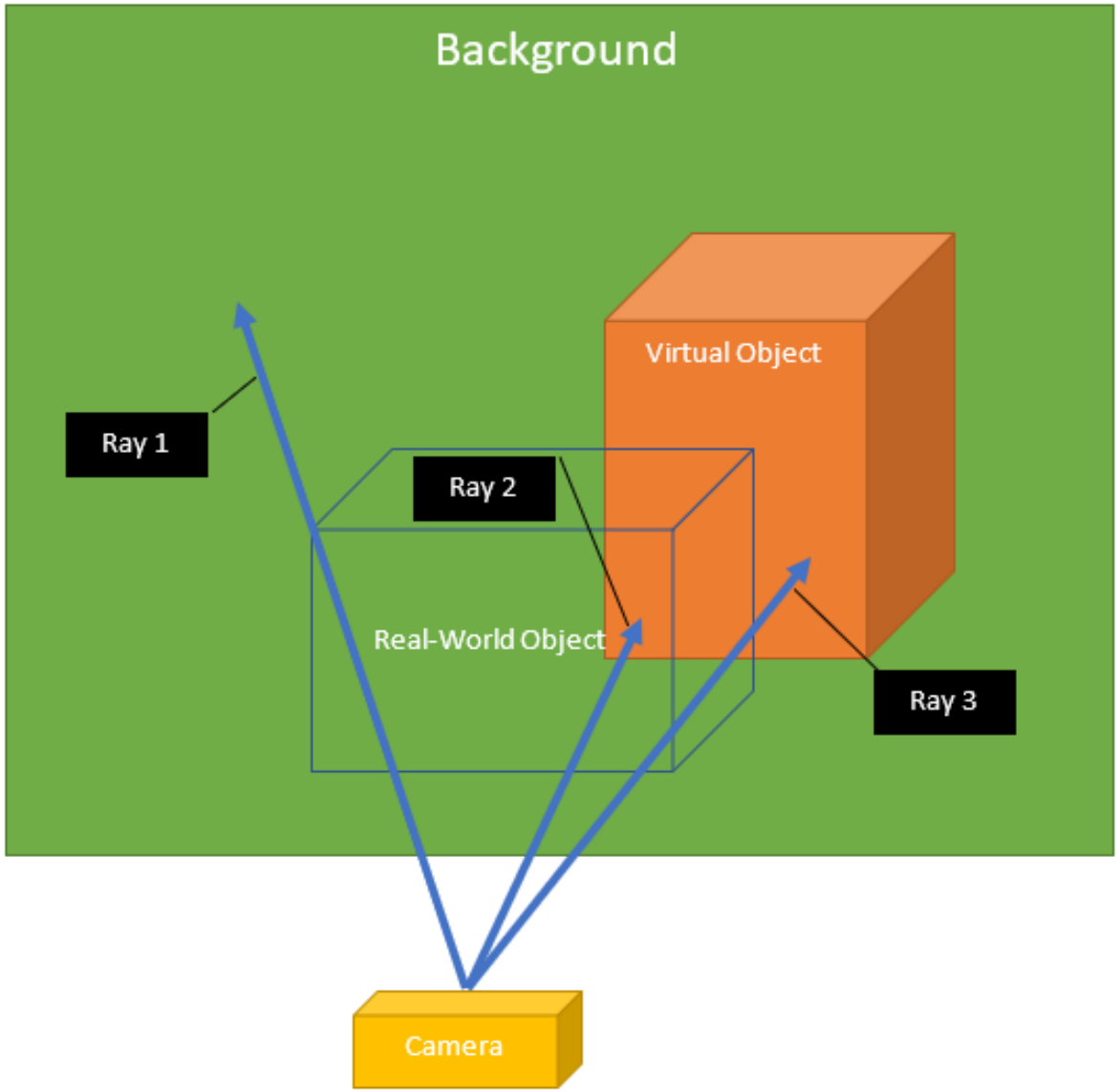
Garcia, S. (2009). Fitting primitive shapes to point clouds for robotic grasping. *School of Computer Science and Communication, Royal Institute of Technology, Stockholm, Sweden*.

A primitive model is fit to segments of the point cloud data.

