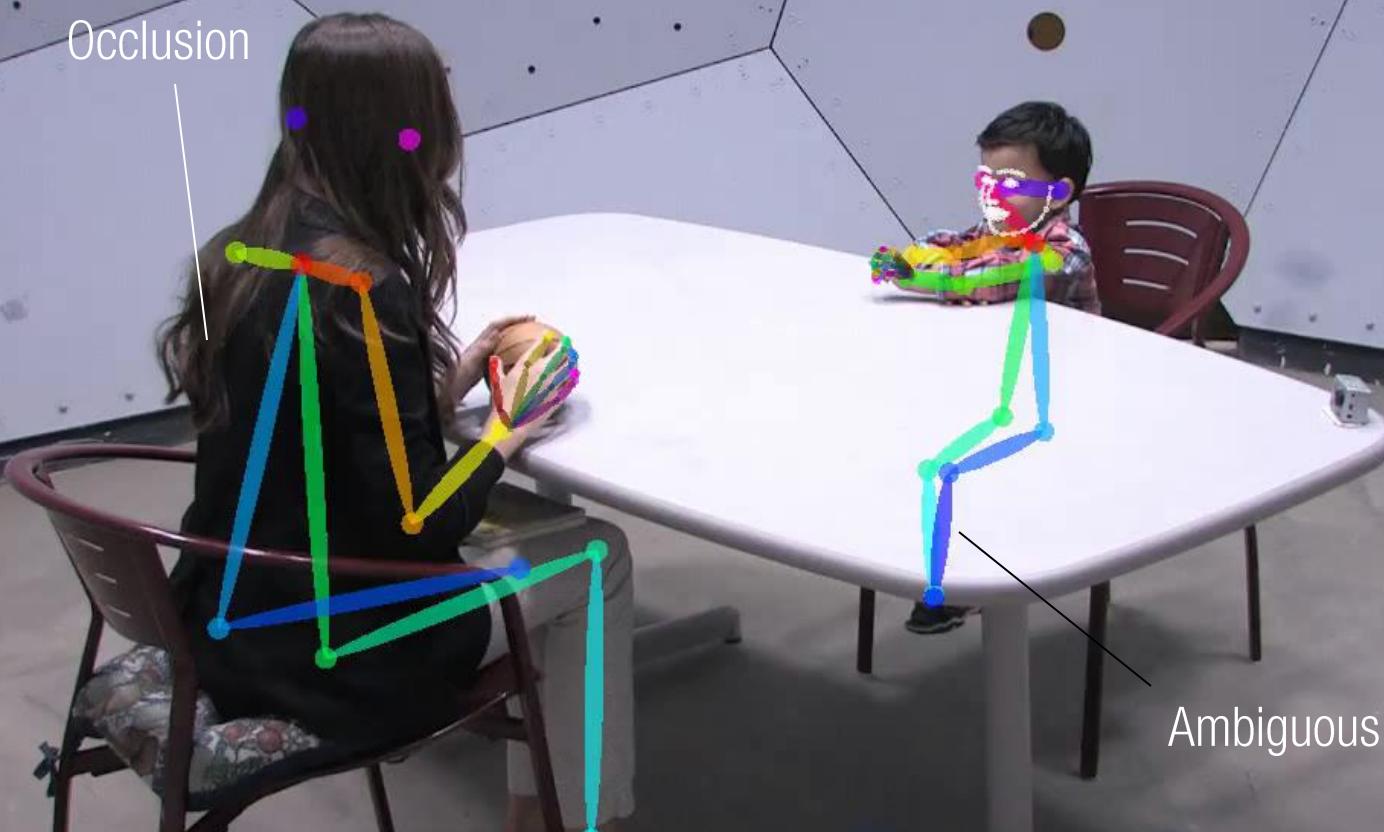


# DIY: A Multiview Camera System

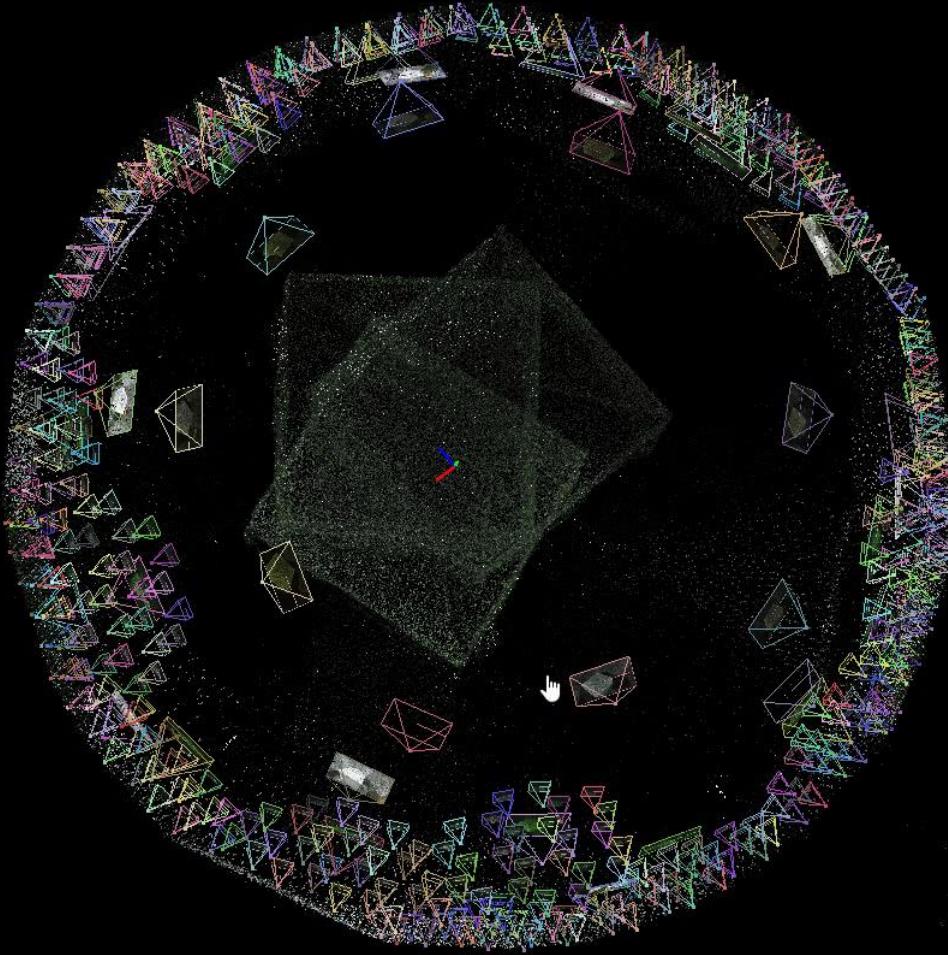
## Fast forward



Occlusion



Ambiguous visual semantics





# Visual Cues from Additional Views



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# Disparity



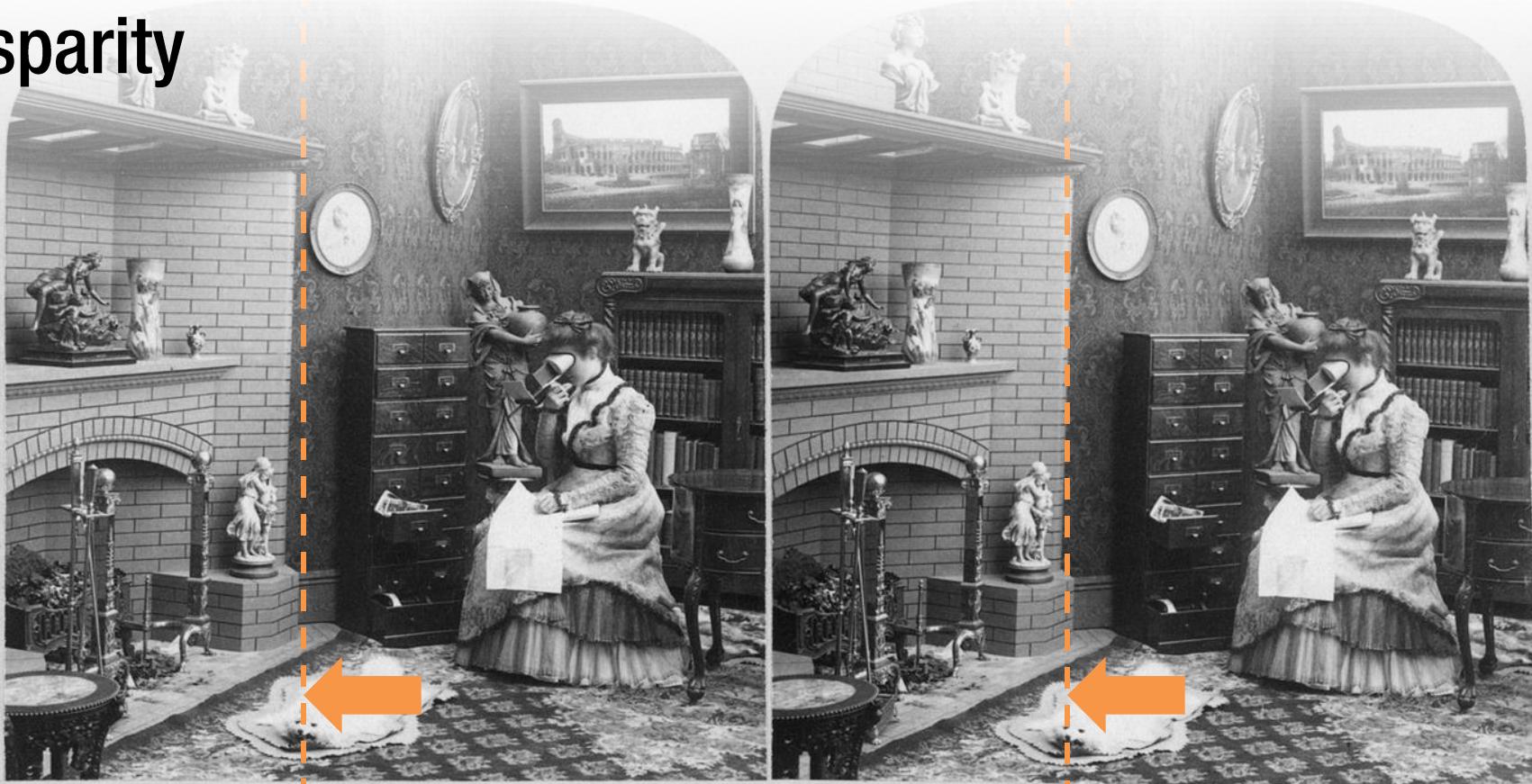
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# Disparity



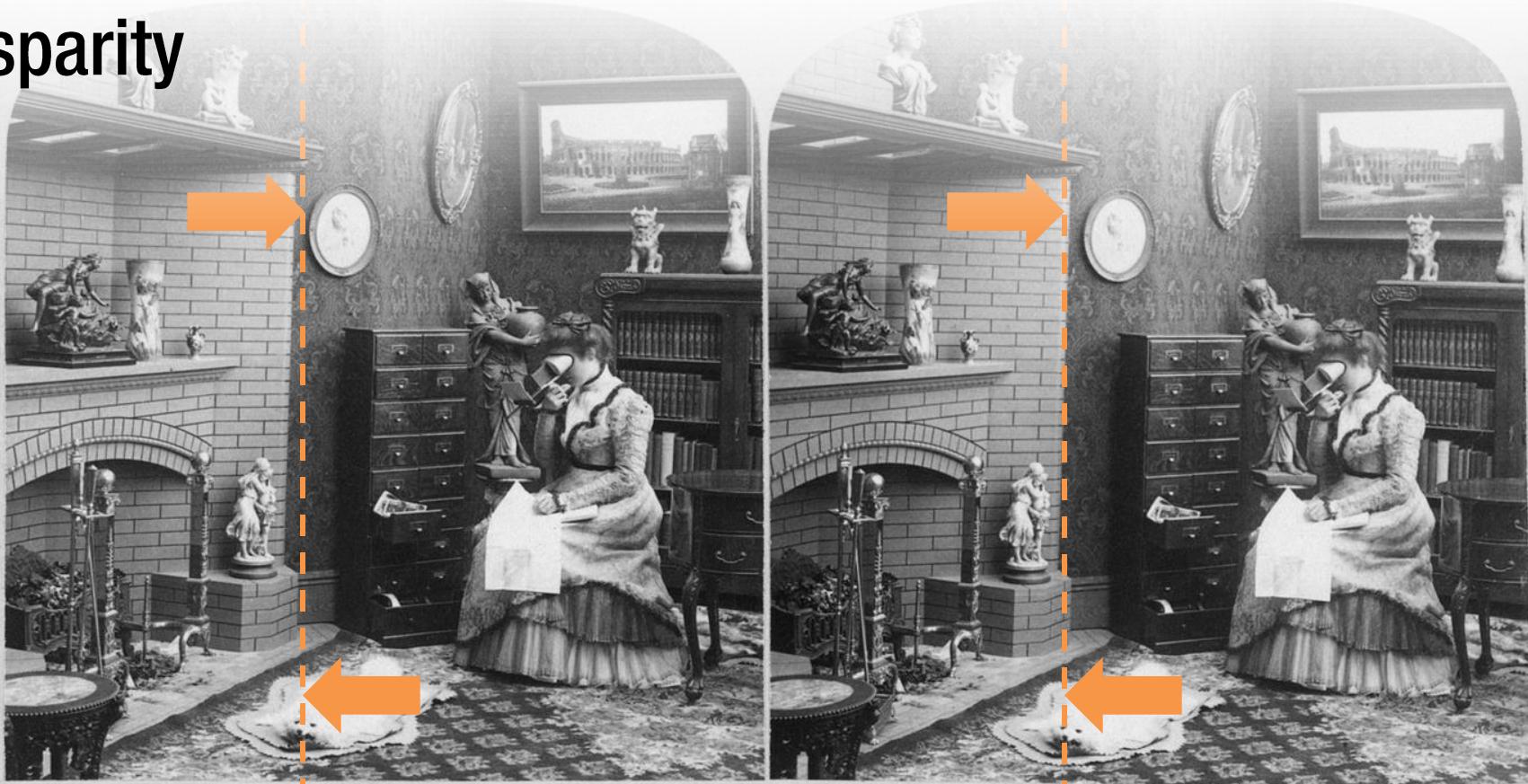
