



Project Management and Software Development

Automatic Pose Synchronization

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Project' s Goal

Synchronize different pose streams in time automatically



Minimize lag due to sampling



https://www.sapling-inc.com/blog/wp-content/uploads/2011/04/GettyImages_85406496.jpg (24/10/16)



Requirements and Specifications

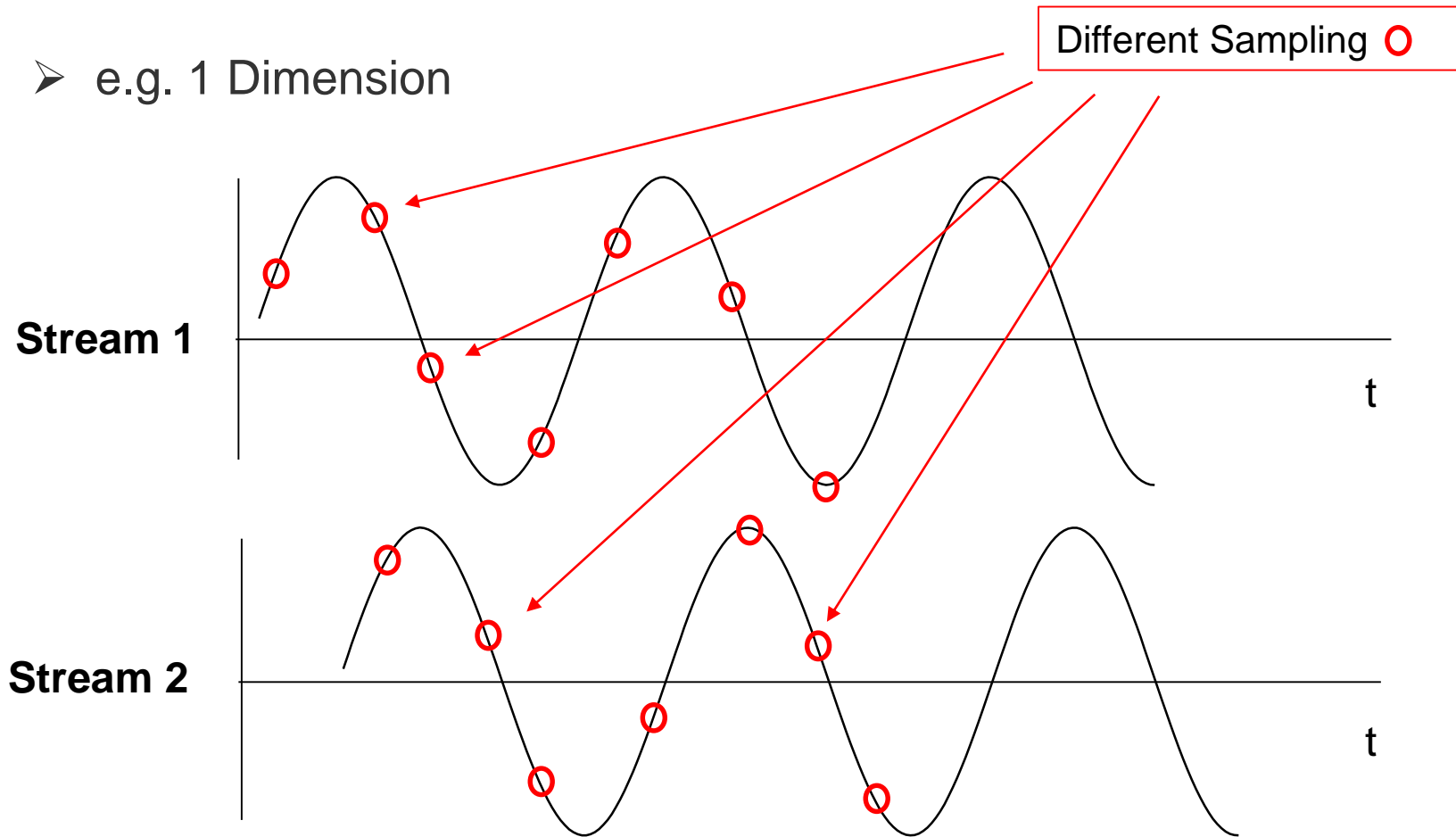
- Communication with tracking system
- Use of Quaternionic Upsampling¹
- Alignment of different tracking streams
- Visualization Framework
- Implementation in Matlab