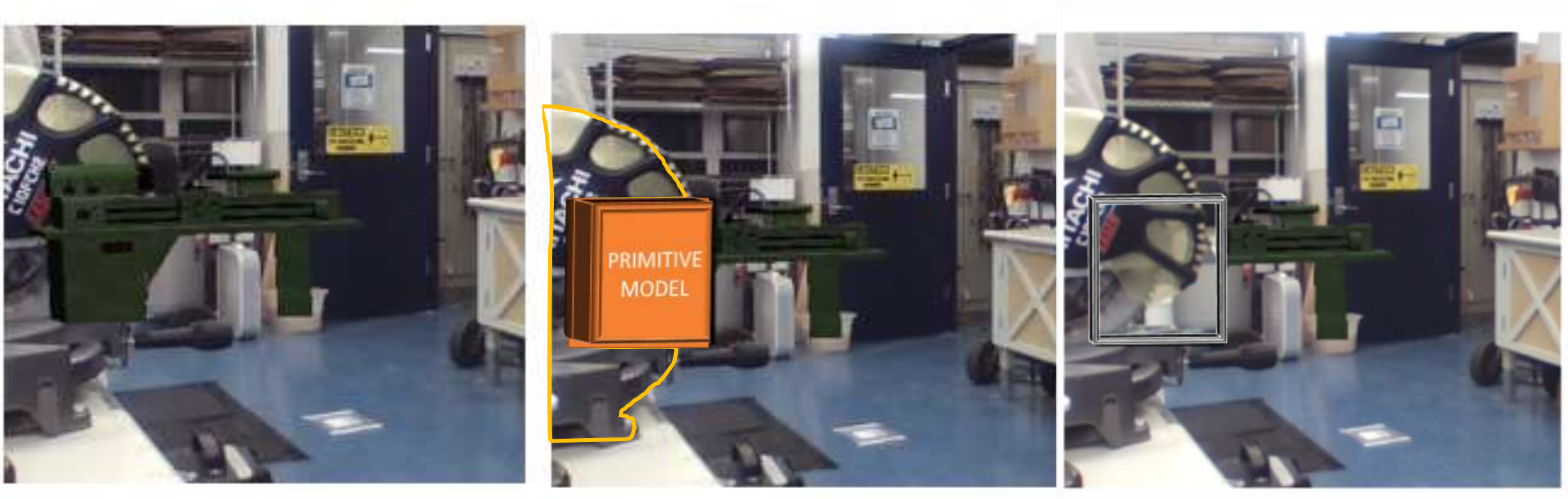
Primitive models are then passed to the Rendering Component.



Occlusion of Virtual Objects is based on data captured from Real Objects.



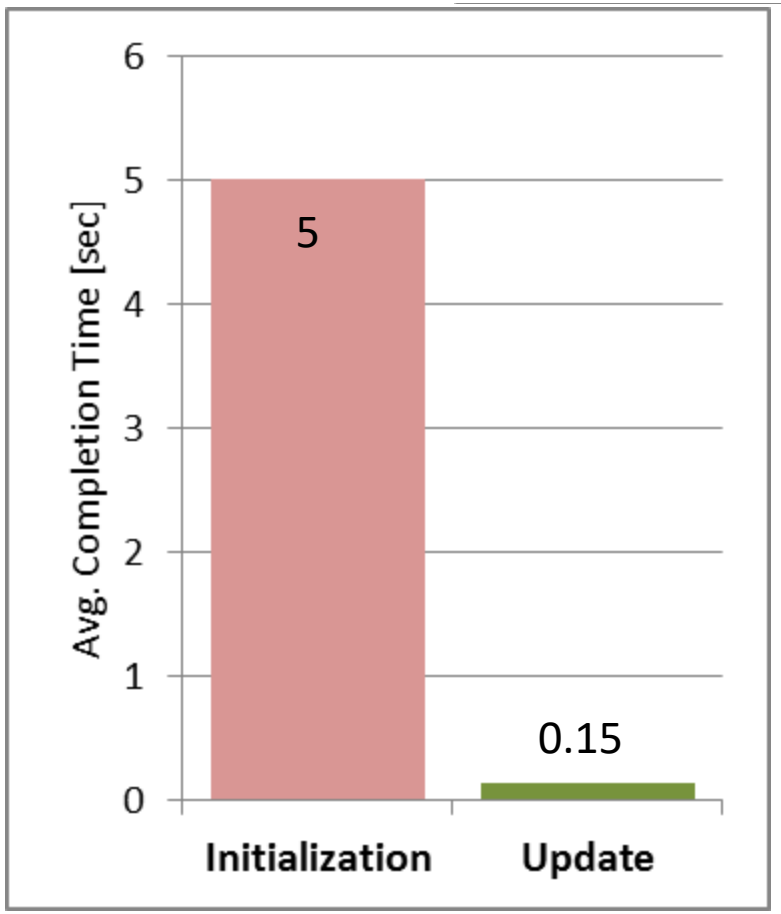
The primitive models allow real world objects to correctly occlude virtual objects.



