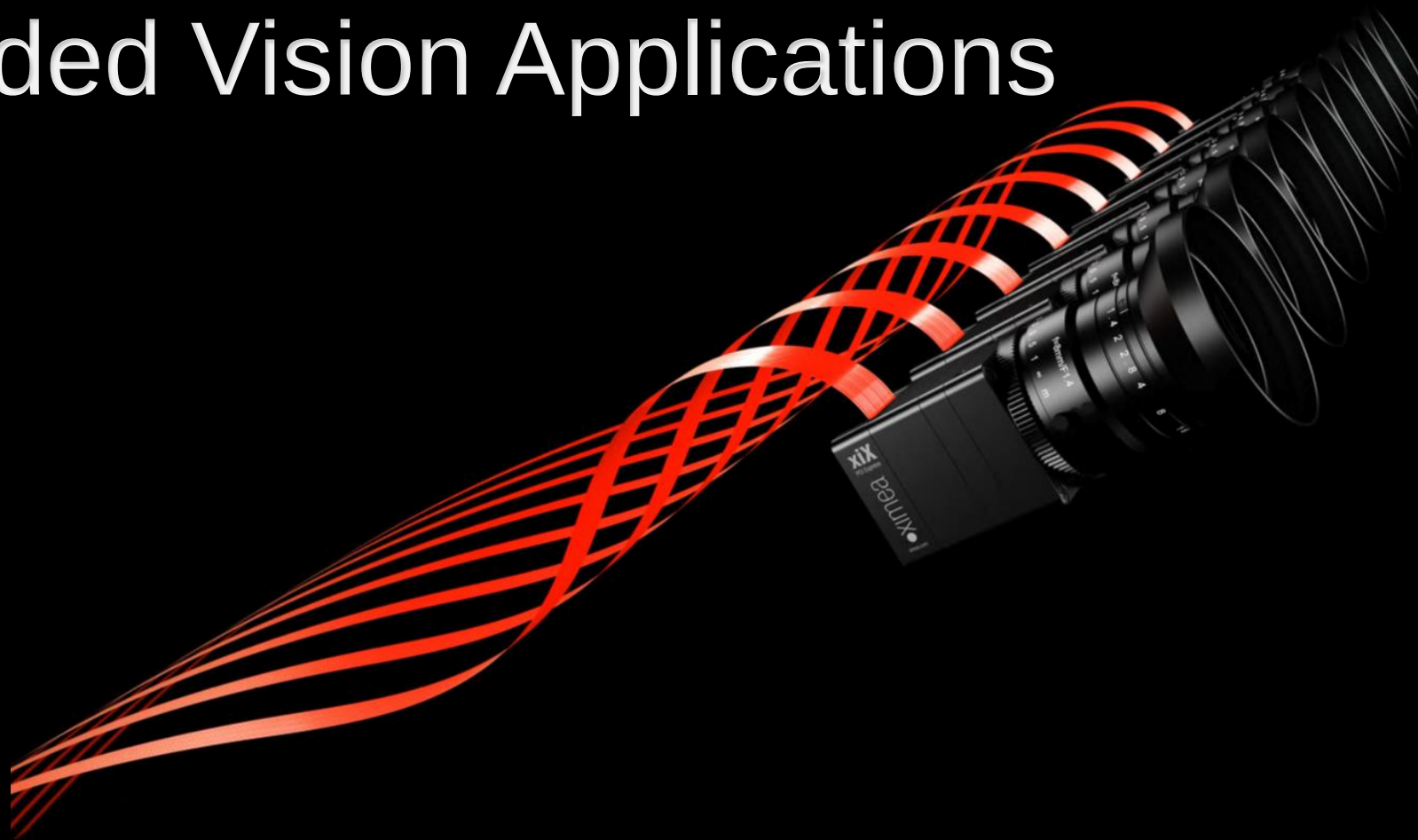


# Multi-camera Systems And Embedded Vision Applications



Max Larin  
CEO XIMEA



- Definition
- Applications
- Configurations
- Considerations
- Solutions based on xiFLY and PCIe

## Definition

- Multi Camera Systems are systems having more than one camera
  - ... but
- Can include any mix of camera resolutions, fps, spectral sensitivity, triggering, etc.
  - ... and each camera can be addressed and configured individually

