Interactive Zoom and Panning from Live Panoramic Video

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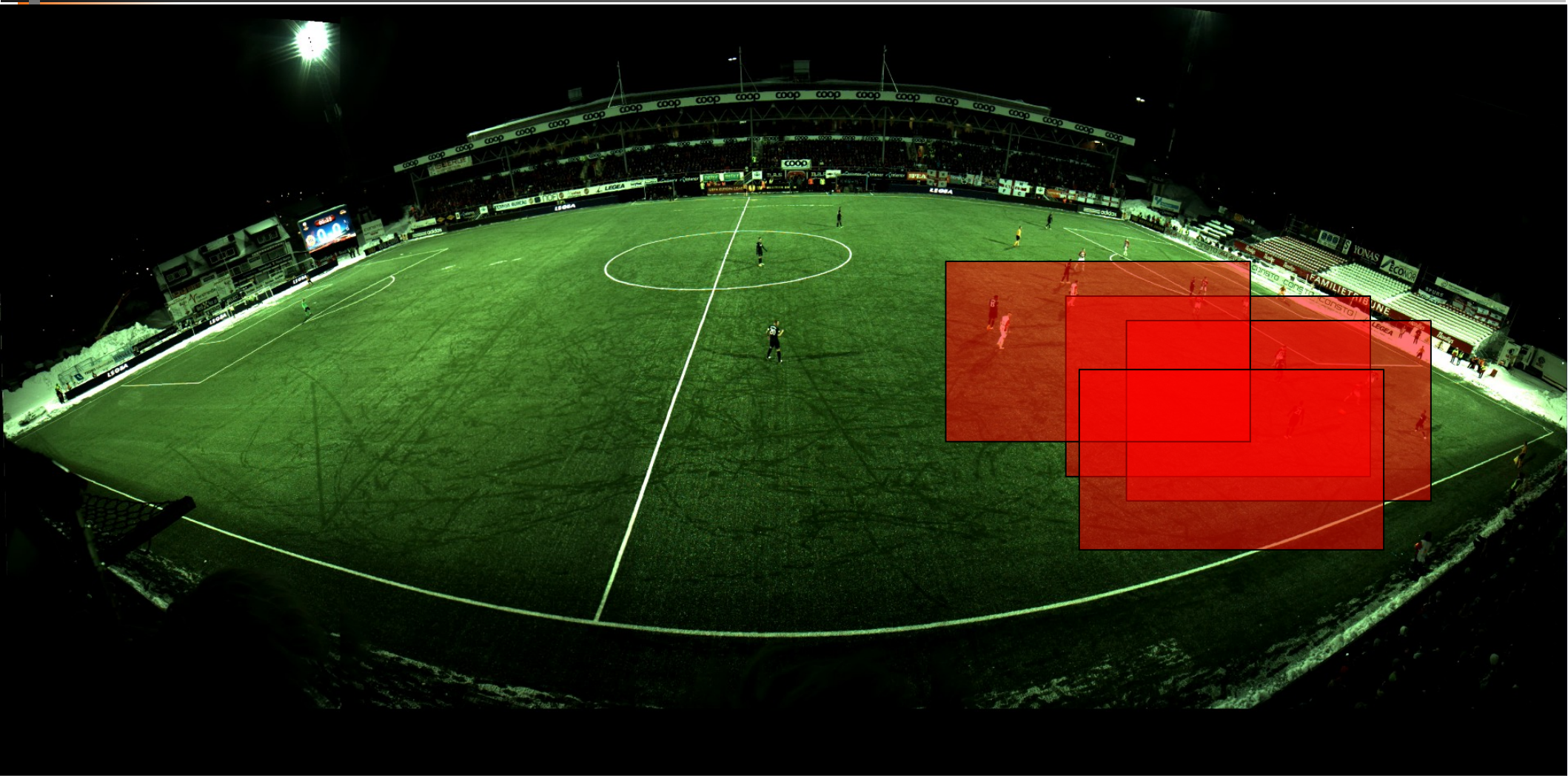
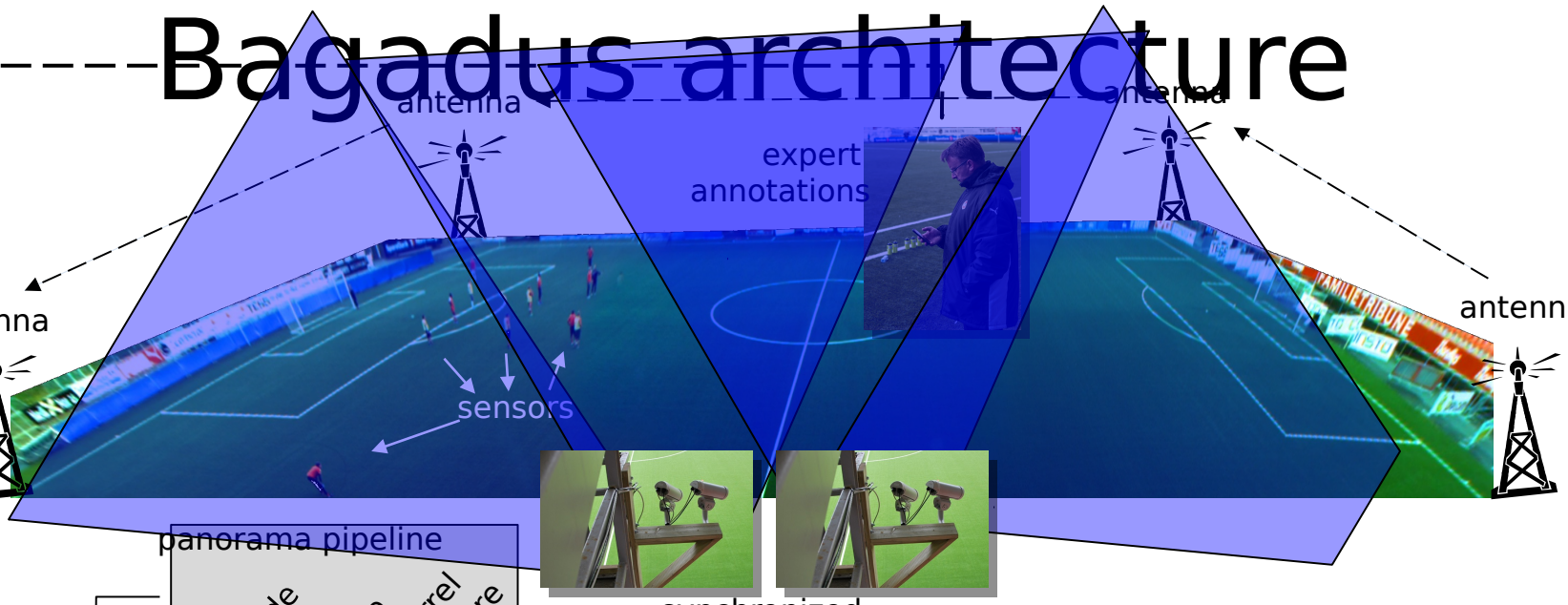
Current day's technology