[1] Source: B. Busam, M. Esposito, B. Frisch, N. Navab **Quaternionic Upsampling: Hyperspherical Techniques for 6 D-o-F Pose Tracking** *International Conference on 3DVision (3DV)*, Stanford University, California, USA, October 2016

Synchronization Problem

➤ e.g. 1 Dimension

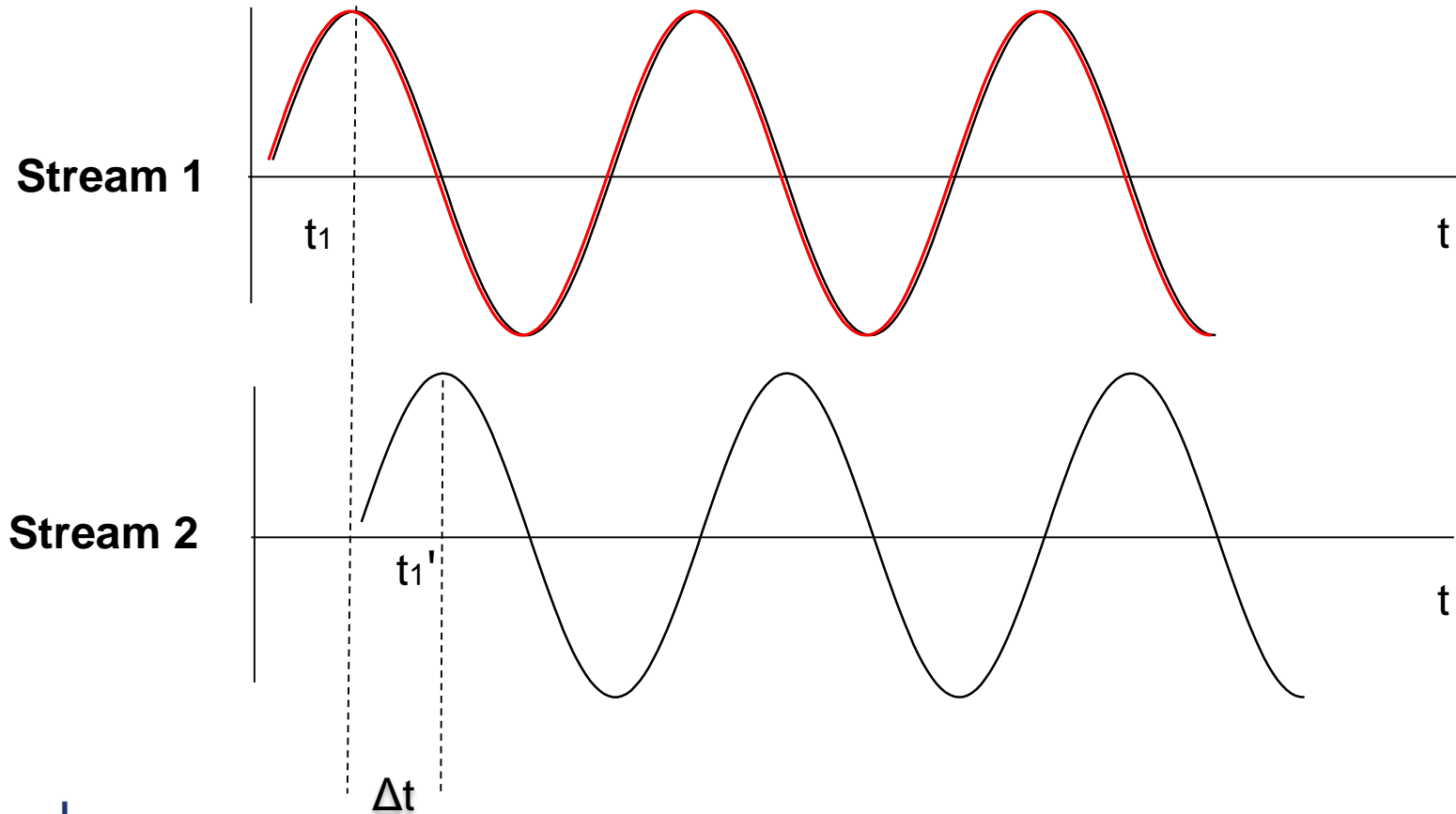


Quaternionic Upsampling gives the continuous line (—)