- Medical Imaging

- Applications

- Mapping/Surveying

- Motion Tracking Systems

- Immersive Technologies

- Cinematography

- Machine Vision

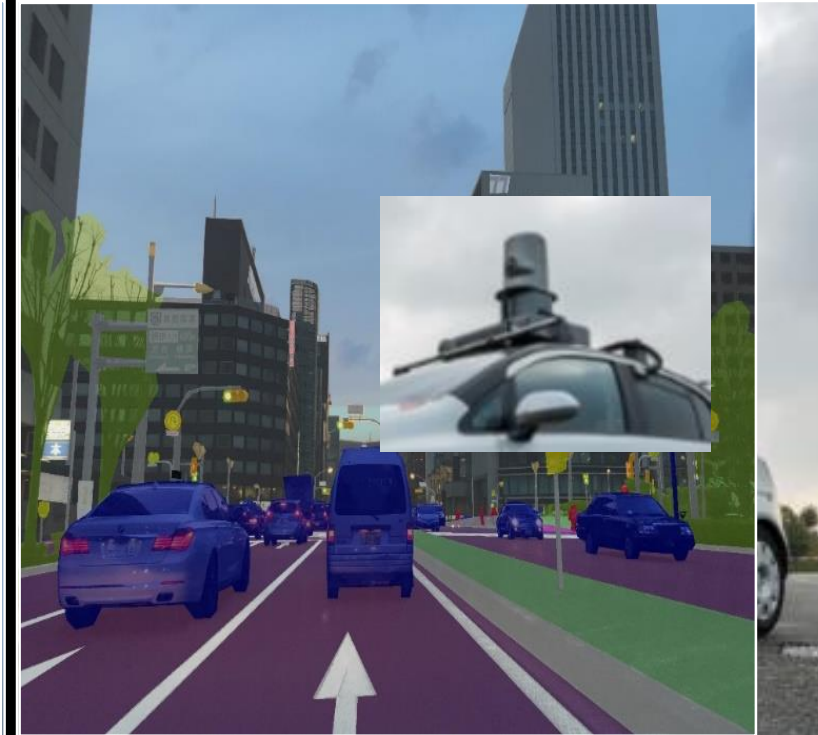
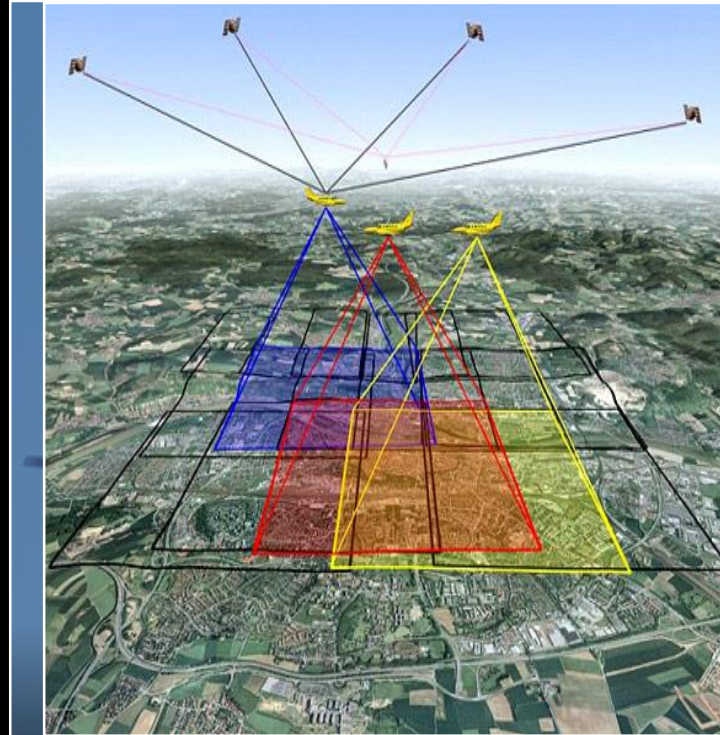
- 3D Scanning, Photogrammetry



# Multi-camera Applications and Systems Architecture

## Applications

- Medical Imaging
- Mapping/Surveying
- Motion Tracking Systems
- Immersive Technologies
- Cinematography
- Machine Vision
- 3D Scanning, Photogrammetry

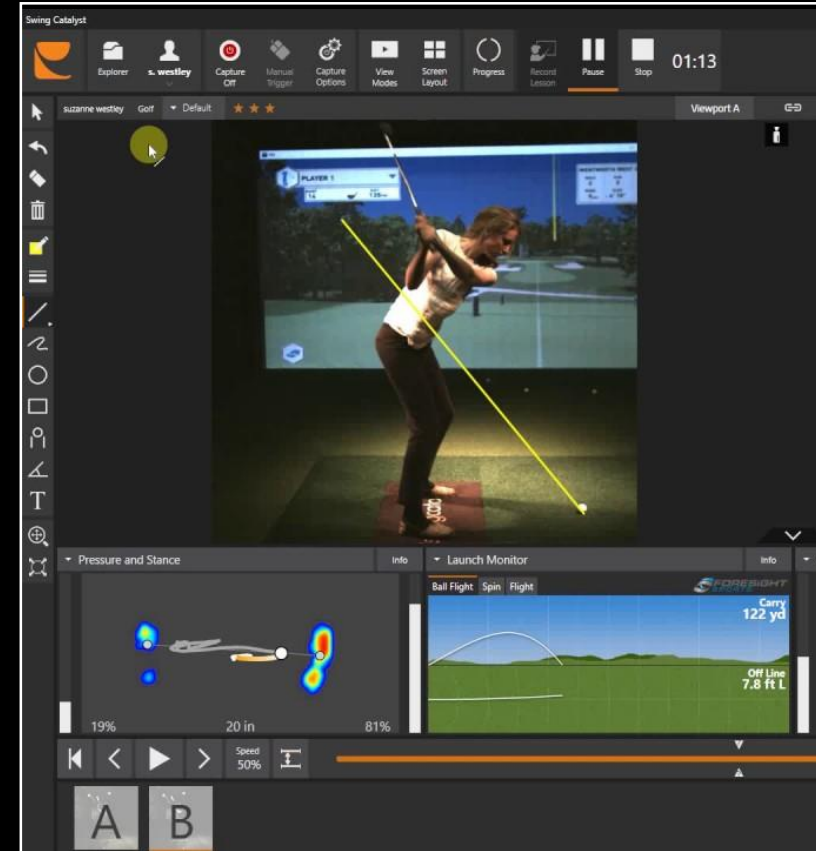




# Multi-camera Applications and Systems Architecture

## Applications

- Medical Imaging
- Mapping/Surveying
- **Motion Tracking System**
- Immersive Technologies
- Cinematography
- Machine Vision
- 3D Scanning, Photogrammetry