- Football
- Medicine
- Surveillance
- Others

Get your own virtual view



Bagadus architecture



synchronized
camera array

panorama pipeline

store encode stitch rotate debarrel capture

single camera pipeline

store encode capture

video
system

sensor system

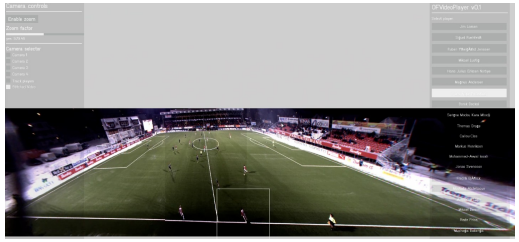
analytics system

user interaction and retrieval

read decode zoom mark player encode send

Camera switching - view

Panorama - view

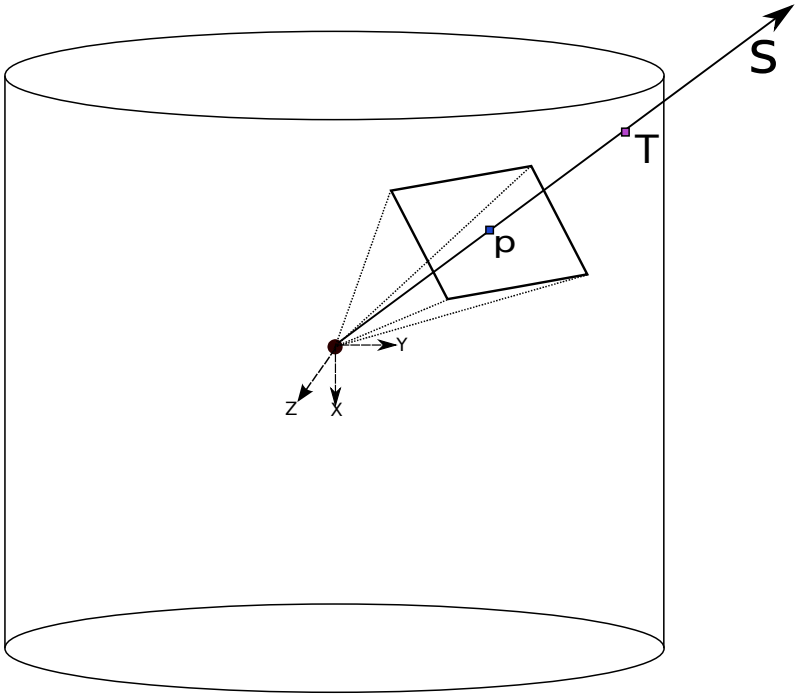


Real-time Panorama Creation

- Debayering
- Warping
- Dynamic seam
- Stitching

Panorama – What next ?

Reprojection



Initial Execution

- Matlab
- OpenCV
- C++
- Single threaded CPU

The old pan video

Next step

- Improvements in panorama capture
- Previous limitations
- current possibilities

Improvements in panorama pipeline

- 3 cameras to 5 cameras
- Multiple capture machines
- Better h.264 compression
- HTTP video segment server