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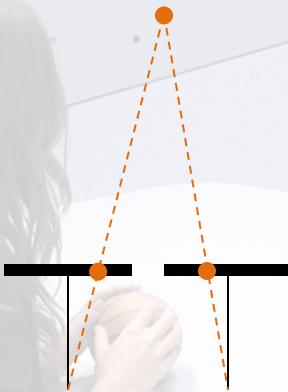
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# Visual Cues from Additional Views



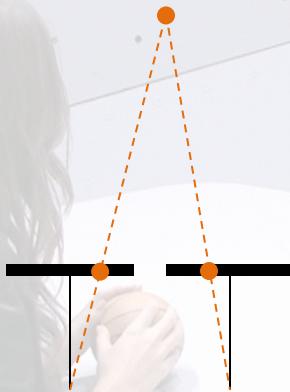
Disparity

# Visual Cues from Additional Views

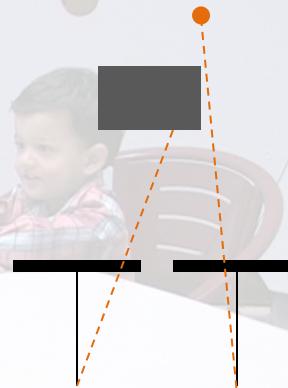


Disparity

# Visual Cues from Additional Views



Disparity



Light field

# Hole Filling



One camera



Two cameras

**Multicamera system is useful.**

No readymade multicamera system.