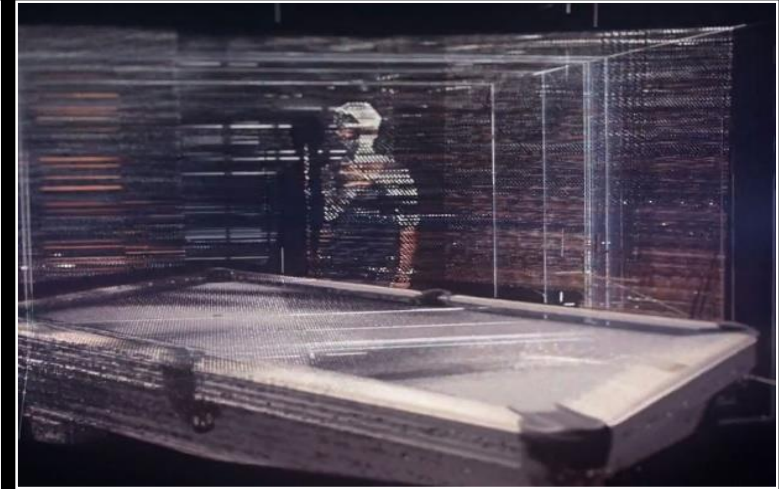
- Medical Imaging
- Mapping/Surveying
- Motion Tracking Systems
- **Immersive Technologies**
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# Multi-camera Applications and Systems Architecture

## Applications

- Medical Imaging
- Mapping/Surveying
- Motion Tracking Systems
- Immersive Technologies
- Cinematography
- Machine Vision
- 3D Scanning, Photogrammetry

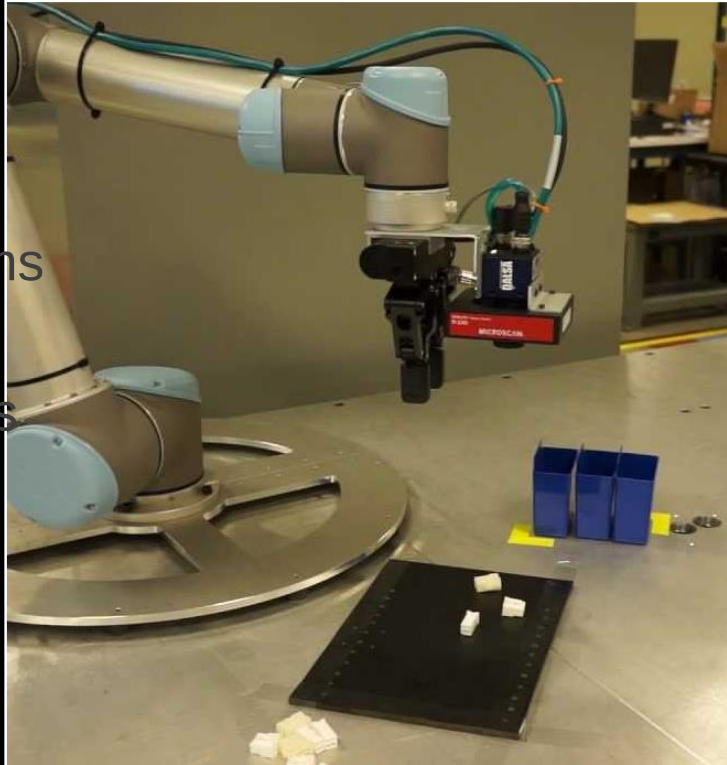




# Multi-camera Applications and Systems Architecture

## Applications

- Medical Imaging
- Mapping/Surveying
- Motion Tracking Systems
- Immersive Technologies
- Cinematography
- **Machine Vision**
- 3D Scanning, Photogrammetry



- Medical Imaging
- Mapping/Surveying
- Motion Tracking Systems
- Immersive Technologies
- Cinematography
- Machine Vision
- 3D Scanning, Photogrammetry