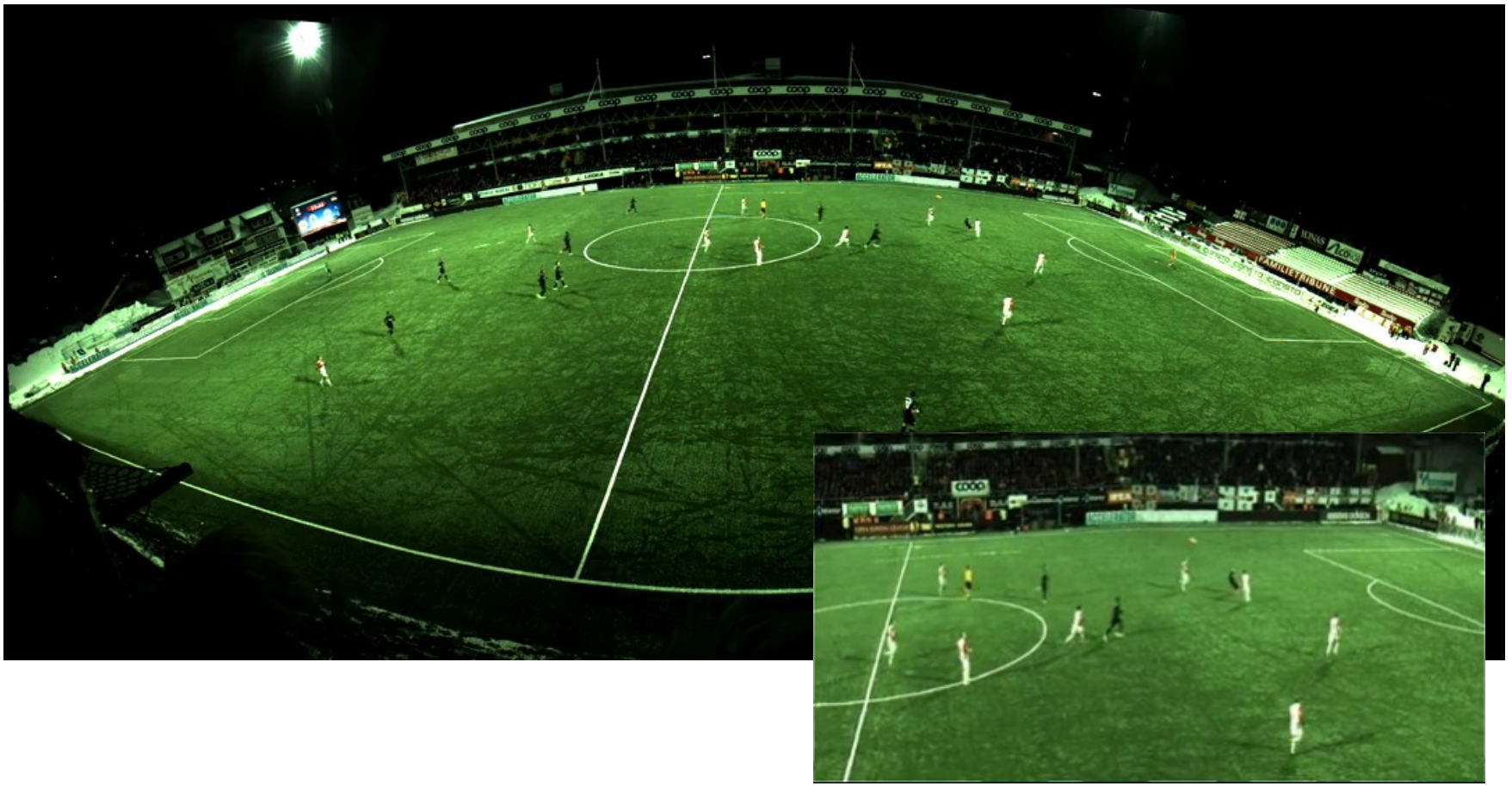
Viewer Technology

- Fully supported Online mode
- Multi-threaded – pipelined architecture
- CUDA GPU execution with texture memories for optimized performance for interpolation