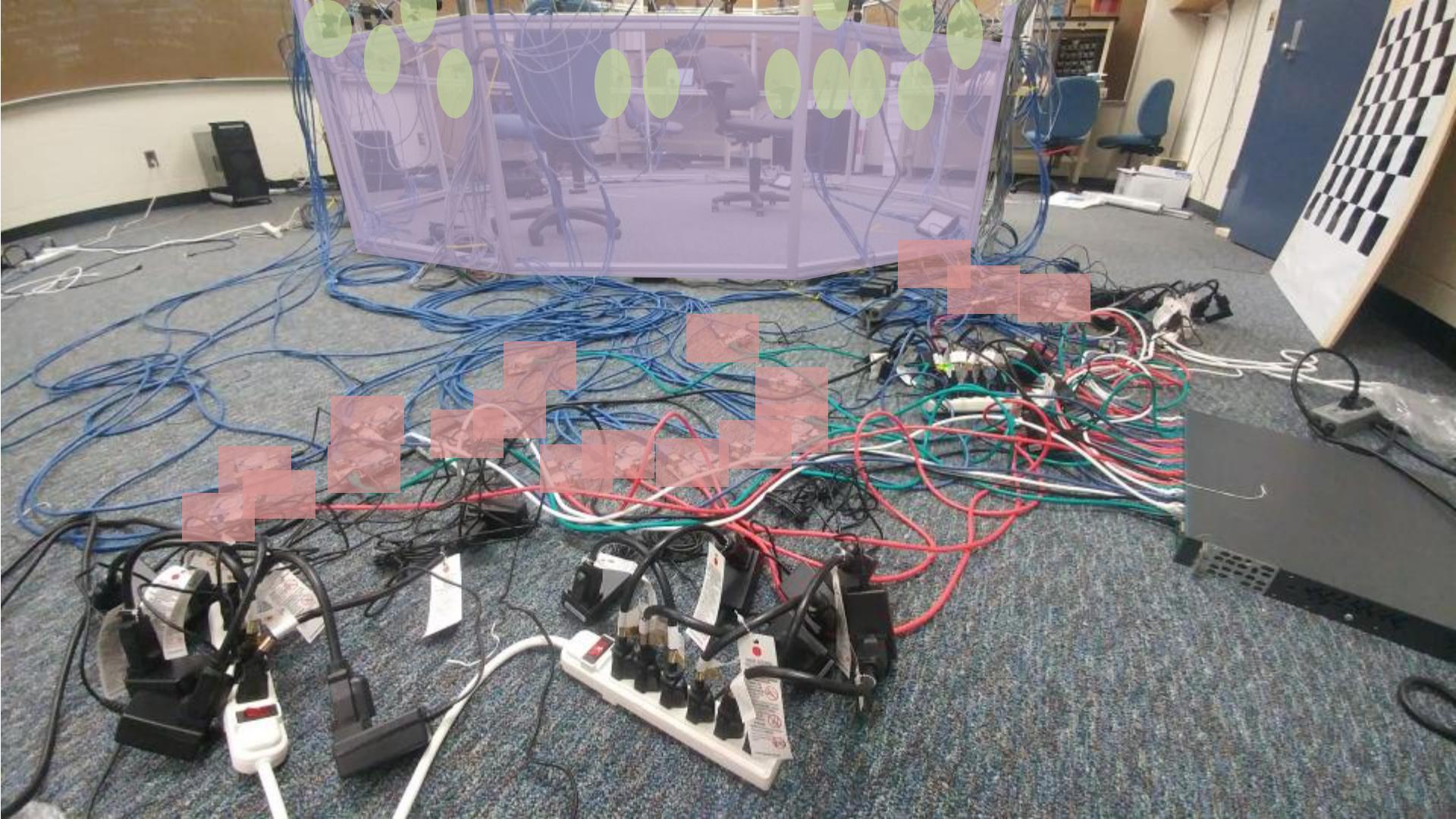
## Multicamera Systems For Motion Analysis Research\*

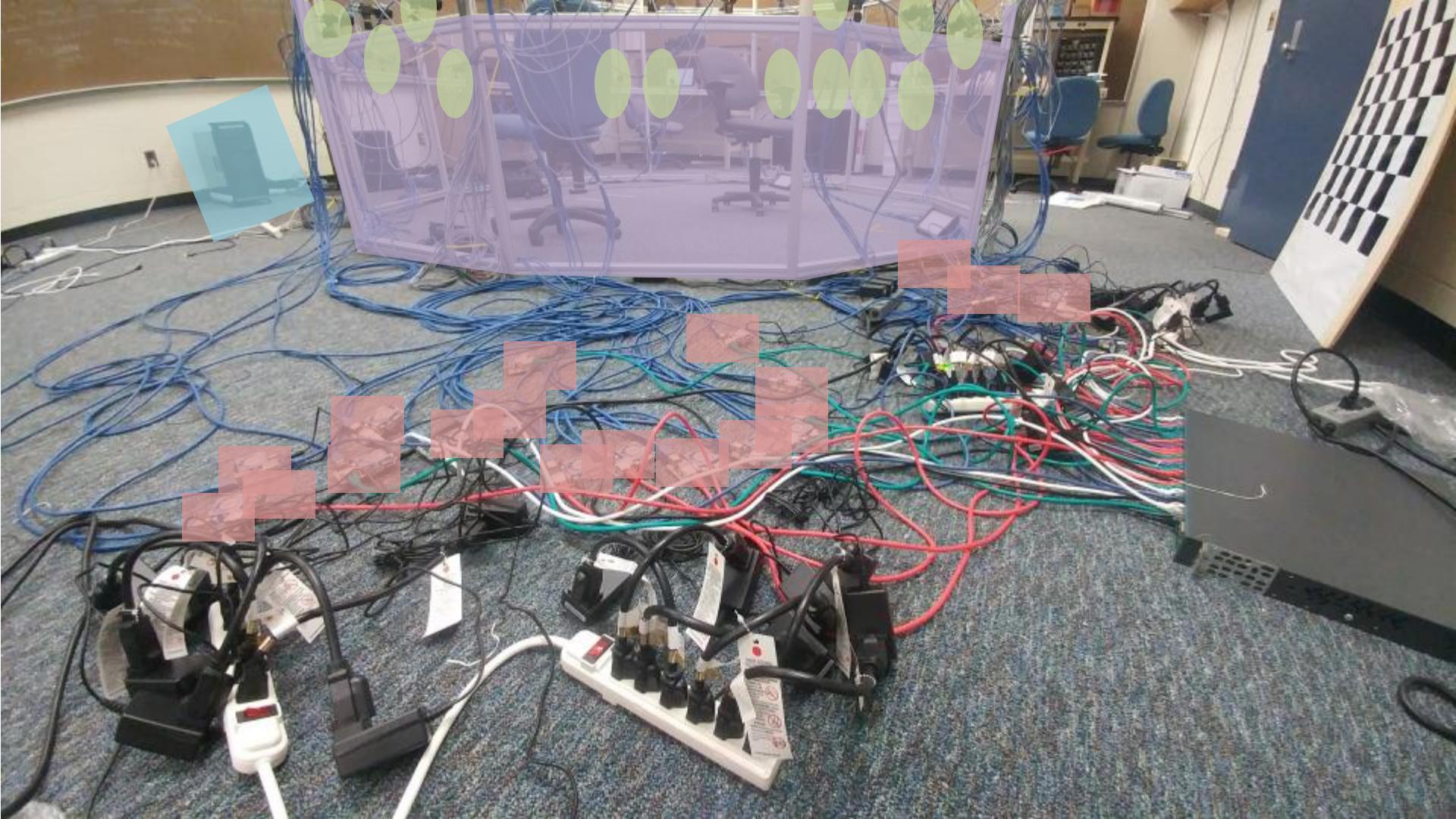
\*The list may be incomplete.