- Inside Out
- Outside In
- Array
- Clustered

- Inside Out
- Outside In
- Array
- Clustered

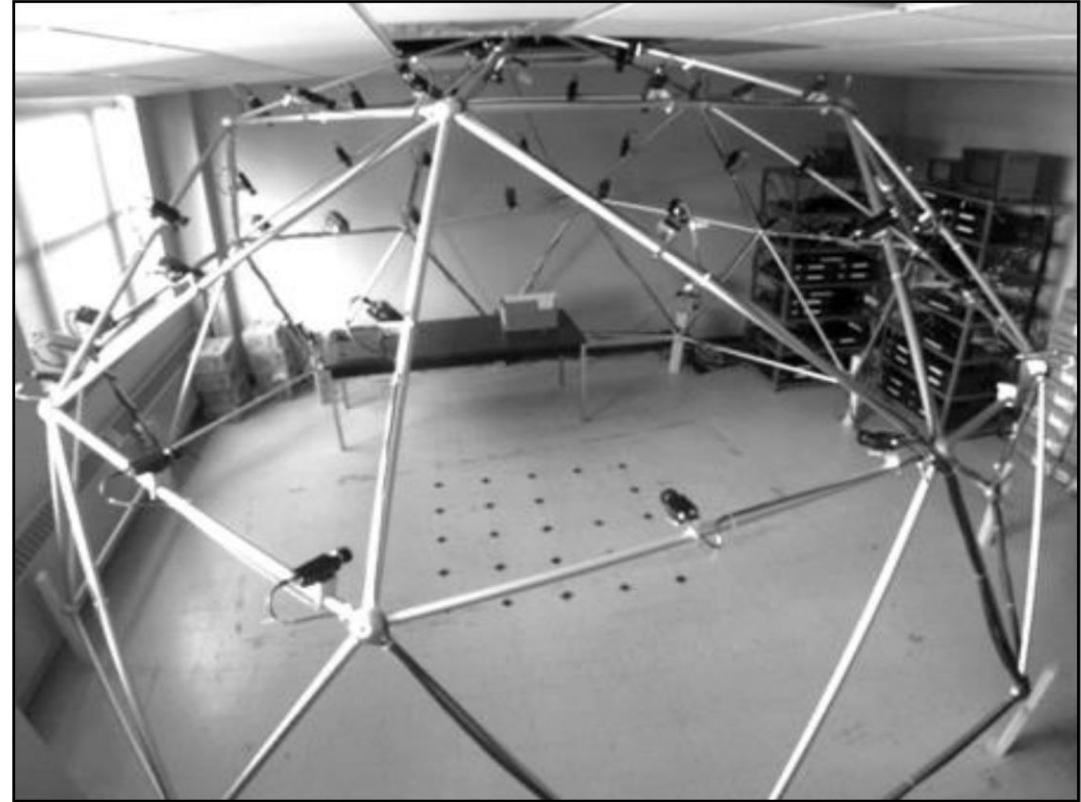




- Inside Out
- **Outside In**
- Array
- Clustered

## 3D Dome (with 51 Cameras) – Analog system, circa 1995

**51 analog  
cameras:  
Synchronized  
and time-stamped  
Recorded on VHS  
video tapes  
Digitized later  
one by one**