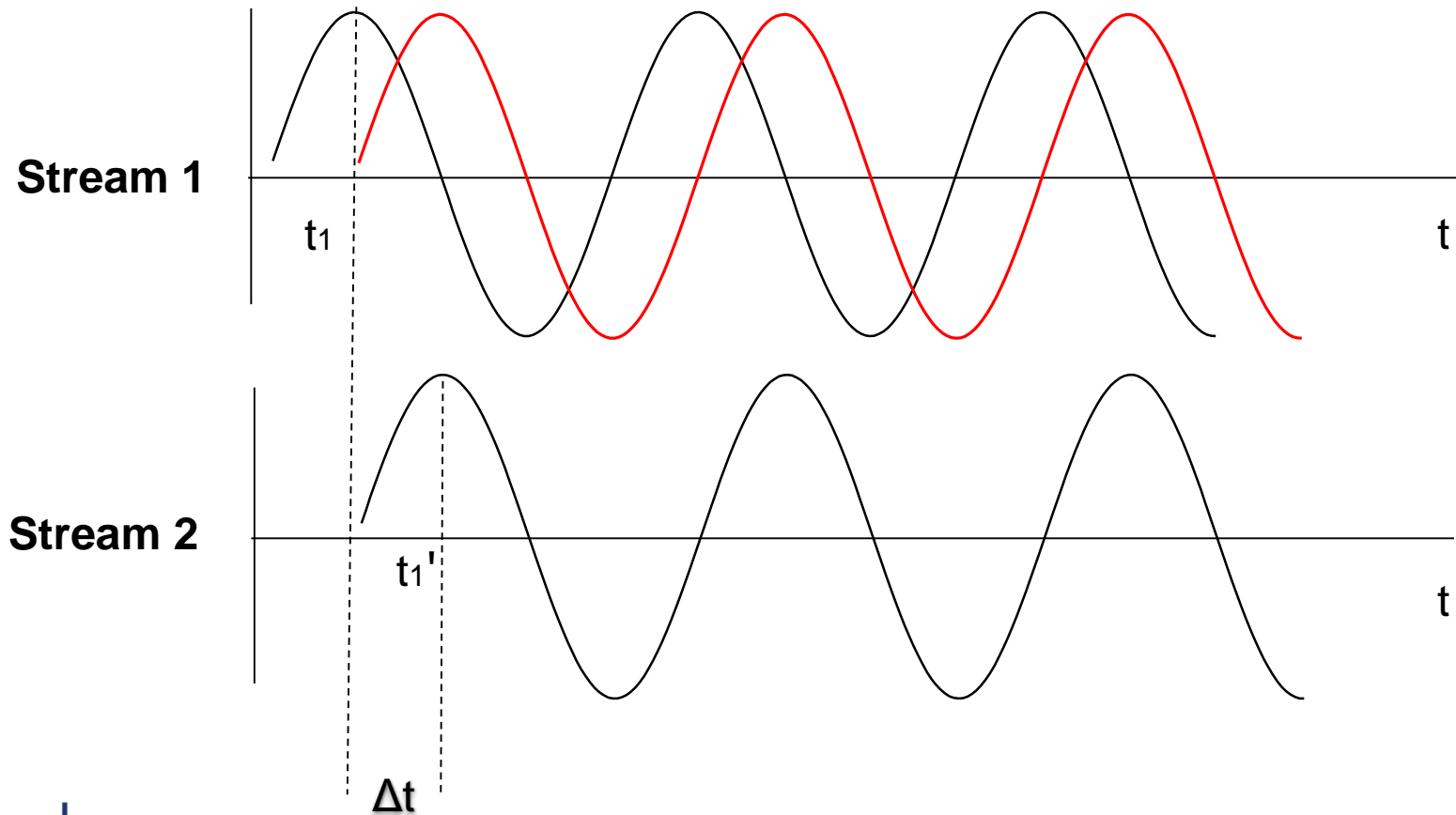
Synchronization Problem

➤ e.g. 1 Dimension



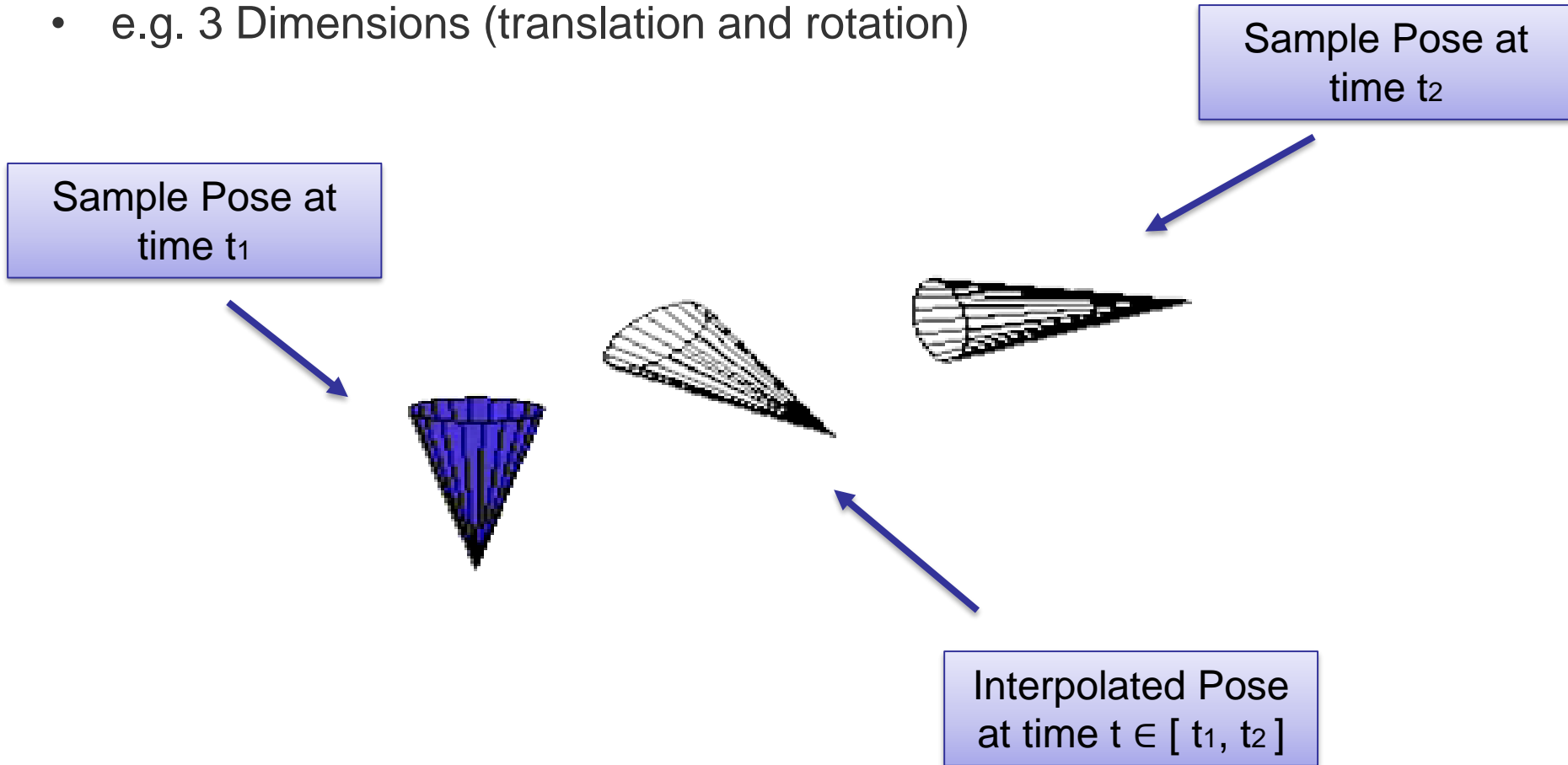
Synchronization Problem

➤ e.g. 1 Dimension



Upsampling

- e.g. 3 Dimensions (translation and rotation)



Tasks and Achievements

Communication interface



Quaternionic Upsampling



Prototype – Synchronization of artificial data streams



Debugging



Live Demo

future work



Prototype Design

Communication

IGT Link Server

1st Stream

2nd Stream

$P_{i(1)}$

$P_{i(2)}$

Collect 2 x n Poses

$P_{i(1)} \dots P_{n(1)}$

$P_{i(2)} \dots P_{n(2)}$

Data Preparation Routines

- Convert rotations to quaternions
- Quaternionic Upsampling
- Translations: linear interpolation
- Convert back to homogenous transformation matrices