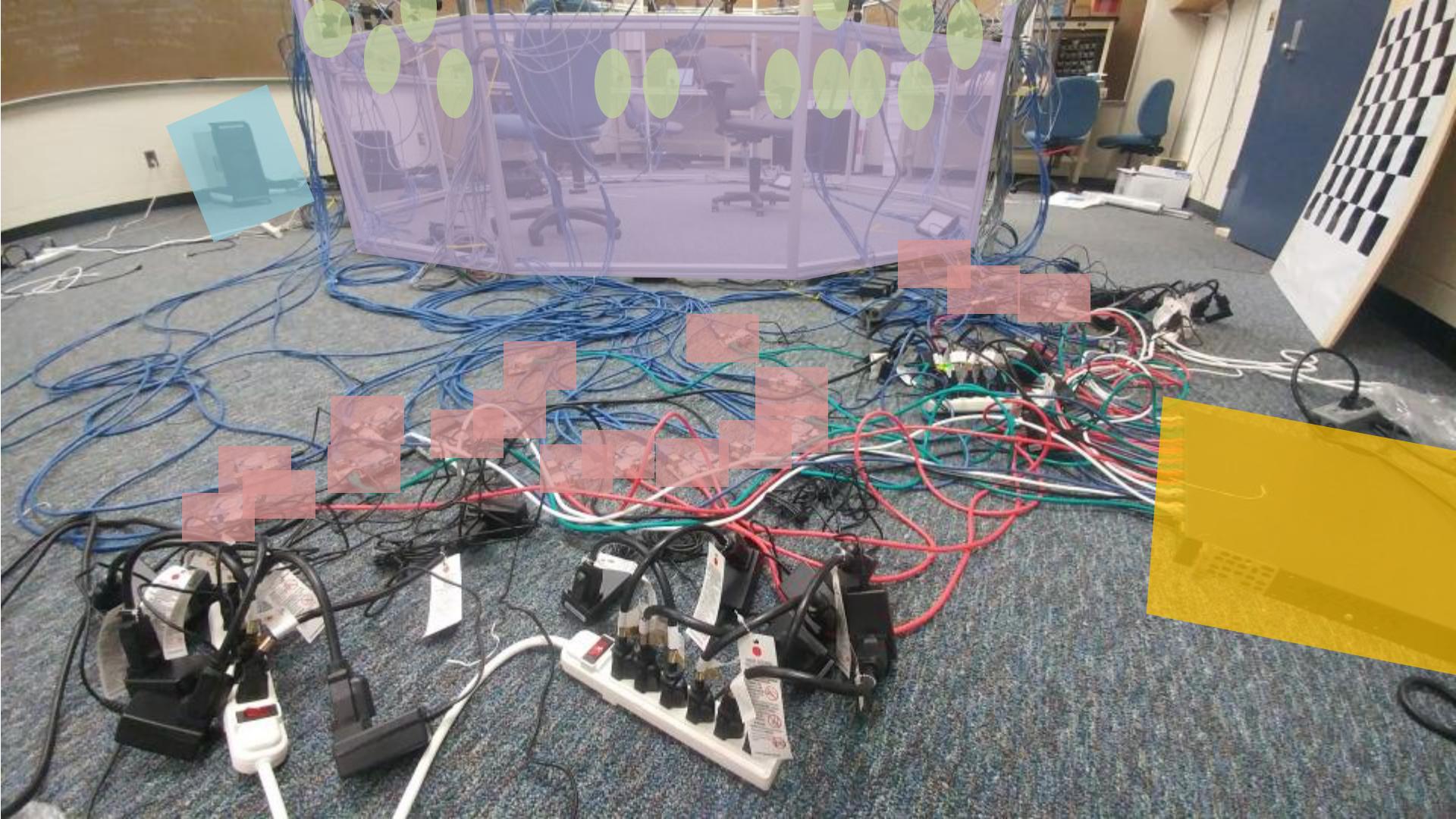




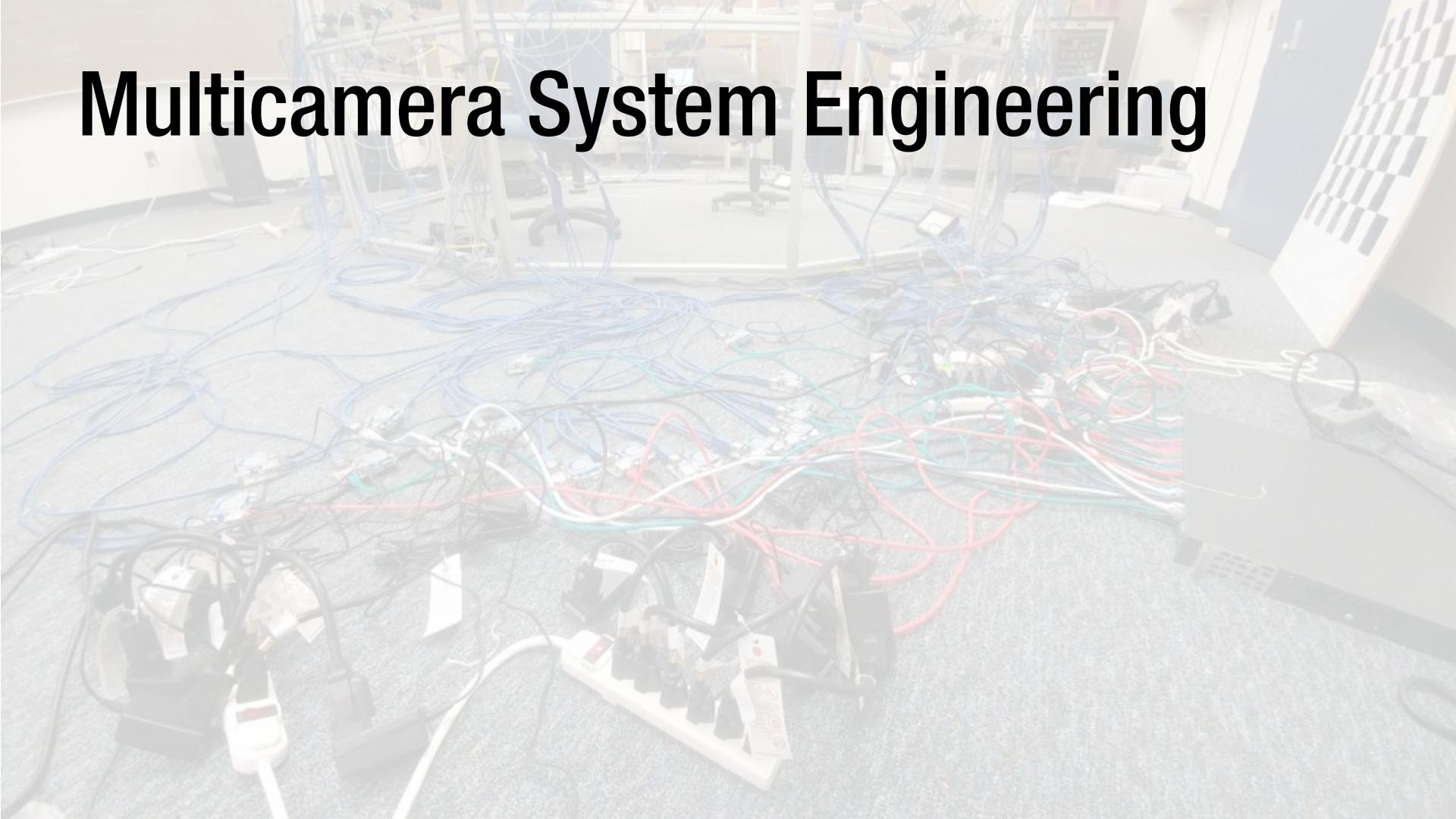








# Multicamera System Engineering

A photograph showing a chaotic tangle of numerous cables in various colors (blue, red, black, white) spread across a carpeted floor. In the background, there are some electronic components, a power strip with multiple outlets, and a checkered racing flag. The scene illustrates the physical complexity and messiness often associated with the engineering of multicamera systems.

