

Stereoscopic Analyzer

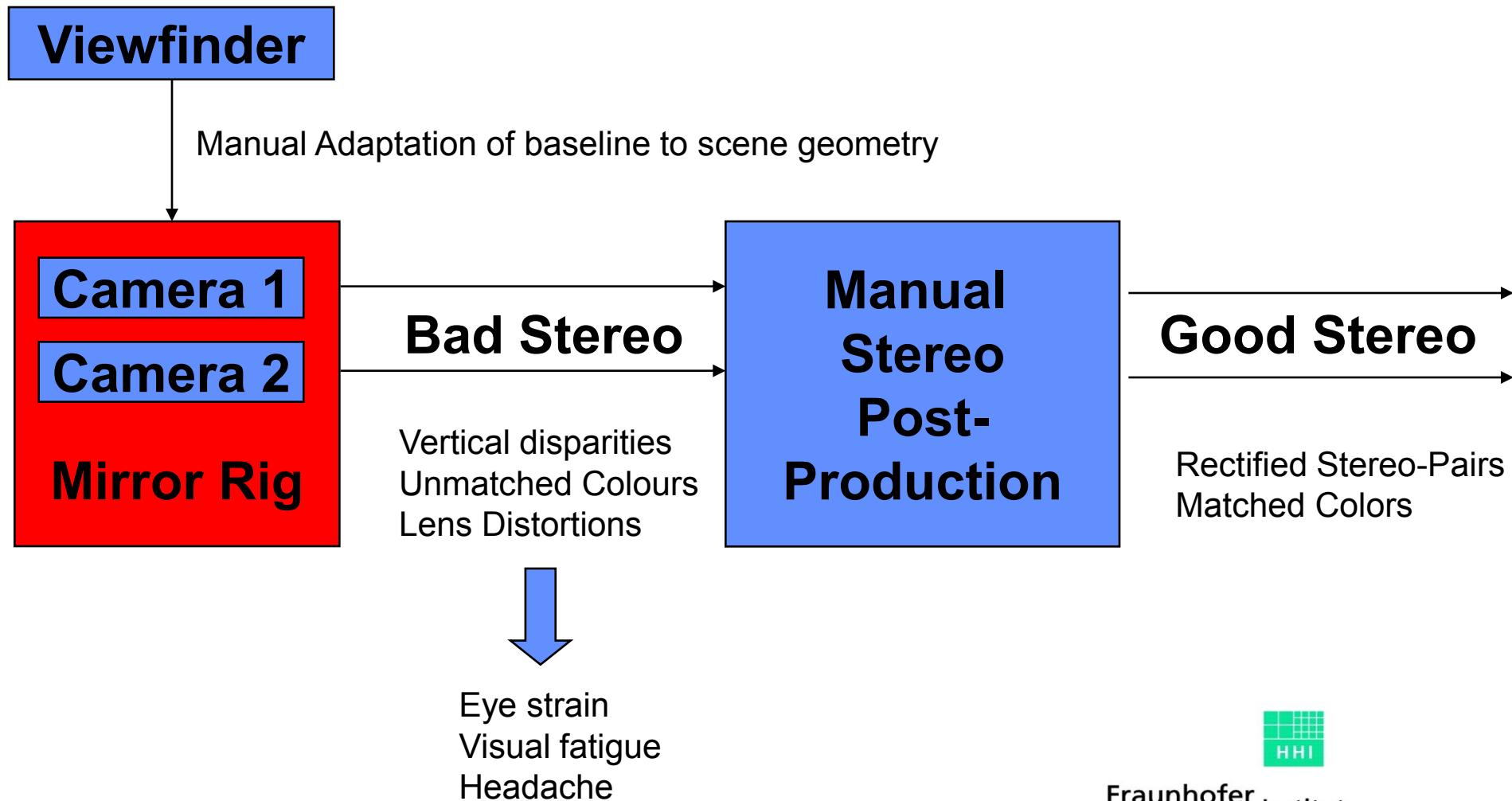
On-Set Assistance System for 3D Capturing