Output

Correction of poses and visualization

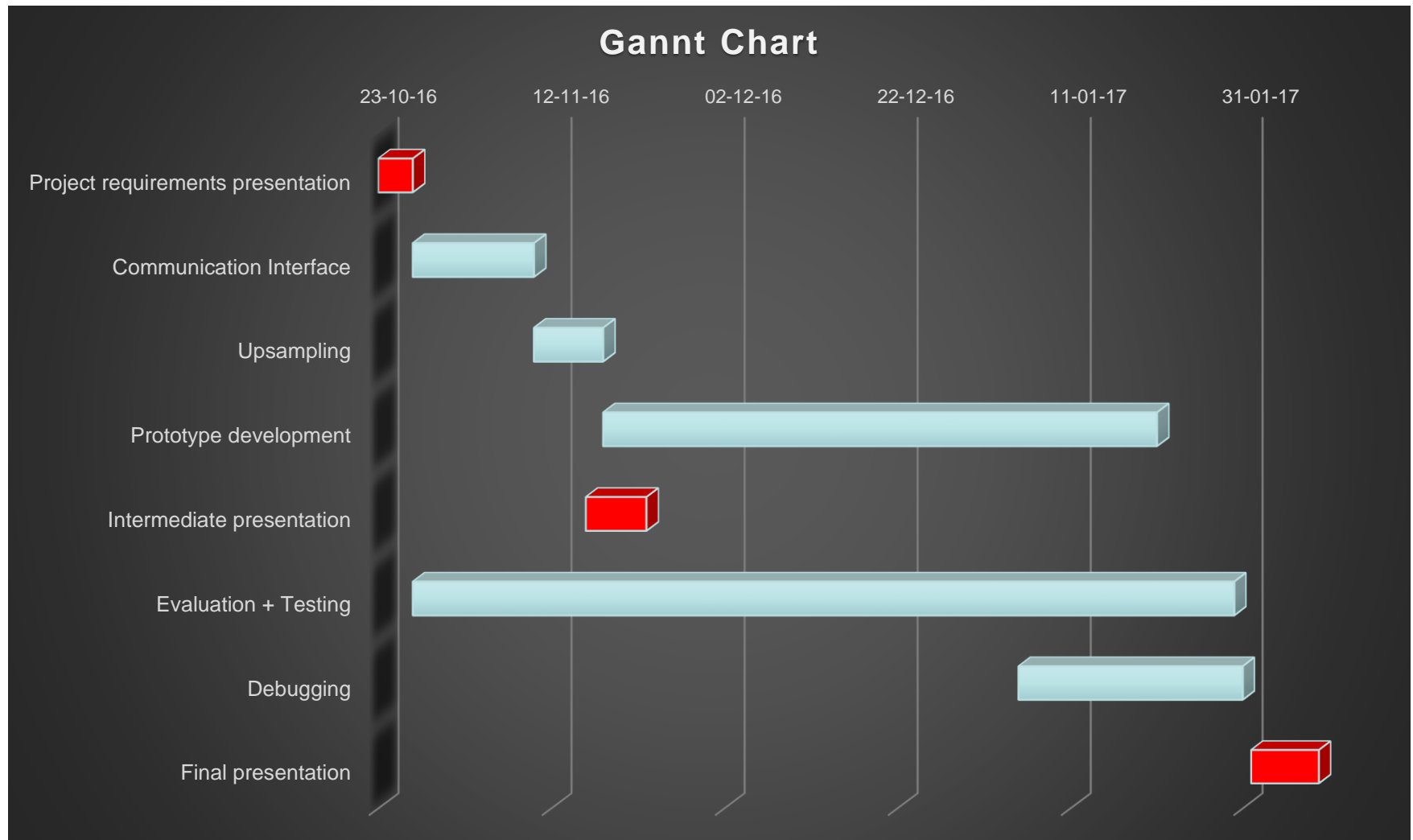
Core Algorithm

- Minimization
- Acquisition of Δt
- Synchronization

Δt

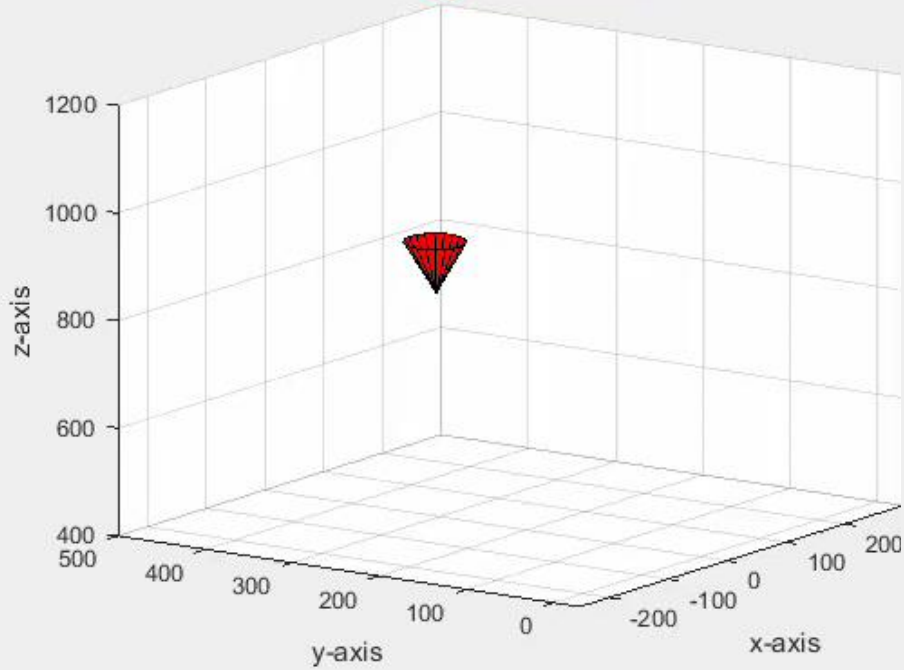


Time Schedule

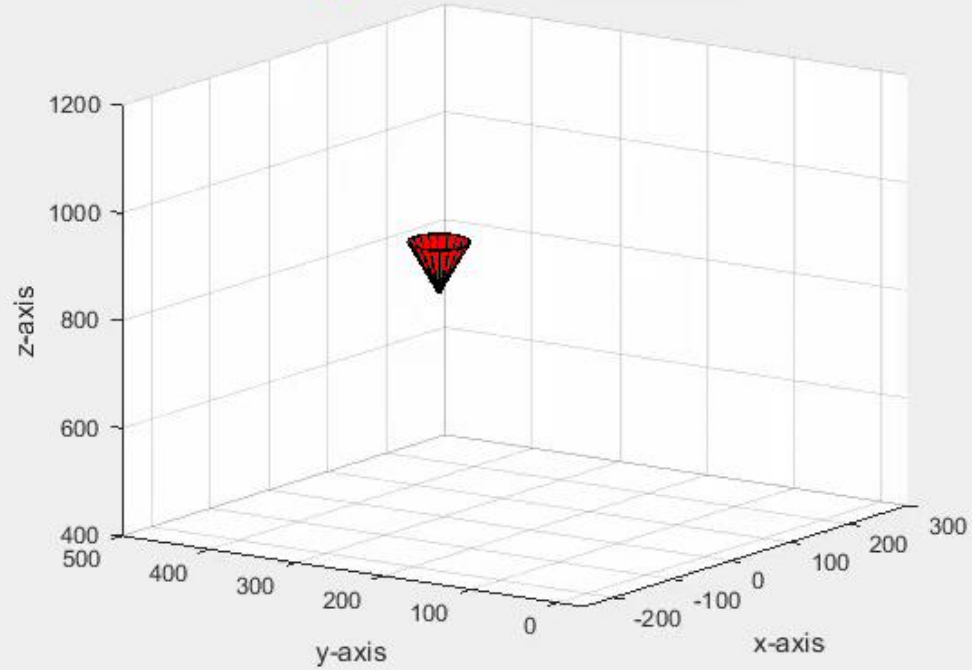


Results

Original data



Synchronized data



In conclusion

- Project's main goal accomplished
- Quaternionic Upsampling proved a good approach for interpolation
- Promising results
- Room for improvement
- Possibilities for integration with other applications



<http://download.4-designer.com/files/20140221/Realistic-target-and-arrow-vector-material-62668.jpg>(5/2/2017)