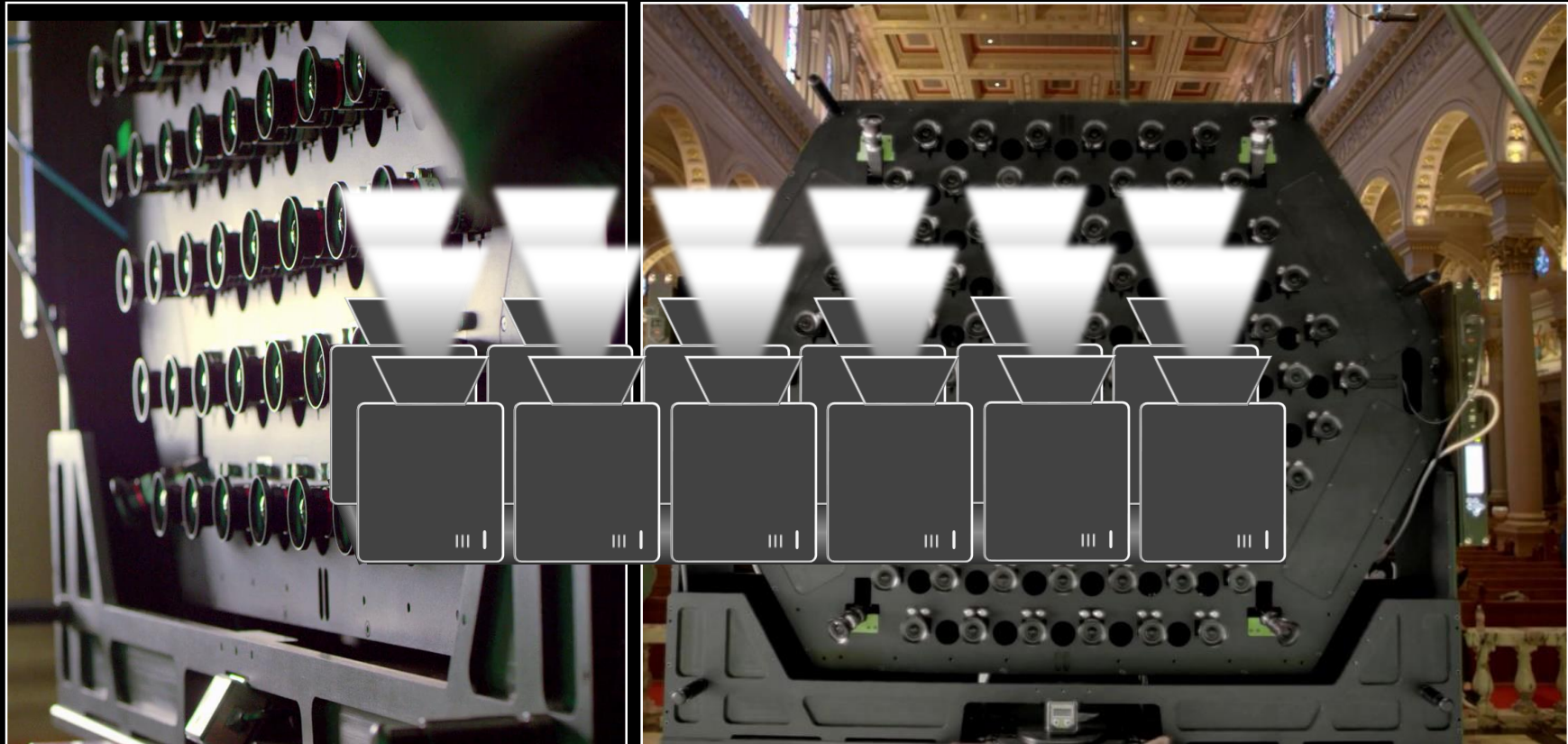


**Carnegie Mellon**

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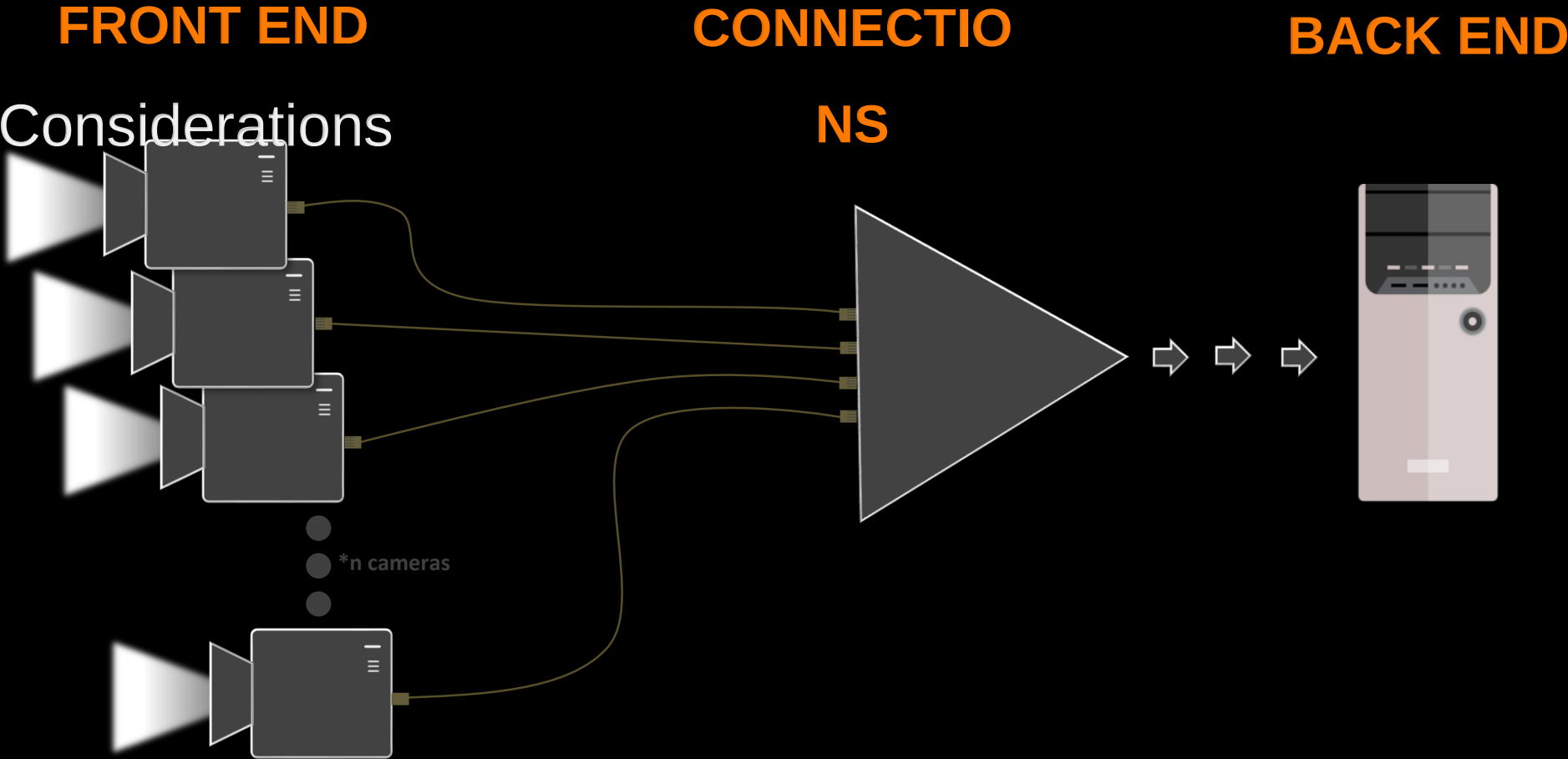
# Multi-camera Applications and Systems Architecture Configurations