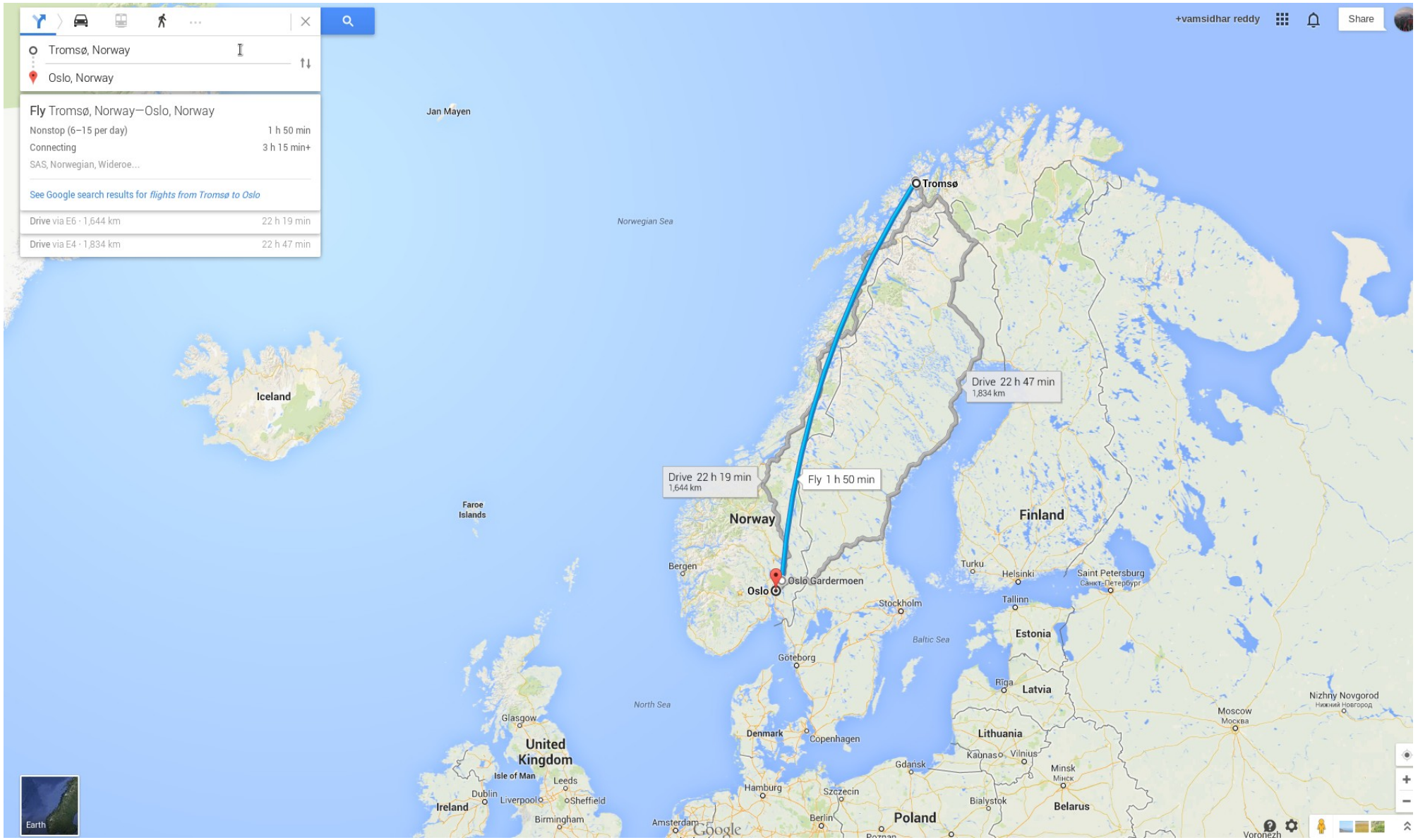
Our weak link

- Network
- Traffic shaping

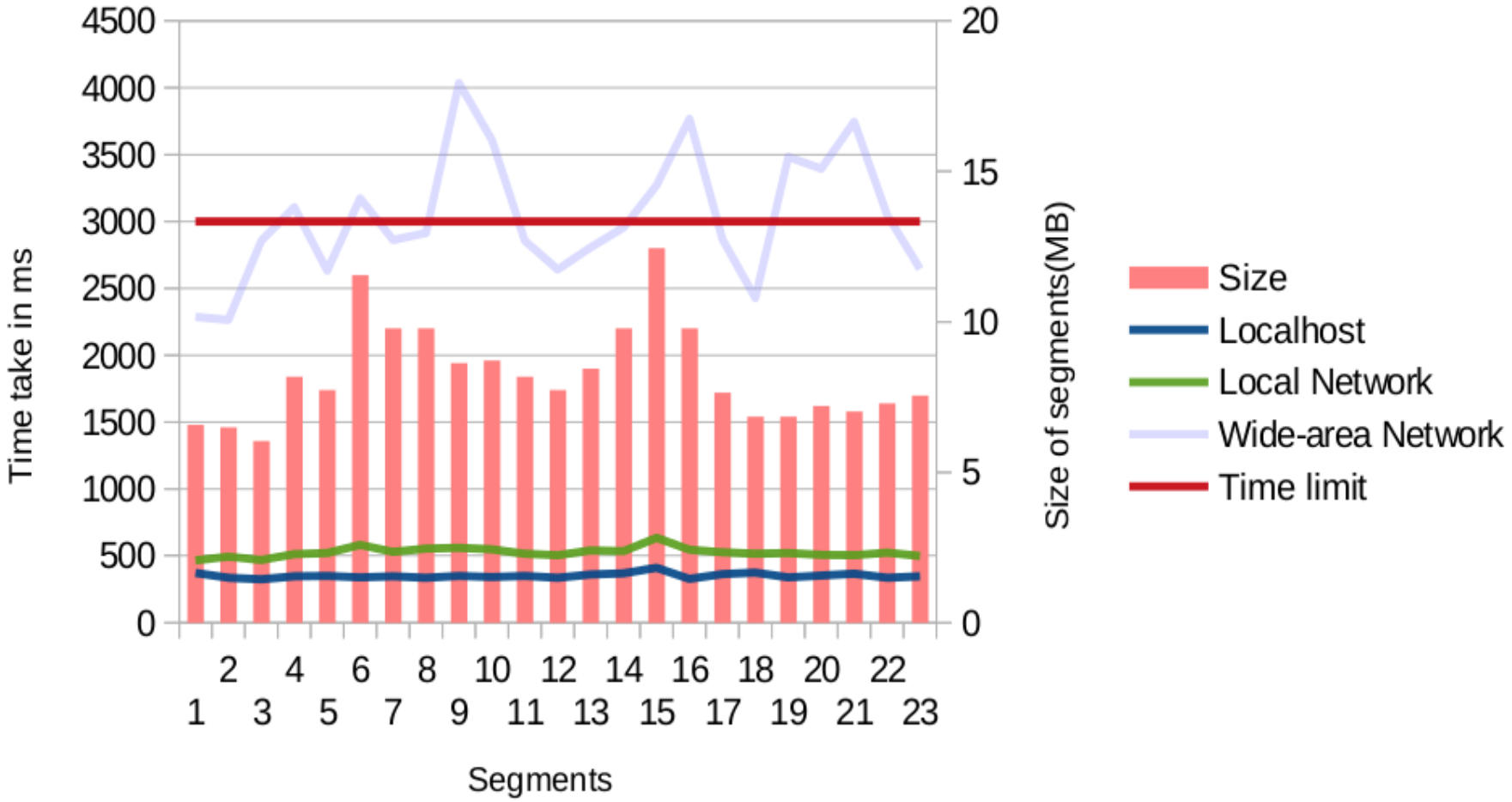
Outcome of the improvements



The actual system