Frederik Zilly, Peter Kauff



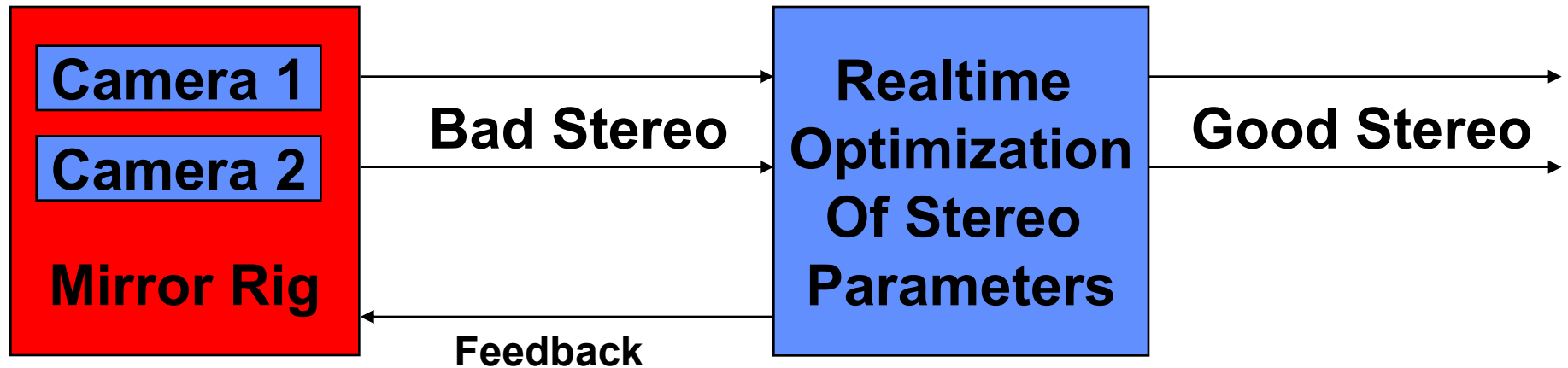
- Conventional Workflow in Stereo Production
- The Vision: Automization of Stereo Workflow
- Concept of Stereoscopic Analyzer (STAN)
- Implementation Details
- Applications Beyond Standard Stereo
- Conclusions and Outlook