- Inside Out
- Outside In
- **Array**
- Clustered

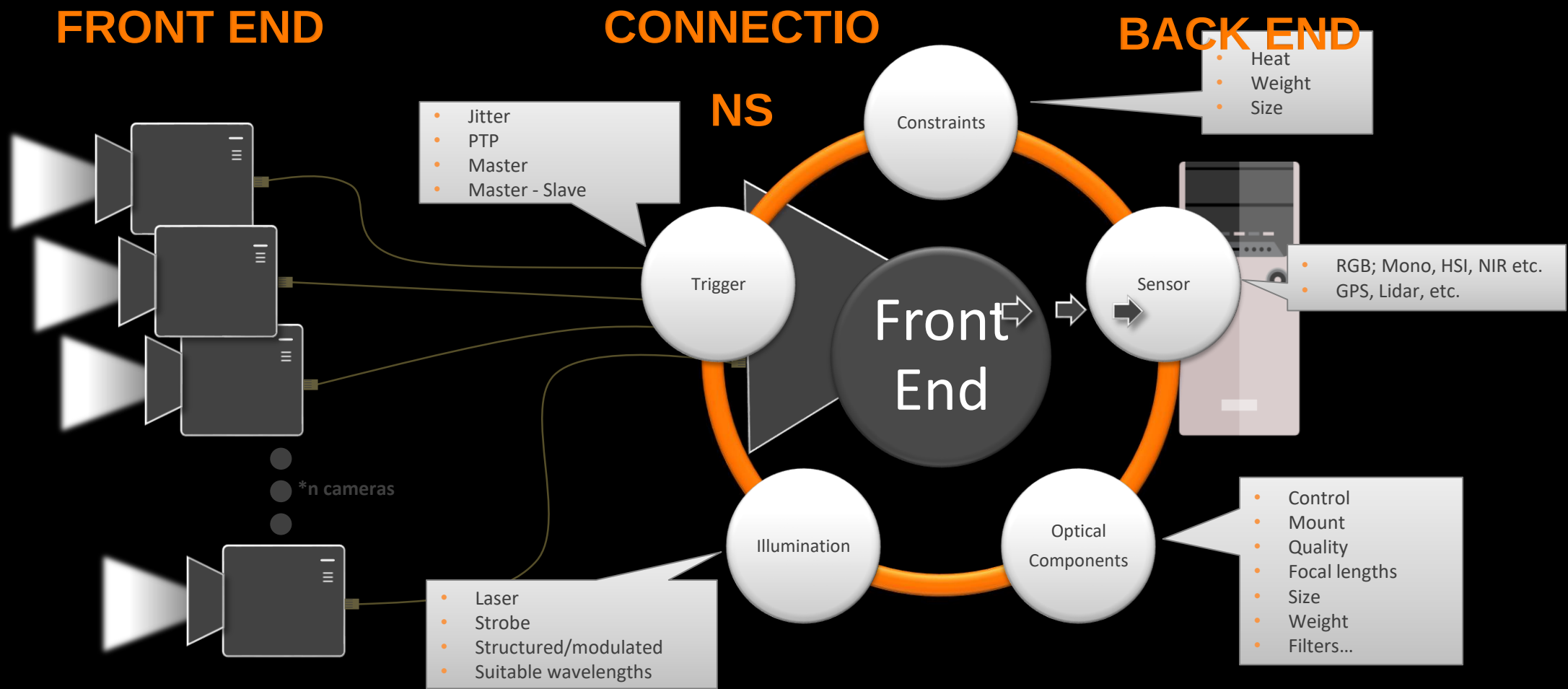


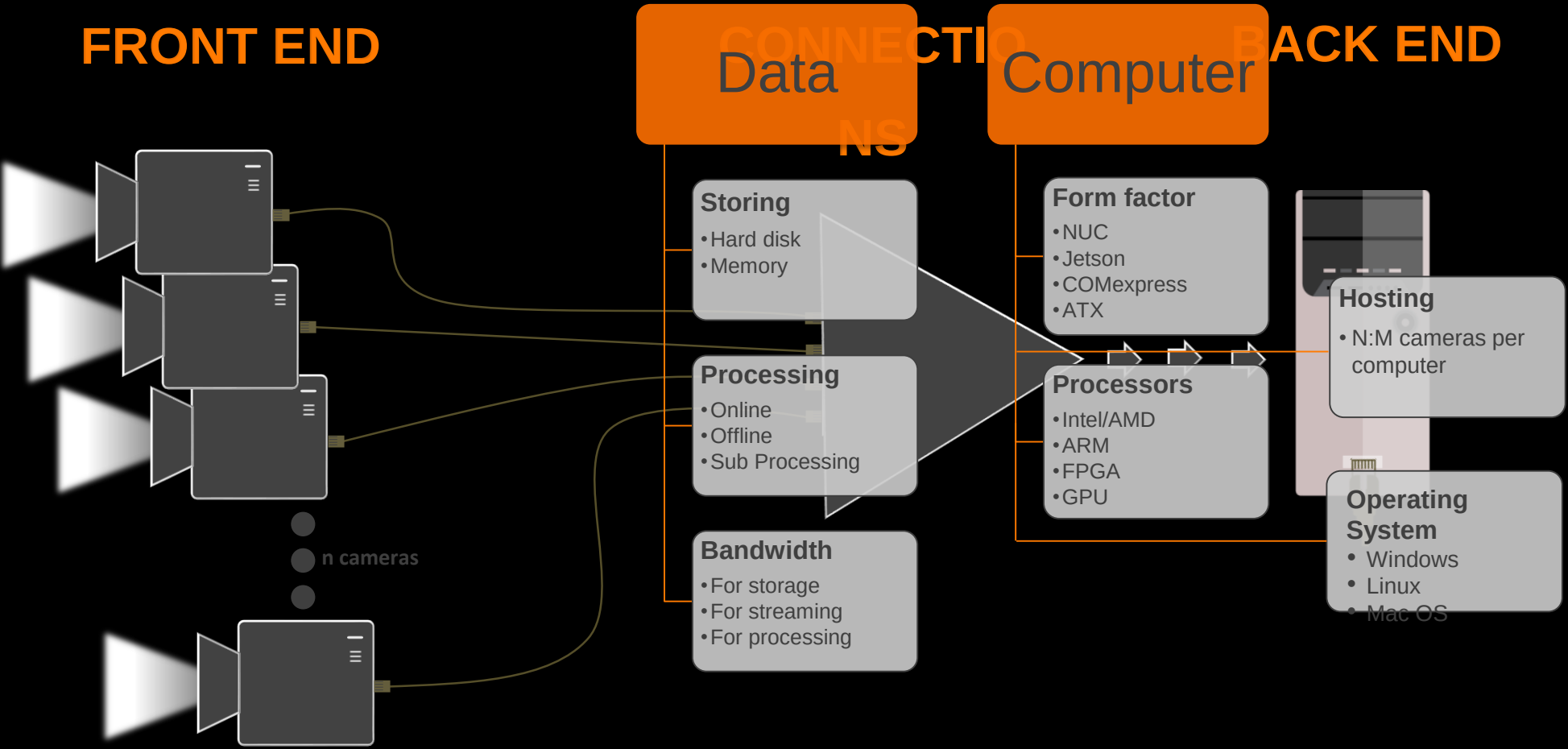
- Inside Out
- Outside In
- Array
- **Clustered**







