

# Real Time 3D Video Avatar Using Serial Distributed Processing Method

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## Concept

Recently, immersive projection displays have been used for tele-communication environment. In order to realize the high-presence communication in the networked three dimensional immersive virtual world, the high presence representation method of the remote users using the three-dimensional image is required. However, it was difficult to represent the three-dimensional video avatar in the shared virtual world in real time because of the large computation load and large amount of communication data. Therefore, in this study, the serial distributed processing method that can represent the three-dimensional video avatar in the immersive projection display in real time was proposed.

SKETCH & POSTER

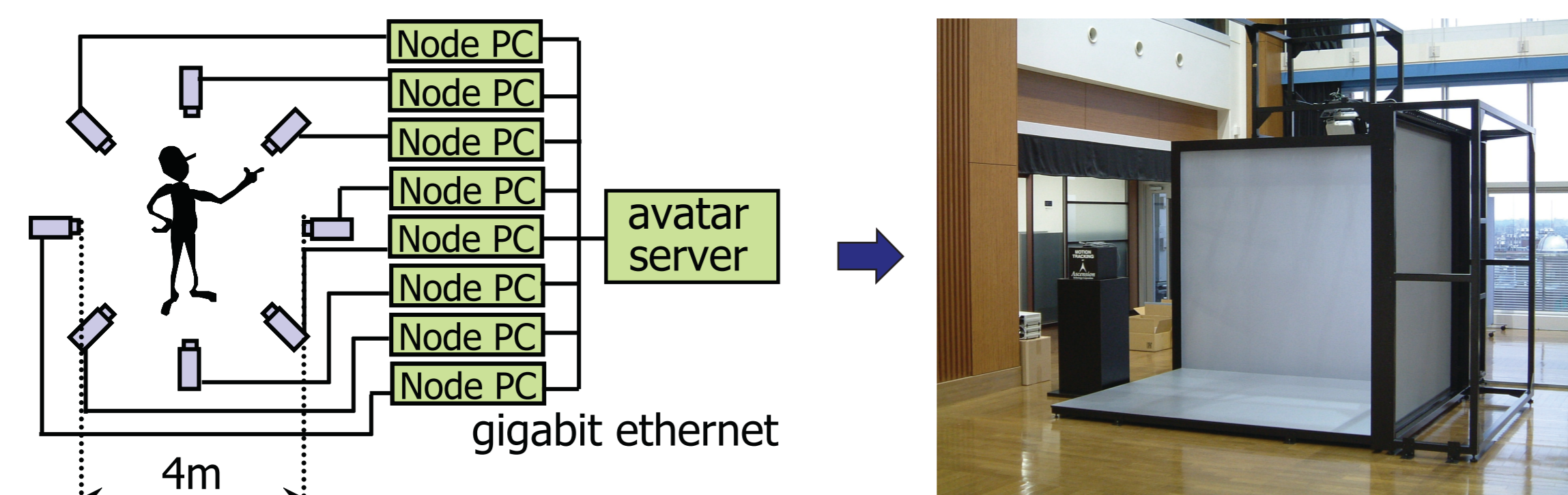
## Purpose of this Study

This study aims at constructing the **3D video avatar** technology that represents the 3D video image of the remote user in real time for the **tele-immersive communication**. However, it was difficult to generate the 3D video image in real time by using the ordinary technology, such as the parallel processing, due to the bottleneck of the large calculation load and the synchronization between each node.

In this presentation, real time 3D video avatar technology using the **serial distributed processing** was developed.

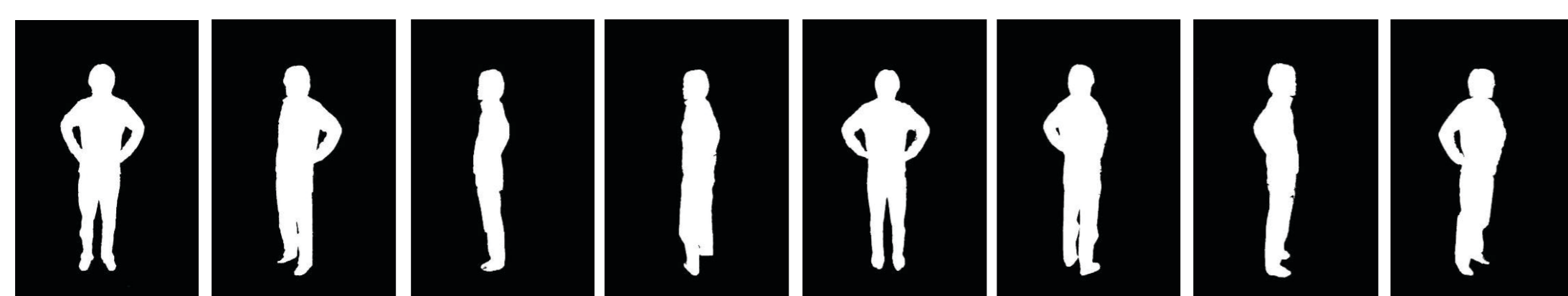
## 3D Video Avatar Using Shape from Silhouette

As a basic technique of generating the video avatar, the **shape from silhouette** was used.