Current Workflow of Stereo Production



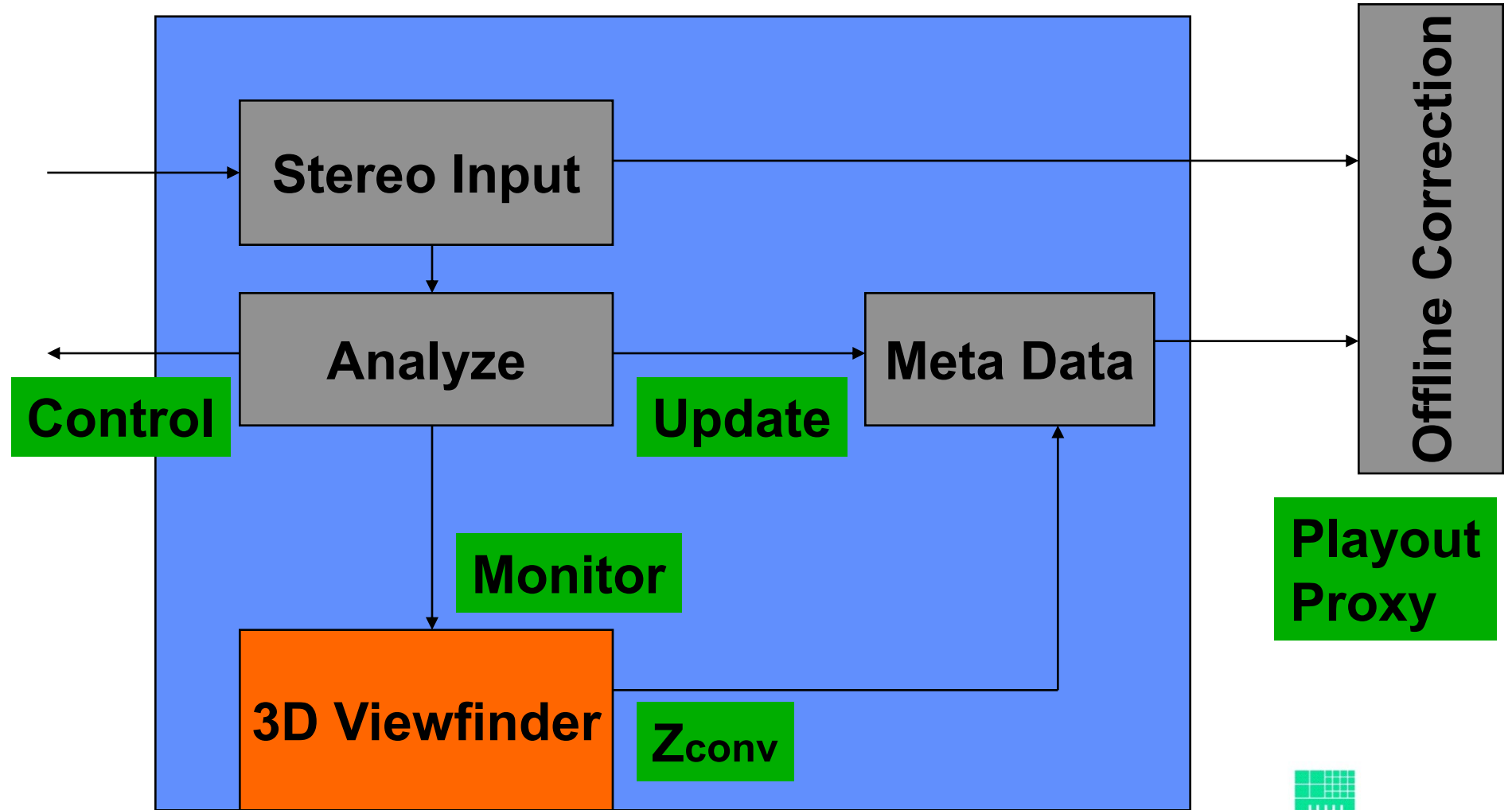
The Vision: Automization of Stereo Workflow

- For Post-Production: supply Meta-Data for offline processing
- For 3DTV: Apply corrections in Real-Time