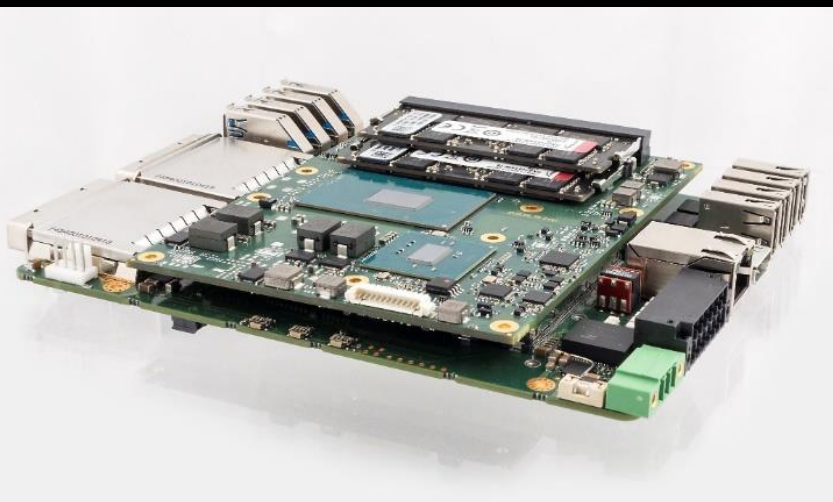




# Multi-camera Applications and Systems Architecture

## Embedded Platform Examples

### xiCX - COM Express Embedded



XIMEA Custom COM

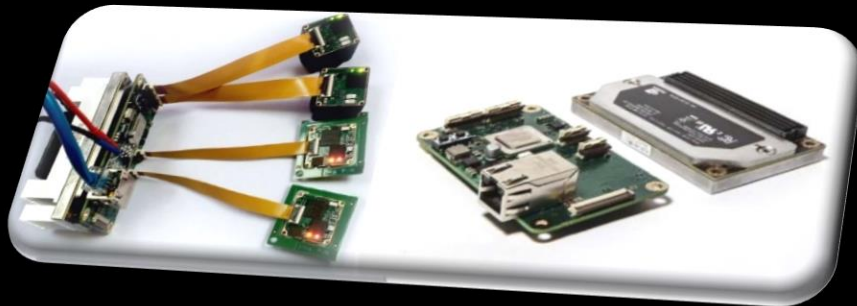
Express box

- 16 PCIe G3 lanes
- 2 x PCIe X8G3
- 4 x USB 3.1 Gen1
- 4 x USB 2.0
- GigE
- HDMI
- 4 M.2 SSD PCIx4G3