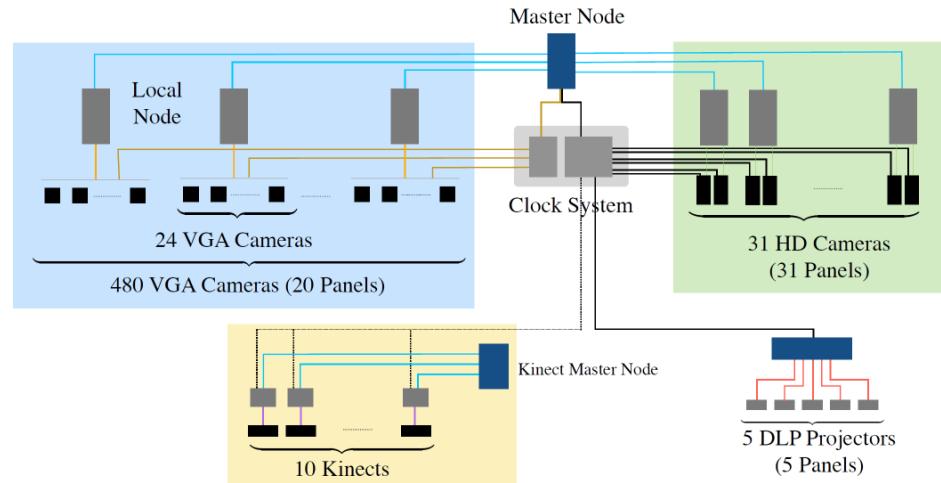
# Multicamera System Engineering

Hardware design



# Multicamera System Engineering

Hardware design  
Camera network architecture

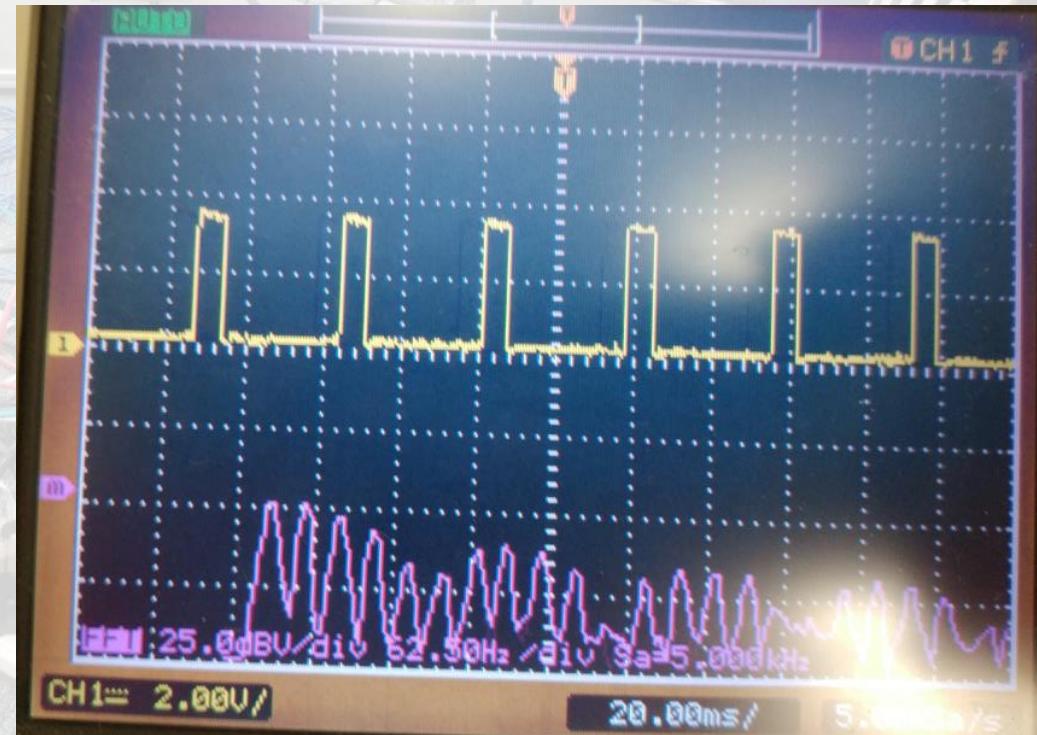


# Multicamera System Engineering

Hardware design

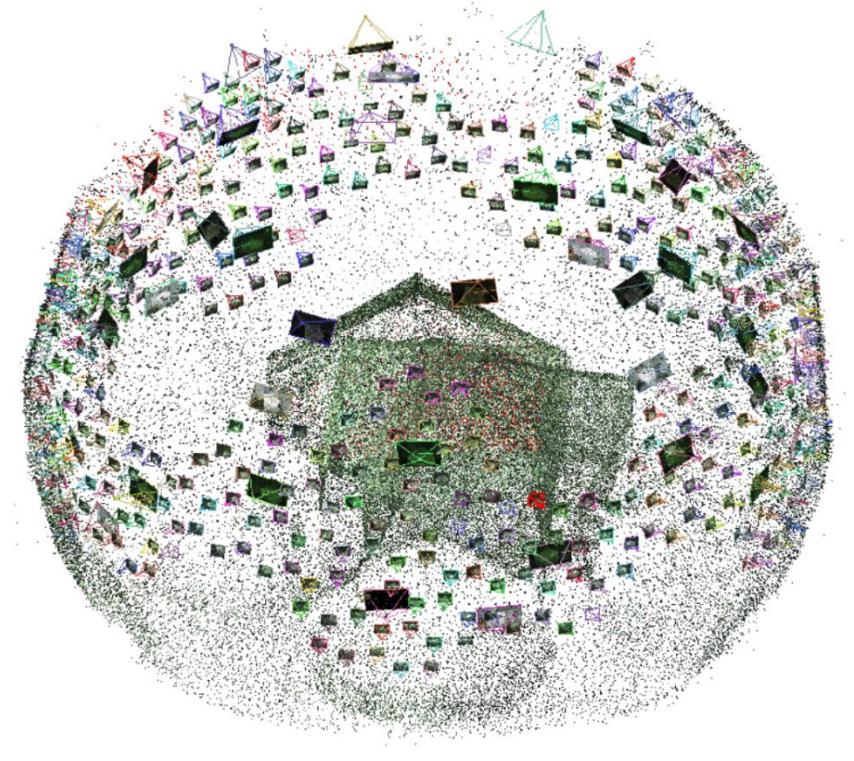
Camera network architecture

Camera synchronization



# Multicamera System Engineering

Hardware design  
Camera network architecture  
Camera synchronization  
Camera calibration



# Multicamera System Engineering

Hardware design  
Camera network architecture  
Camera synchronization  
Camera calibration  
Distributed computing / storage