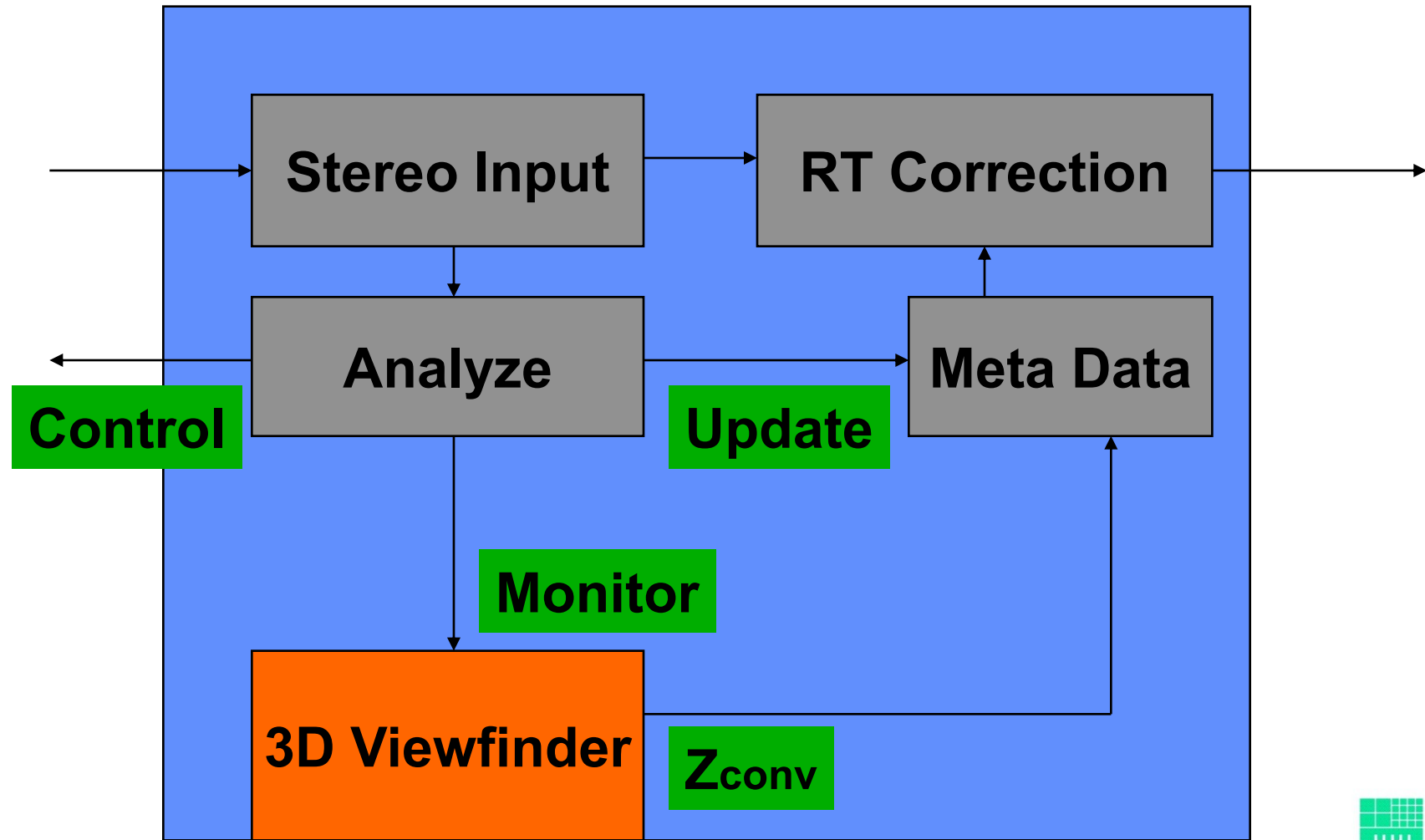


- Short Feedback Loop for manual and/or automatic reconfiguration

3DTV Post-Production



Live Stereo for 3DTV



Analyze Stereo Pair

Control

- Baseline
- Color: rough
- Focus
- Iris
- Zoom

Monitor

- Stereo Quality
- Framing Alert
- Vectorscope
- Disparity Histogram

Correction

- Rectification
- Color: fine
- Lens Distortion
- Convergence Plane
 - Shift / Crop / Scale