Network performance



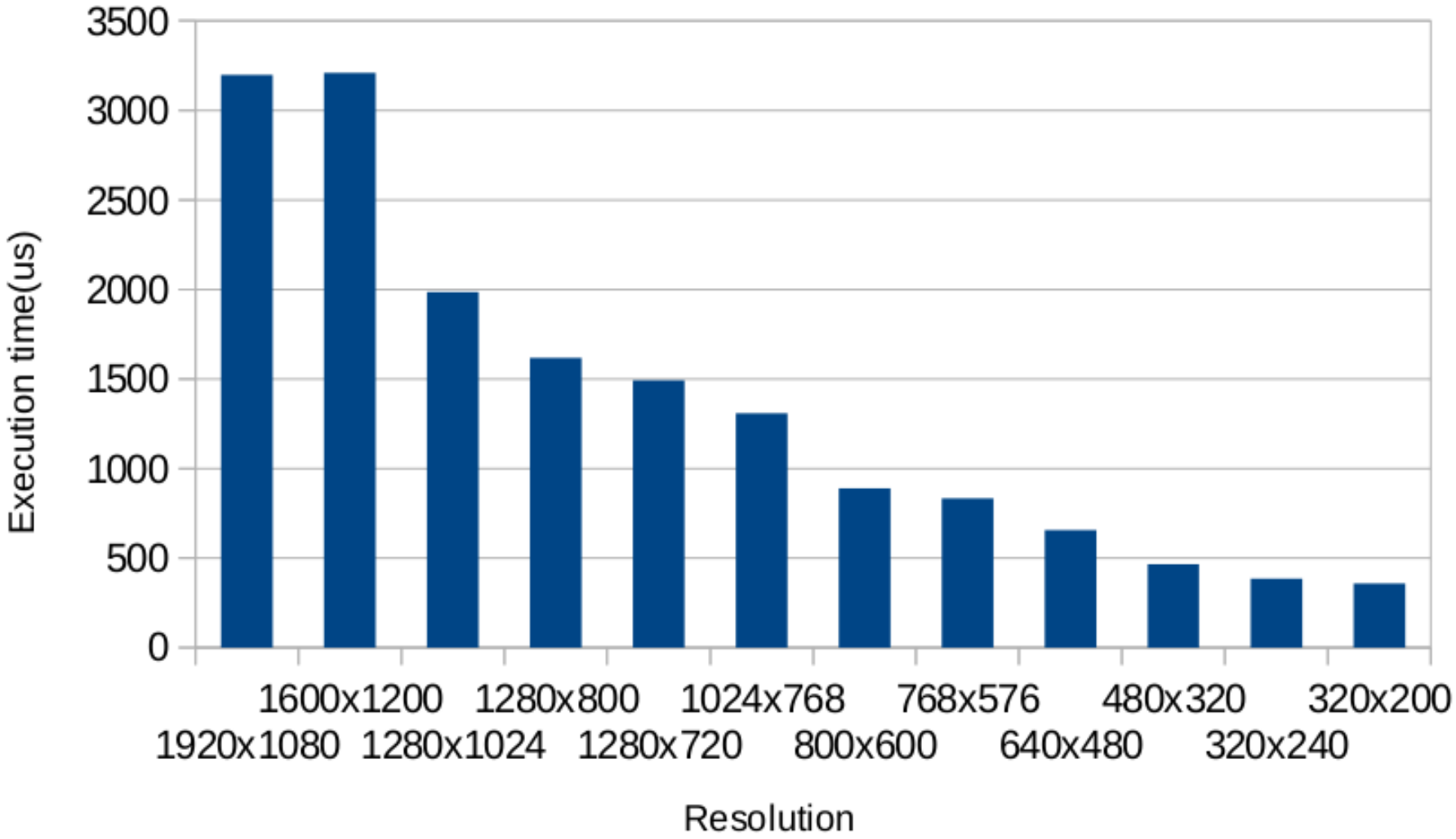
Interpolation experiments

Nearest neighbour
2916 us

Bilinear
2840 us

Bicubic
3242 us

Virtual camera size



Future work

- Adaptive streaming
- Hardware encoding
- HDR
- System replication

Conclusion

- Fully functional system with a replicated demo
- Non-intrusive immersion capabilities
- Real-time performance