# Multicamera System Engineering

Hardware design

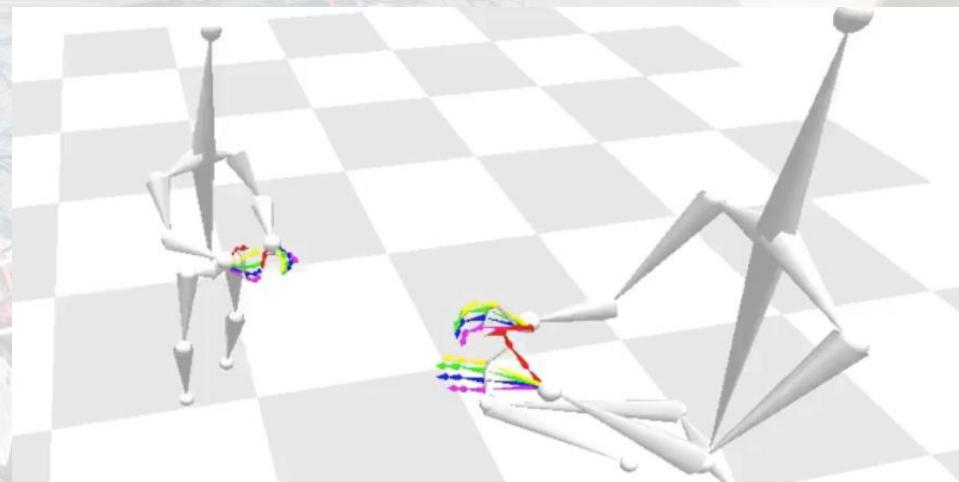
Camera network architecture

Camera synchronization

Camera calibration

Distributed computing / storage

Model representation



# Multicamera System Engineering

Hardware design

Camera network architecture

Camera synchronization

Camera calibration

Distributed computing / storage

Model representation

Realtime motion capture



# Multicamera System Engineering

Hardware design

Camera network architecture

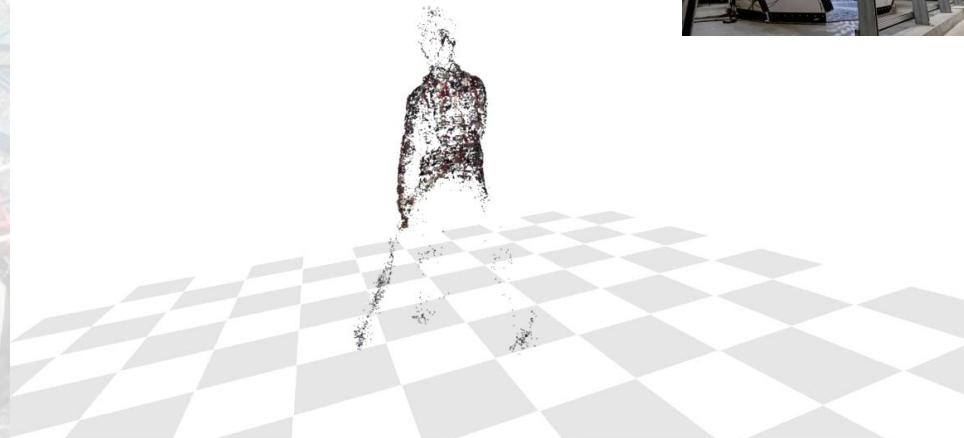
Camera synchronization

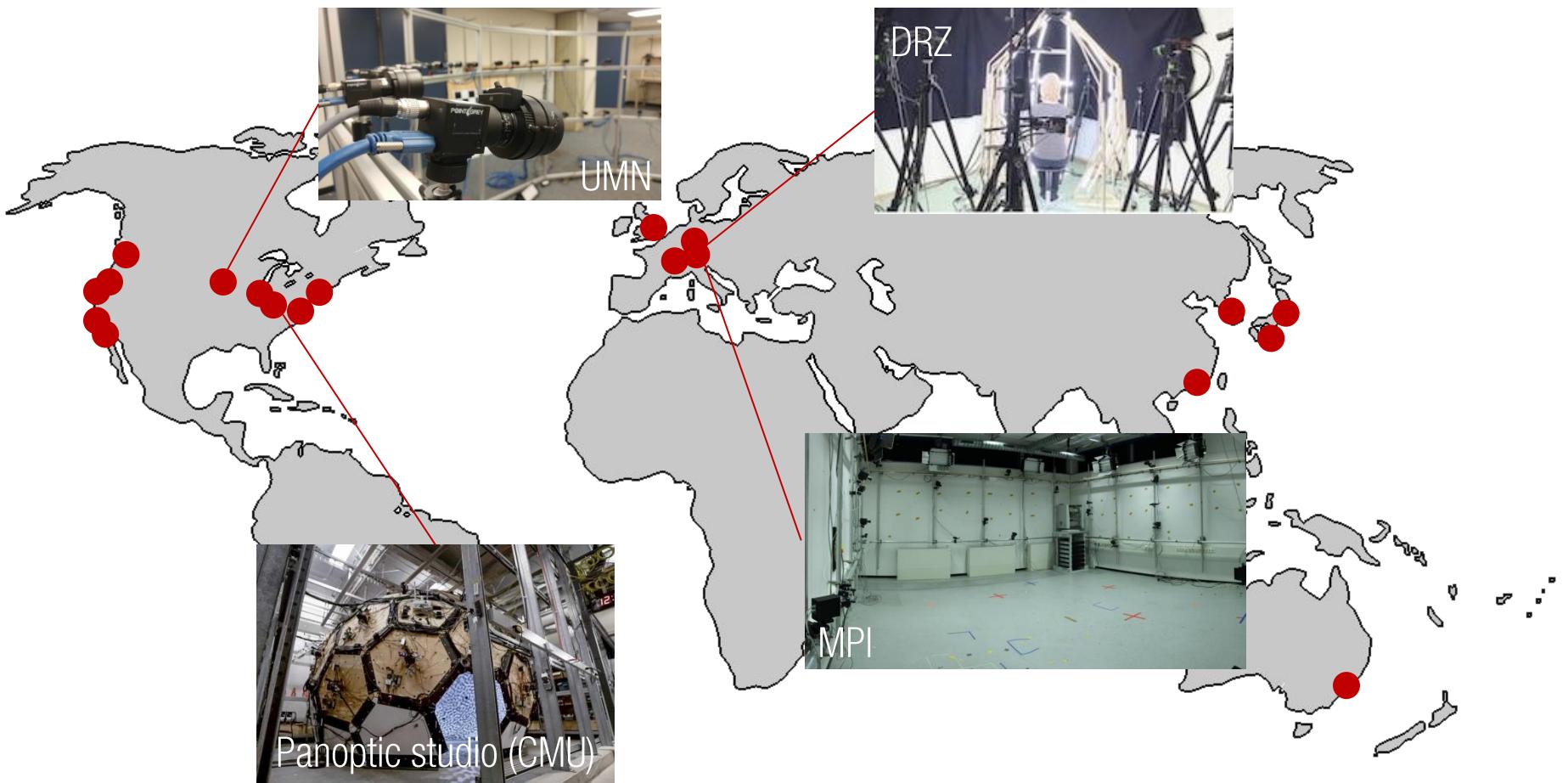
Camera calibration

Distributed computing / storage

Model representation

Realtime motion capture





# Multicamera Systems For Motion Analysis Research\*

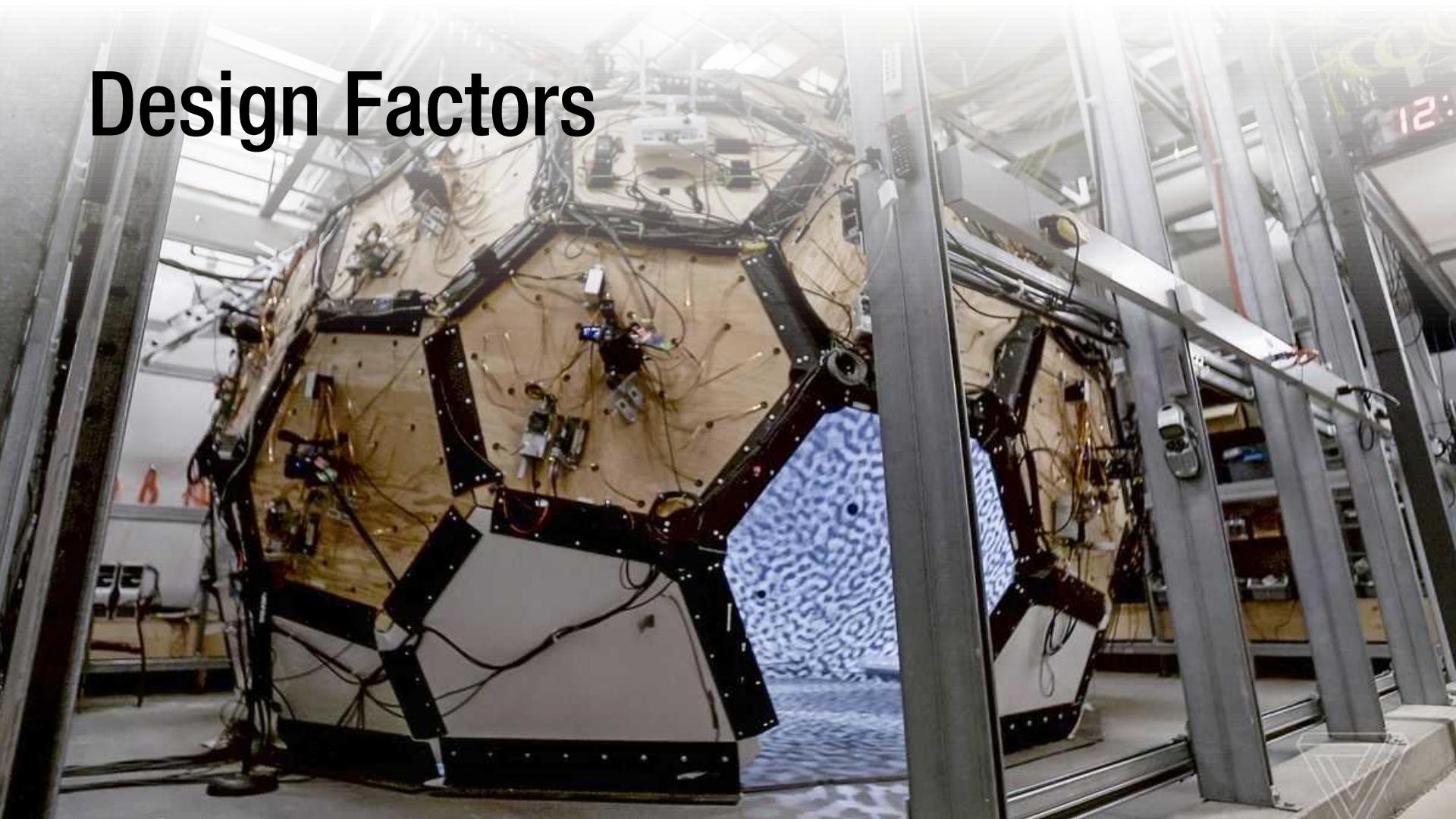
\*The list may be incomplete.