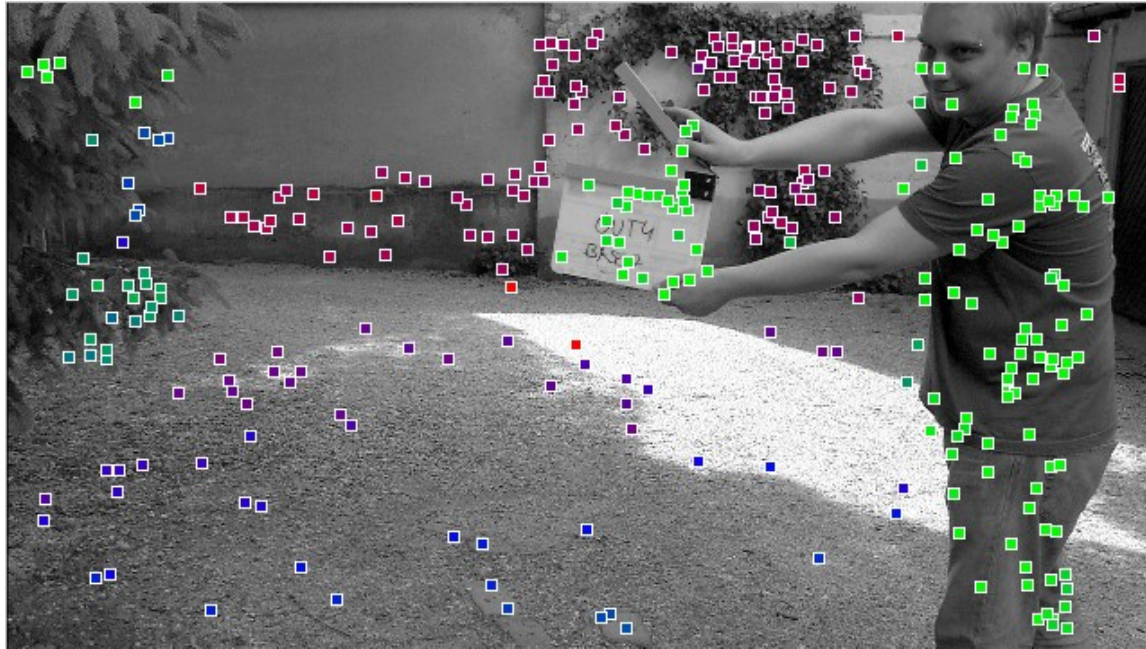
Analyze: Fast GPU Feature Detector

- Point correspondences:



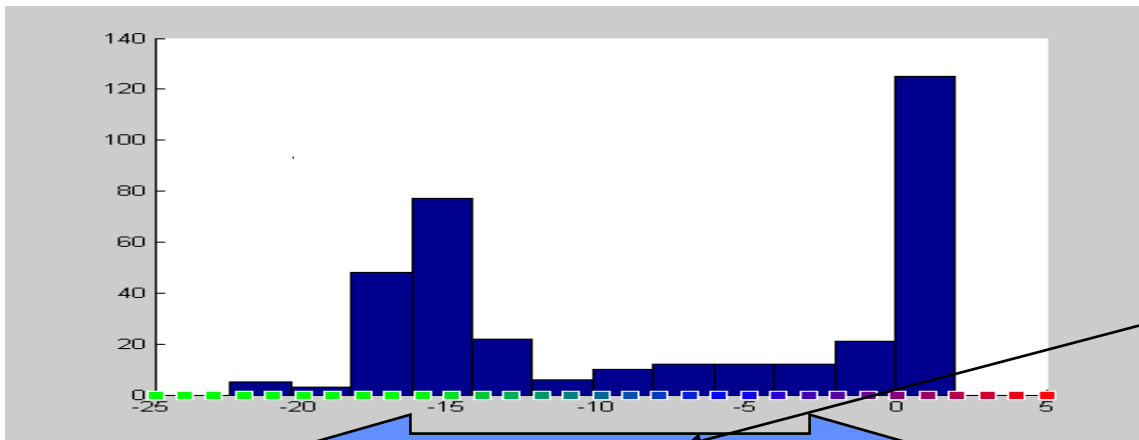
- Detect Feature Points
- Estimate Fundamental Matrix F
 - Apply constraints induced by epipolar geometry to feature points