User's images are captured by eight video cameras placed around the user.

Constructed 3D video avatar is displayed in the immersive projection system.



Silhouette images made by captured video images



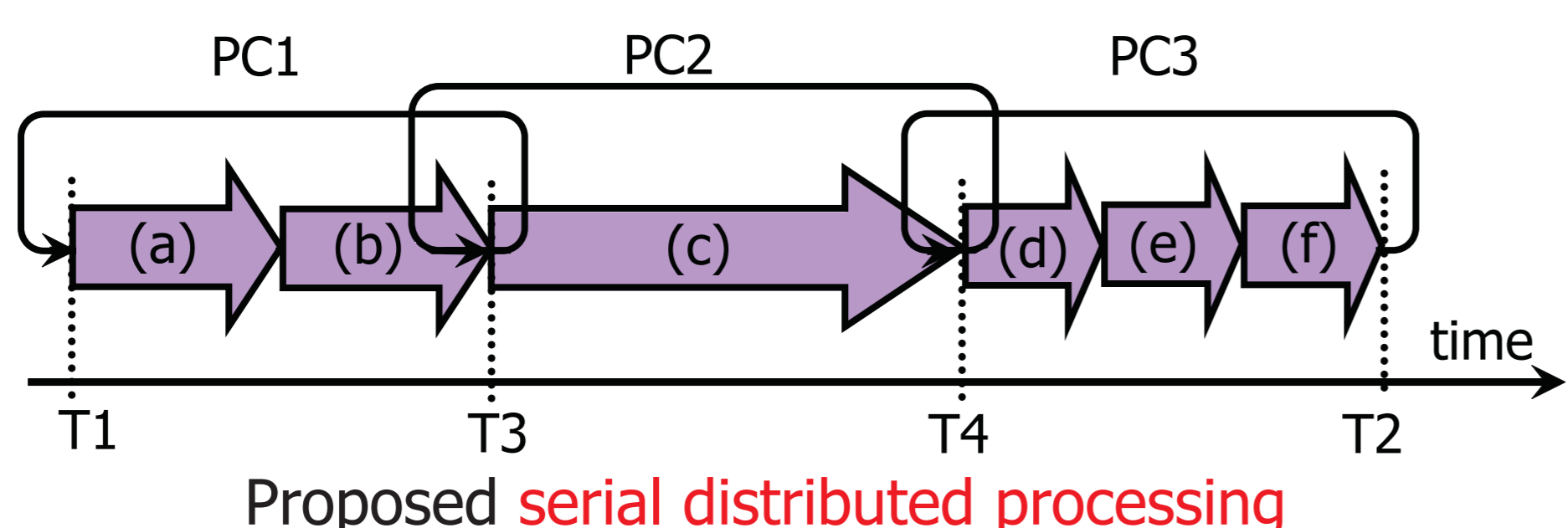
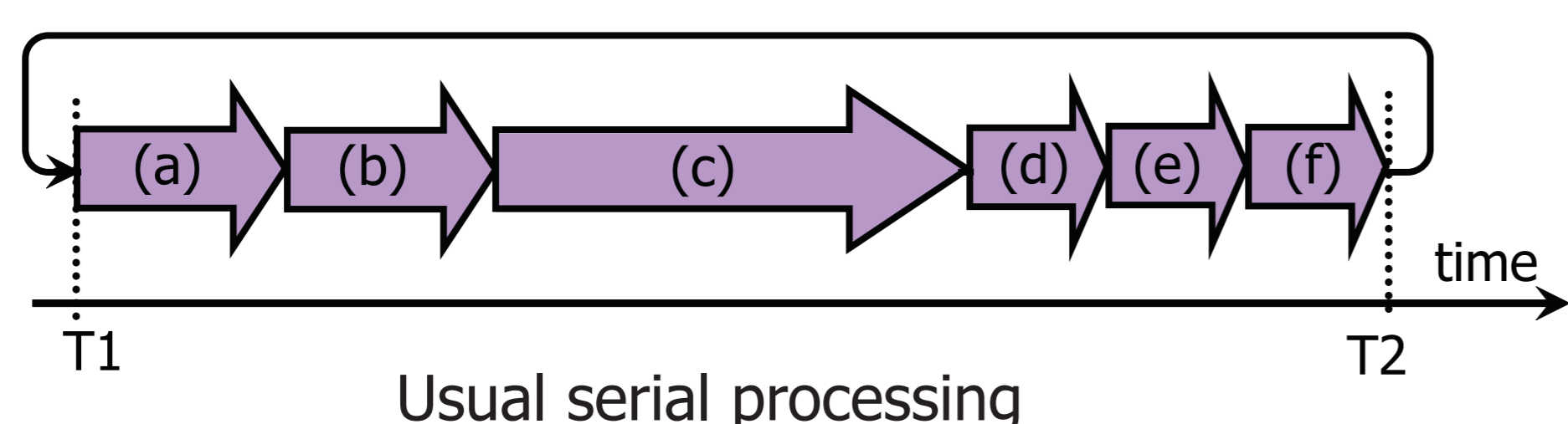
Voxel model generated by shape from silhouette