# Tutorial goal:

To provide an engineering manual for

1. building a customized multicamera system
2. developing a computational representation
3. leveraging an existing dataset/models

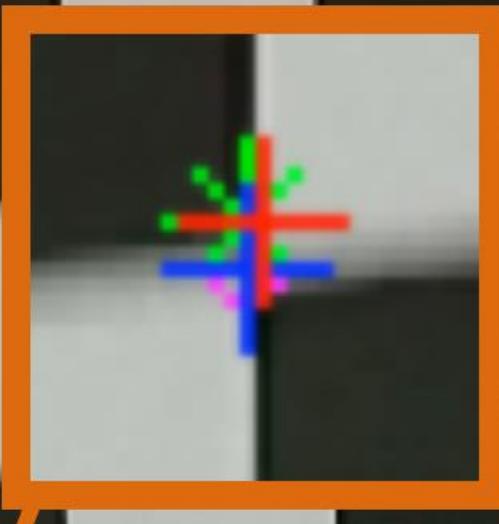
# Design Factors



# Design Factors



Precision



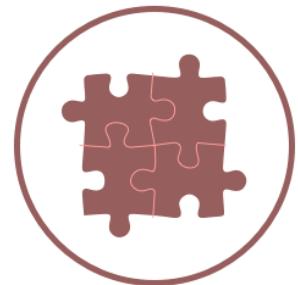
# Design Factors

Kinect v2 (10)

VGA (480)

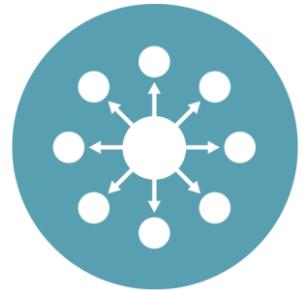
Diversity

HD (31)



# Design Factors

6.37e+9 pixel/sec

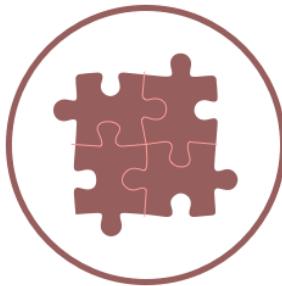


Scalability

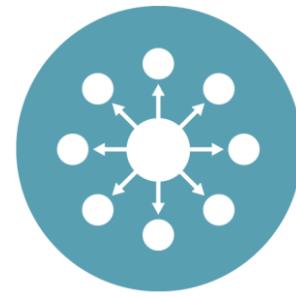
# Design Factors



Precision

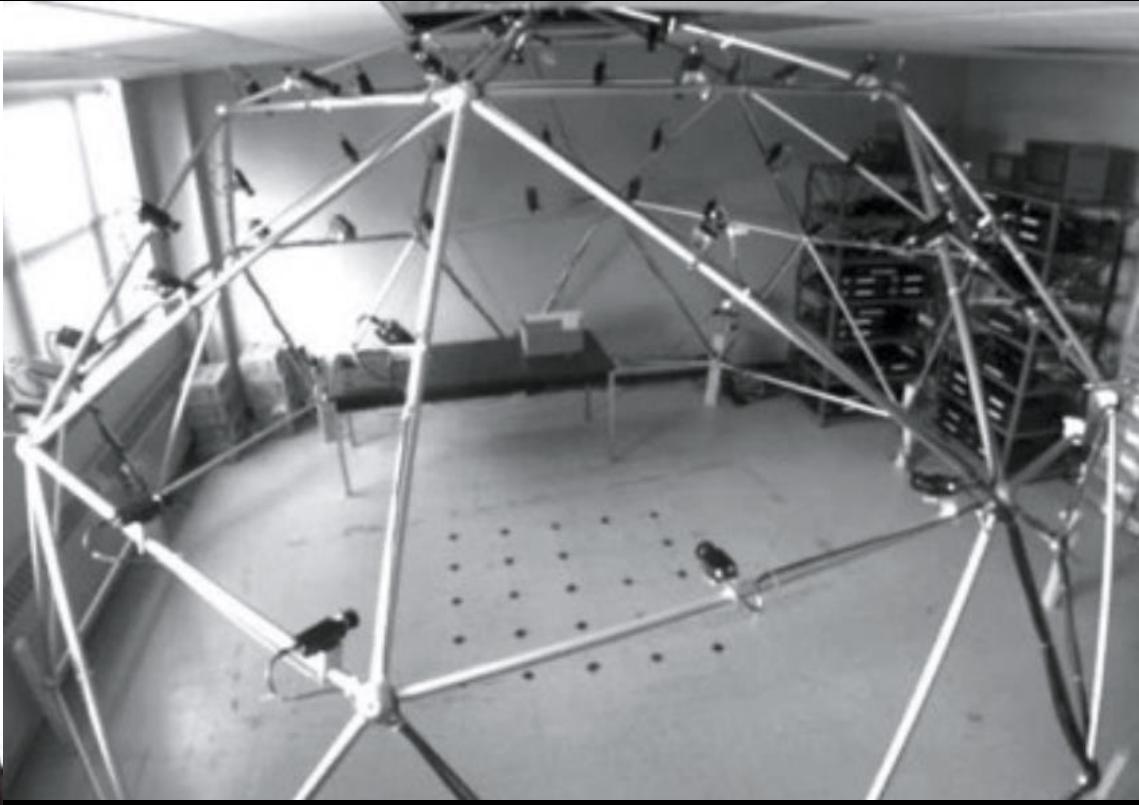


Diversity



Scalability

# Invited Speakers



**Takeo Kanade (CMU)**  
*Many Camera Systems: How they started*



**Christian Theobalt** (MPI Informatik)  
*New Methods for Marker-less Motion and Performance  
Capture and the Multi-Camera Studio Behind*