Monitor: 3D Viewfinder



← **Scene Points**

Disparity Histogram



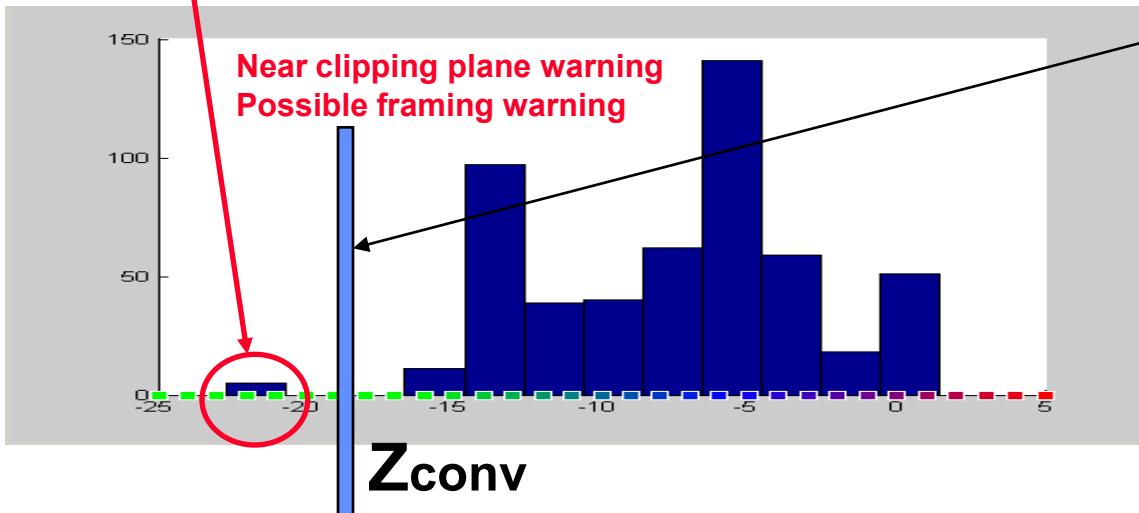
← **1/30 Screen Width**



Monitor: Disparity Analysis

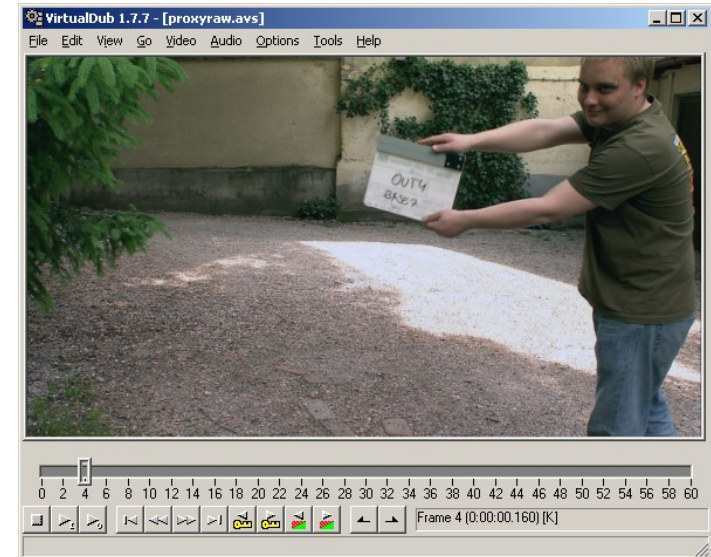
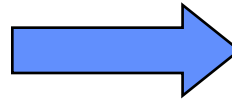
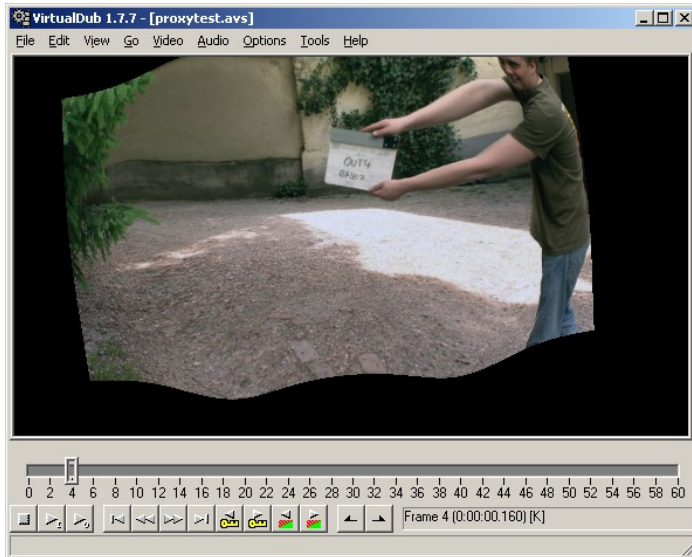