slots



### xEC2 - NVidia Jetson TX2

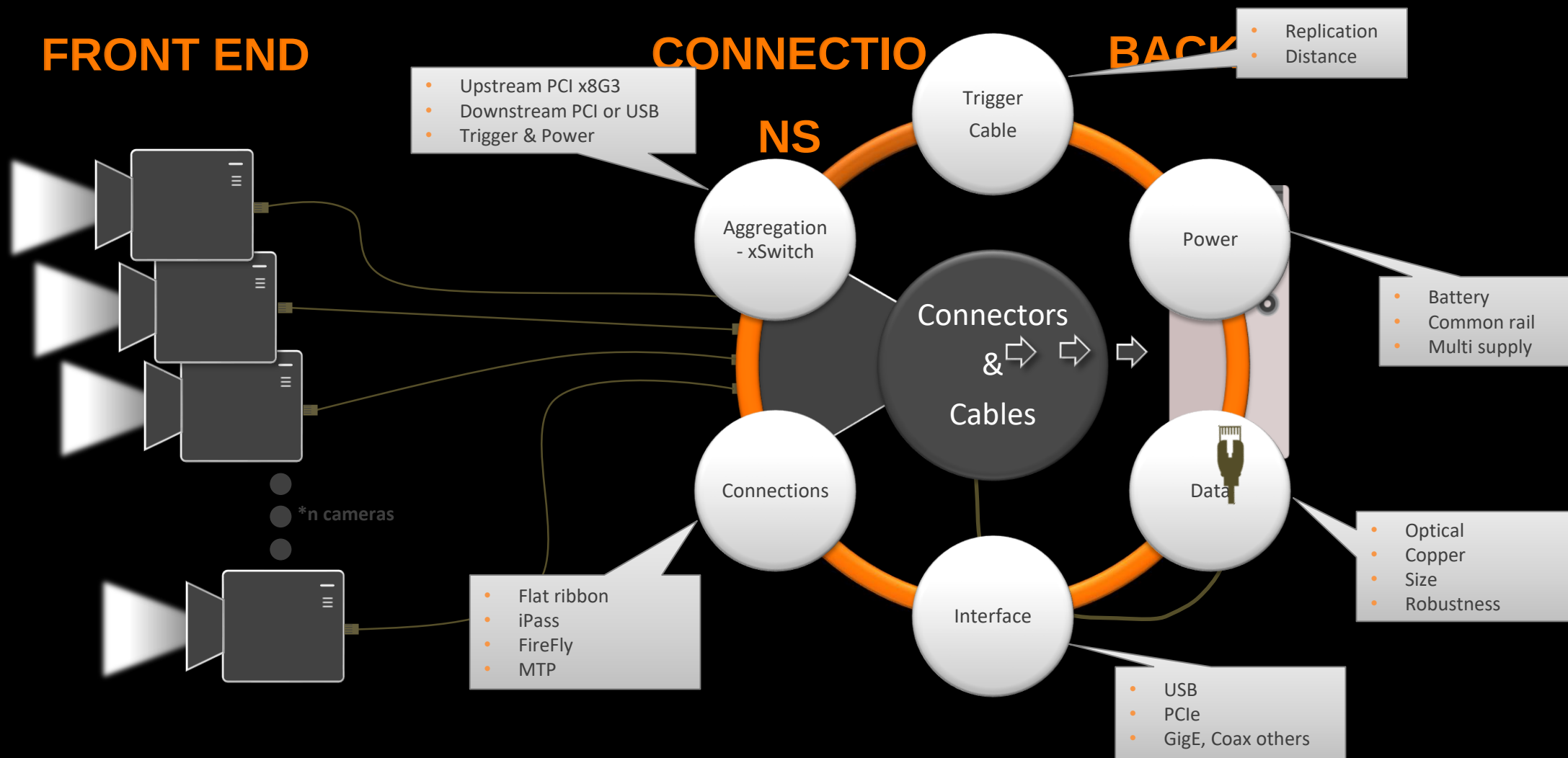


XIMEA custom carrier boards

- 4 x X2G2 downstream
- 1 x X4G2 downstream
- 2 USB 3.1 flex
- 1 USB3.0 type A
- 1 USB 2.0 micro B
- M.2 x4G3
- GigE
- HDMI
- Battery Management IC
- Hot swappable with charging
- SD memory
- mSATA



# Multi-camera Applications and Systems Architecture Considerations



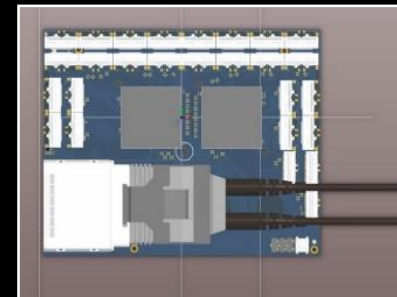
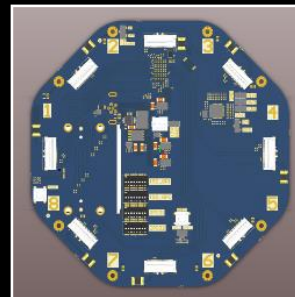
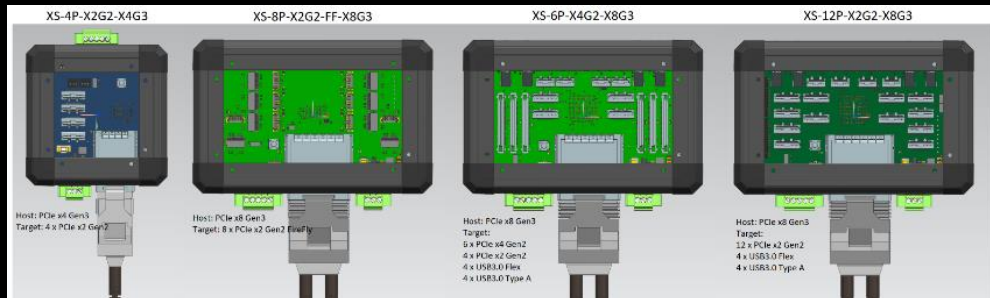
xiFLY – a platform for rapid development of multicamera systems from XIMEA

- Has the versatility to support all different configurations thanks to multiple interconnect options for dense and displaced architectures, superb bandwidth and excellent scalability
- E.g. a performance of:
  - 12 cameras each 12 Mpix resolution running @ 60 fps
  - totaling 8.6 GB/s sustained data rate to disk on a single PC

### PCIe + USB aggregation / multiplexing



- Up to 27 PCIe camera ports
- Up to 8 USB3 connectors
- Synchronization
- Power replication
- Bandwidth up to 64 Gbit/s



# Multi-camera Applications and Systems Architecture

## List of Sources

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9. LYTRO
10. LYTRO
11. Cisco - <http://www.itinstock.com/cisco-3-camera-cluster-cts3k-cam-clust-hd-ip-cts-telepresence3000-video-system-34367-p.asp>



Done



Thank you for your attention  
Questions?