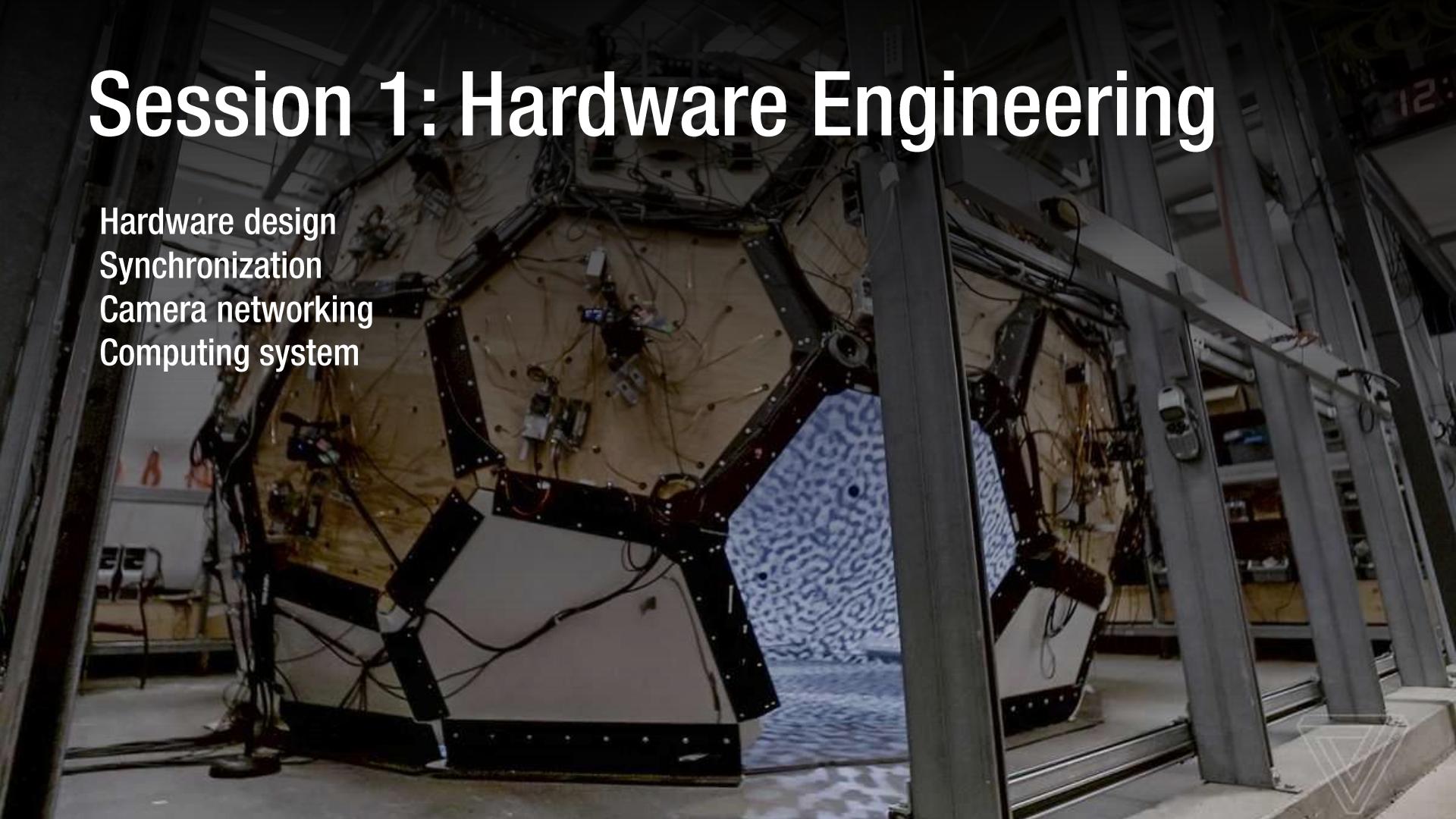


© Disney

**Thabo Beeler and Derek Bradley** (Disney Research Zurich)  
*Multi-view Capture for High Resolution Digital Humans*

# Session 1: Hardware Engineering

Hardware design  
Synchronization  
Camera networking  
Computing system



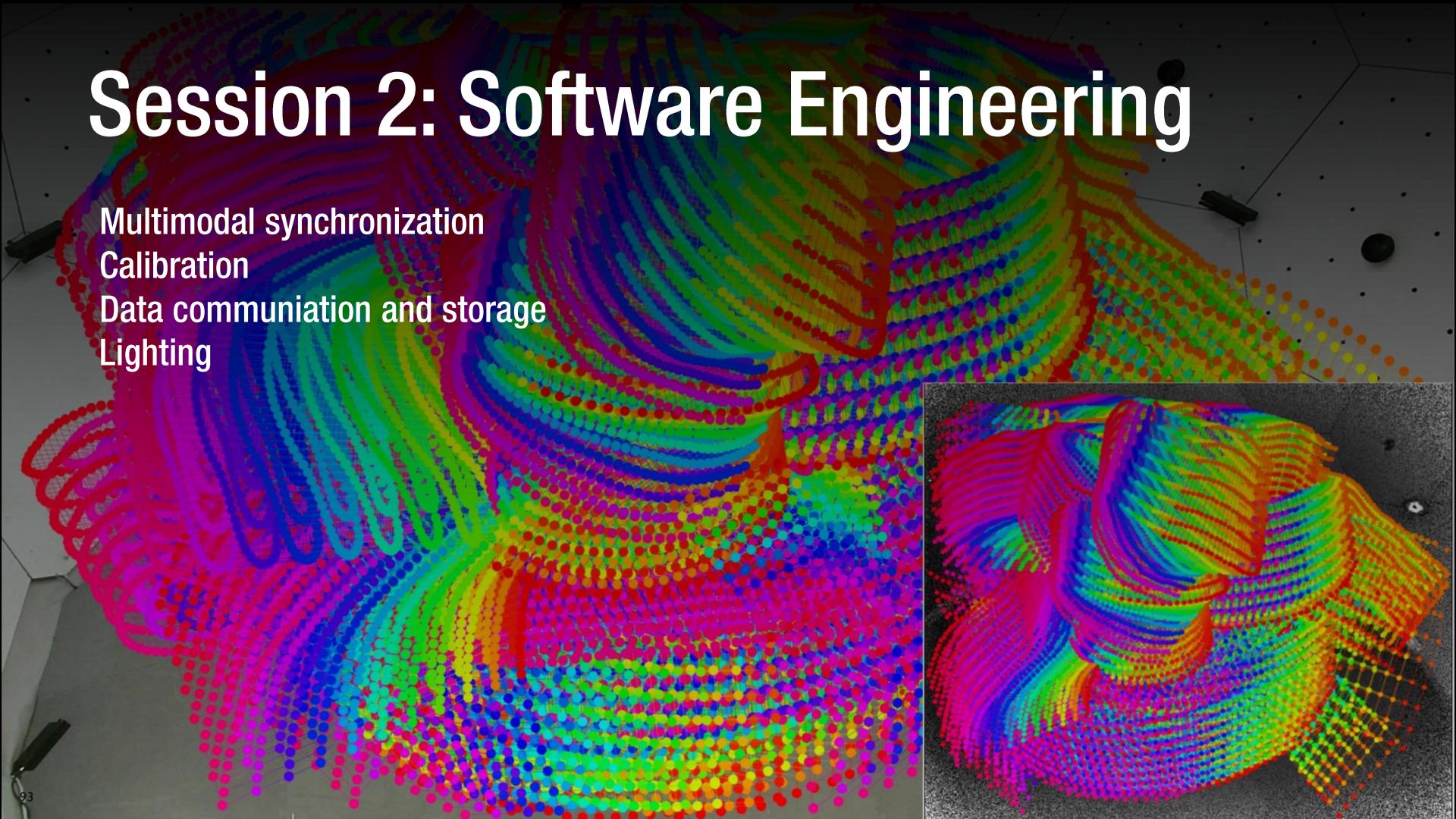
# Session 2: Software Engineering

Multimodal synchronization

Calibration

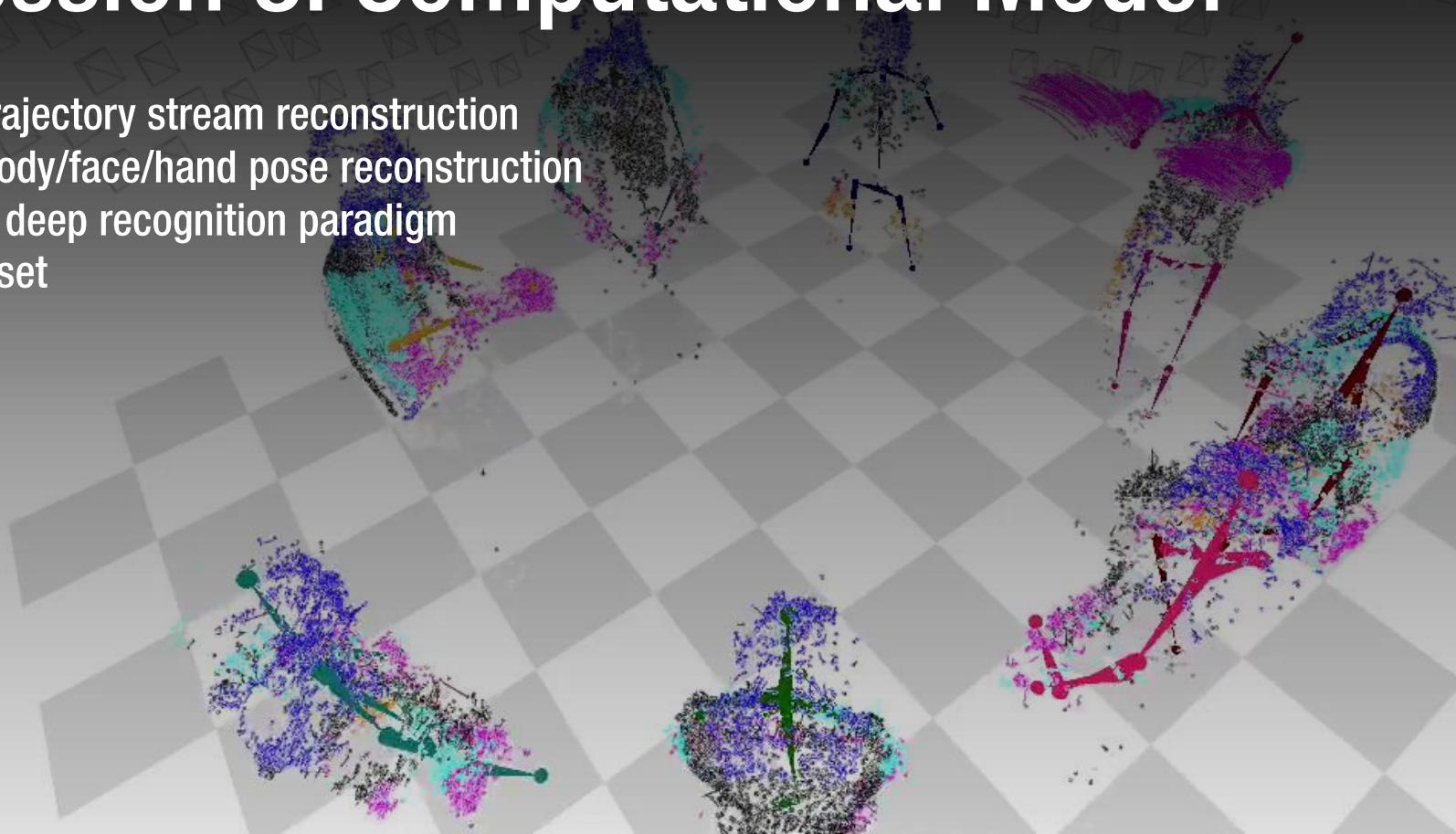
Data communication and storage

Lighting



# Session 3: Computational Model

3D trajectory stream reconstruction  
3D body/face/hand pose reconstruction  
New deep recognition paradigm  
Dataset



# Session 4: DIY Multicamera and Demo

Design optimization

Cost

System integration

Opensource software

Realtime markerless motion capture system