Convergence Plane

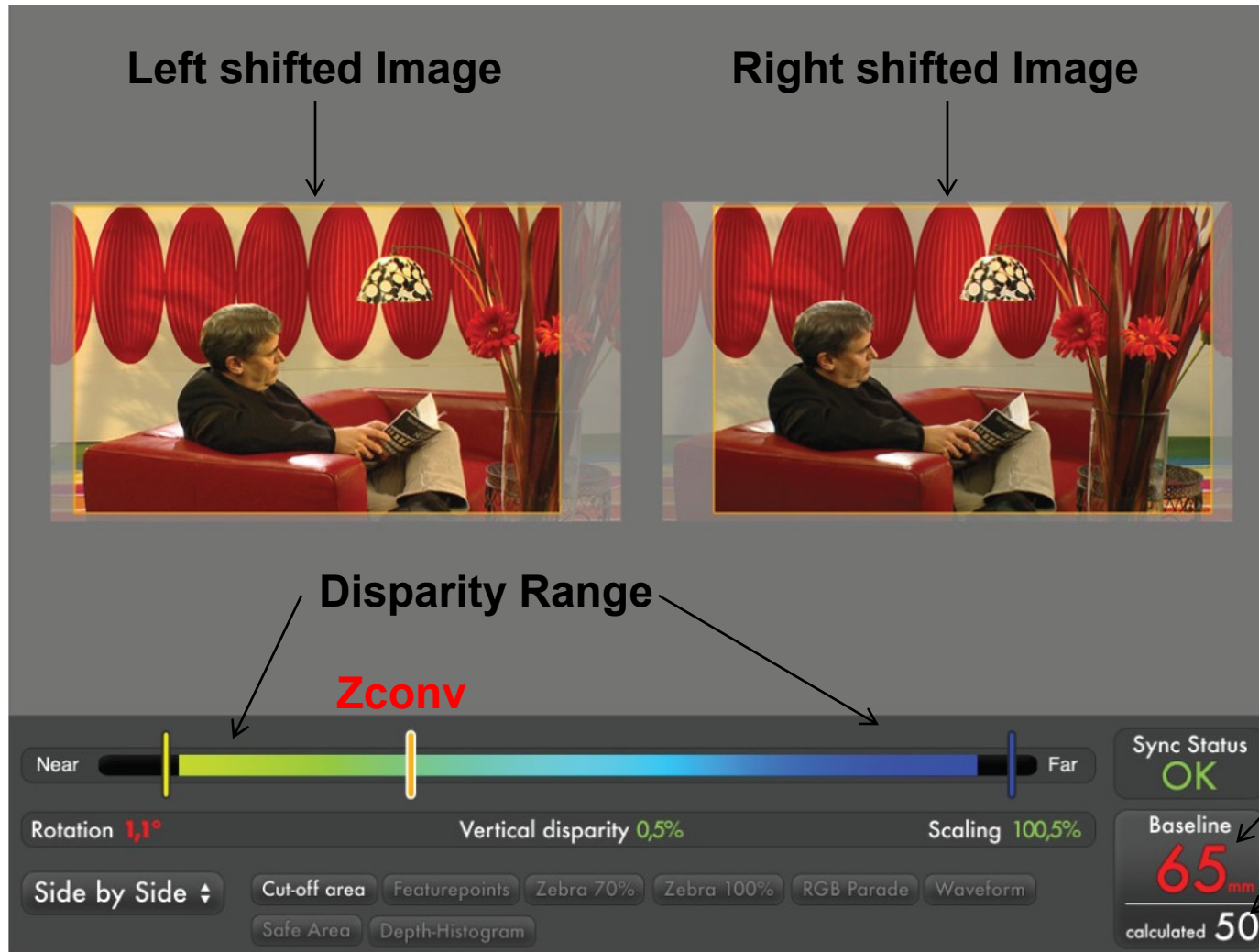


Correction of Geometrical Distortions

- Correct Lens Distortions & Keystones in Real-Time
- For RT-Preview or Live Transmission
- Handle Meta-Data in Machine & Human Readable Format
- Supply Proxy Driver for Post-Production and Playout