3D video avatar integrated in the virtual world

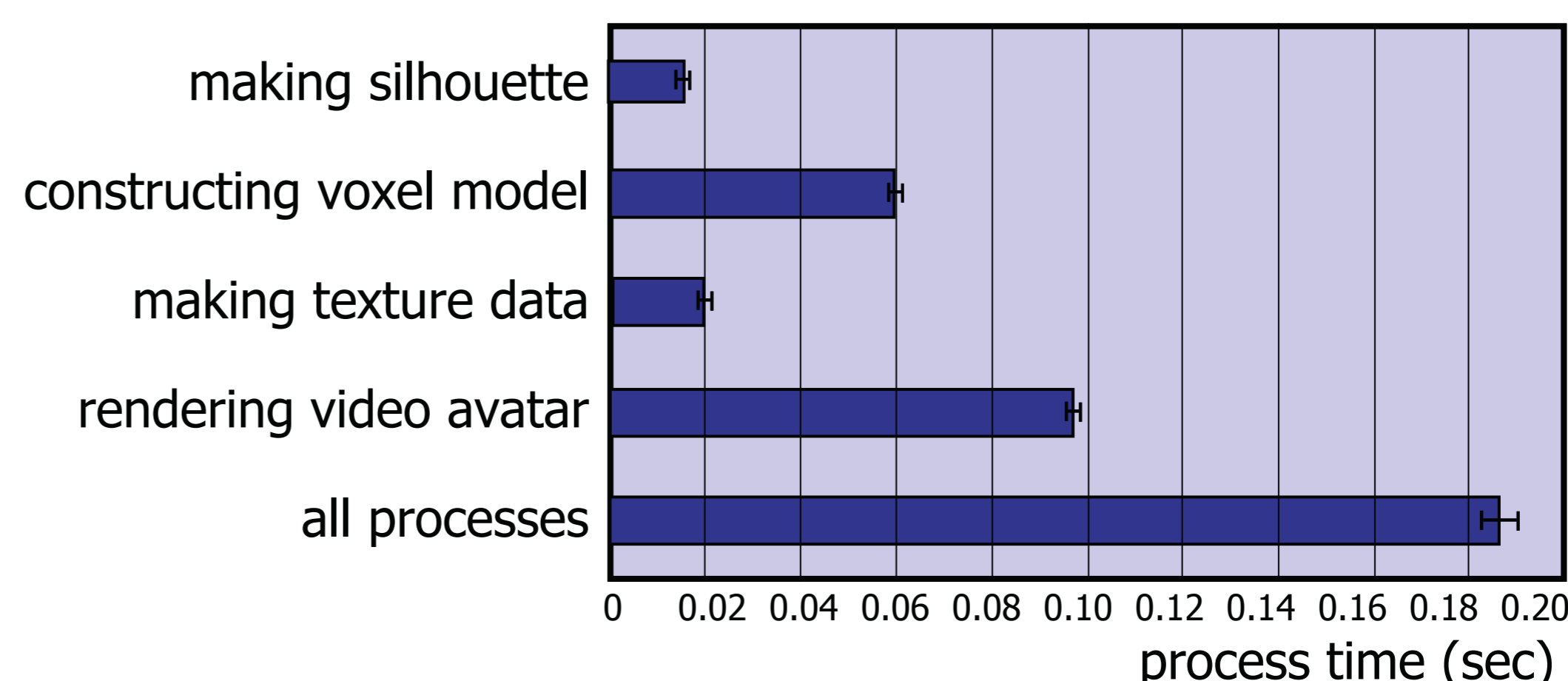
## Principle of Proposed Serial Distributed Processing

In the usual serial processing, it is difficult to realize the real time processing when it takes a lot of time to perform the whole process. In the proposed serial distributed processing method, each PC performs the divided process at high frame rate by sending the intermediate data to the next PC, when the total processing time were large.