Method allows for real-time occlusion while moving freely through the environment

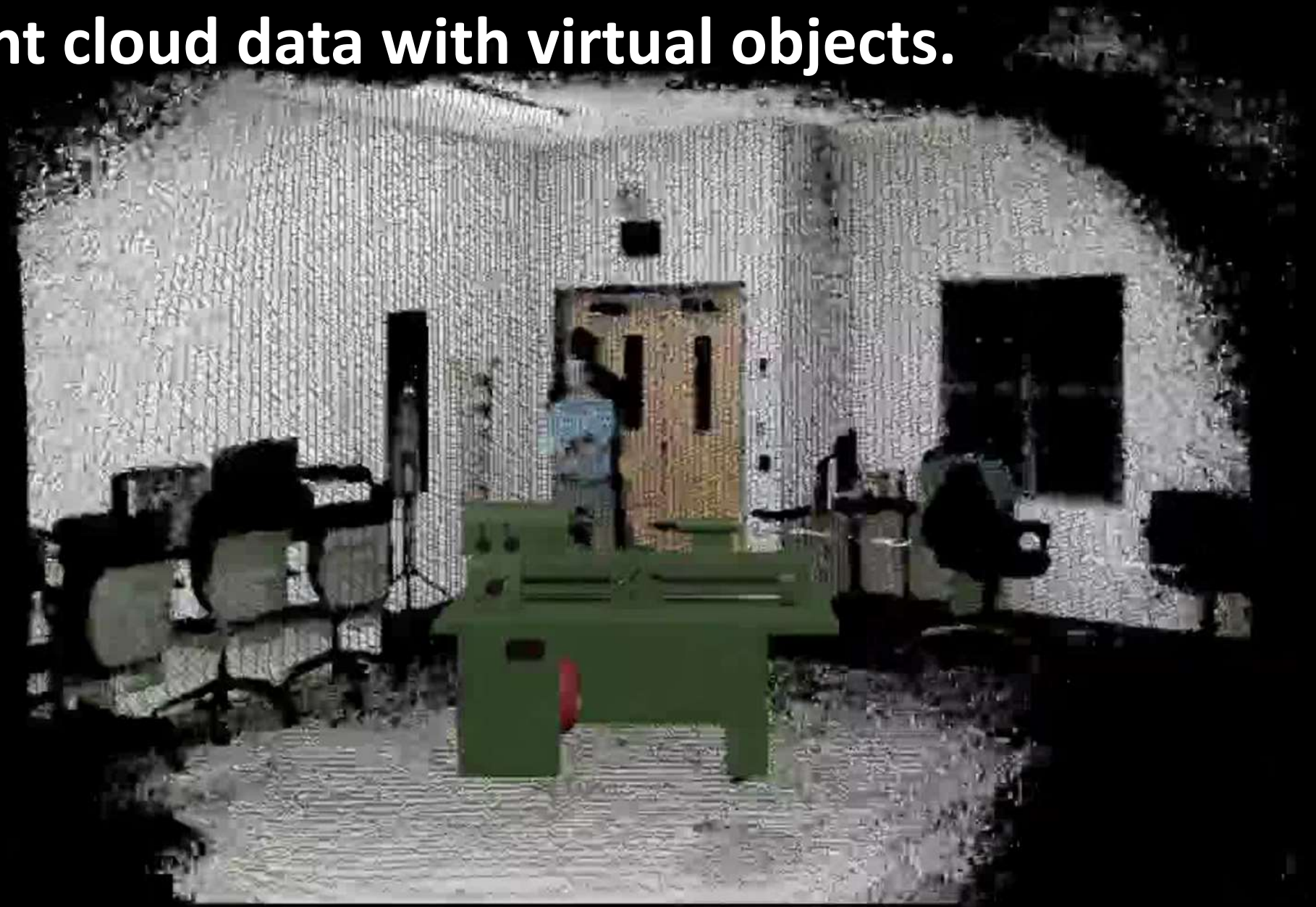
5 Runs in an Eng. Lab Environment

MSI GT72VR with Intel Core i7 and nVidia GTX 1060 + Kinect sensor v2.



Completion Time

Currently testing a Point Cloud method that shows real-time point cloud data with virtual objects.



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Thank you!

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