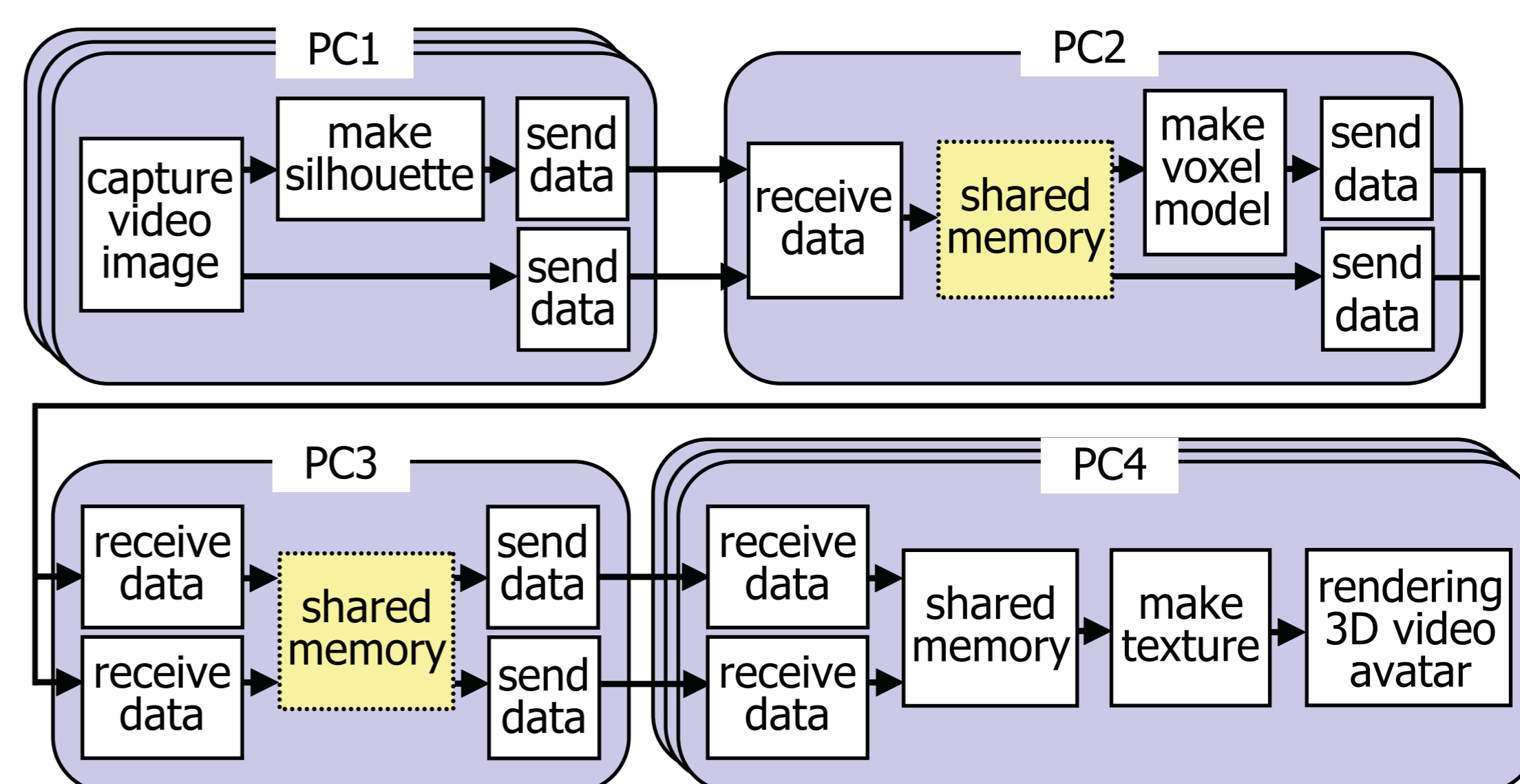


## Optimized Distributed Processing

In this study, calculation time for each elemental proces of making 3D video avatar was measured, and the optimized distributed process of generating 3D video avatar was designed.



Average calculation time of each process of generating 3D video avatar



Optimized configuration of serial distributed processing for generating 3D video avatar

The IEEE1394 cameras used in the experimental system capture the user's image at the frame rate of 15Hz. In the proposed system, the final 3D video avatar was transmitted from the remote site and was rendered over **15Hz** by using the optimized system configuration.

## Application of real time 3D video avatar

3D video avatar was integrated in the immersive virtual world in real time, and it was applied to the tele-immersive communication between remote users.



## Summary

In this study, **real-time 3D video avatar** generation technique using the serial distributed processing method was developed, and the performance over 15Hz was realized. Future work will include developing the practical applications, such as the remote presentation or the remote education, using the 3D video avatar technology.

## References:

1. Tetsuro Ogi, Mitsutaka Sakai: Communication in the Networked Immersive Environment, 2006 ASIAGRAPH, pp.67-72, Shanghai, 2006.