3D Viewfinder in Detail



Actual Baseline

Calc. Baseline

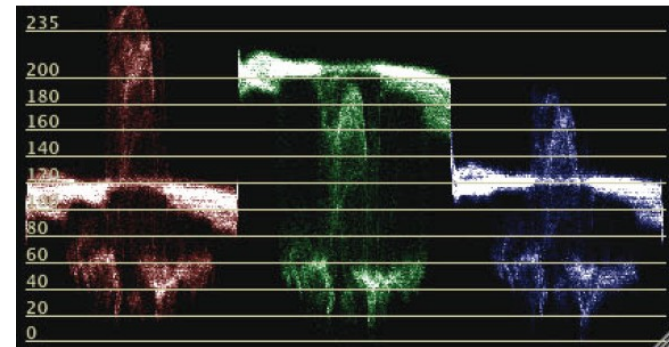
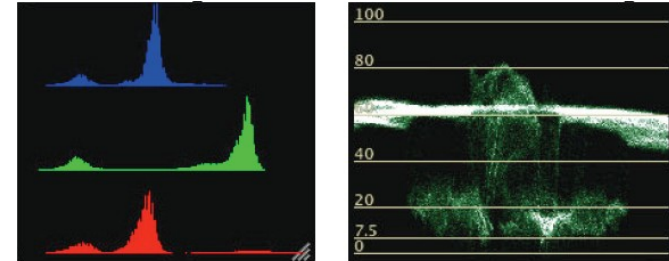
GUI Design by KUK Film Production



3D Viewfinder continued



Disparity Histogram



Color Calibration
Waveform
Vectorscope



Different View Modes



Features under Development

- Preview of Depth Information and Scene Depth Structure for Post-Production Purposes



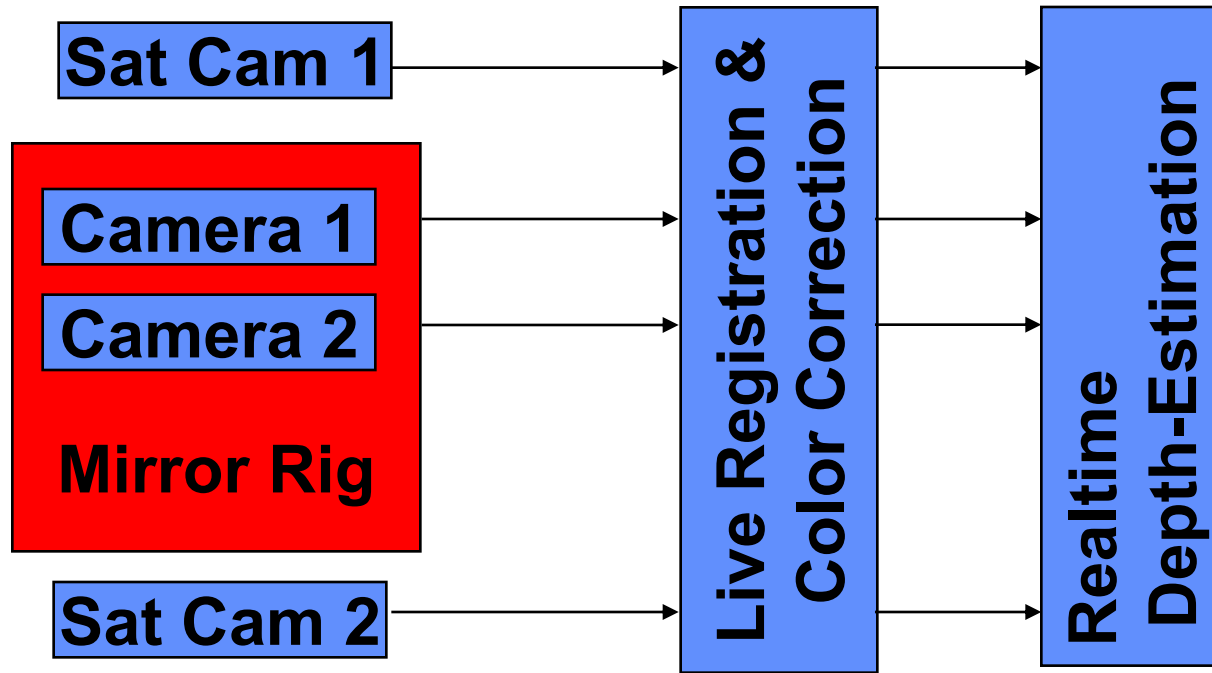
- Real-Time Depth Calculation for Live 3DTV Using Video-Plus-Depth Formats
 - Rectified Stereo enables efficient scanline search
 - Color Corrected Stereo helps SAD-based algorithms, improves coding efficiency
 - Known and/or controlled disparity range makes Depth Estimation faster and more robust
- Enable Zoom
 - Needed for Live 3DTV, however introducing new challenges



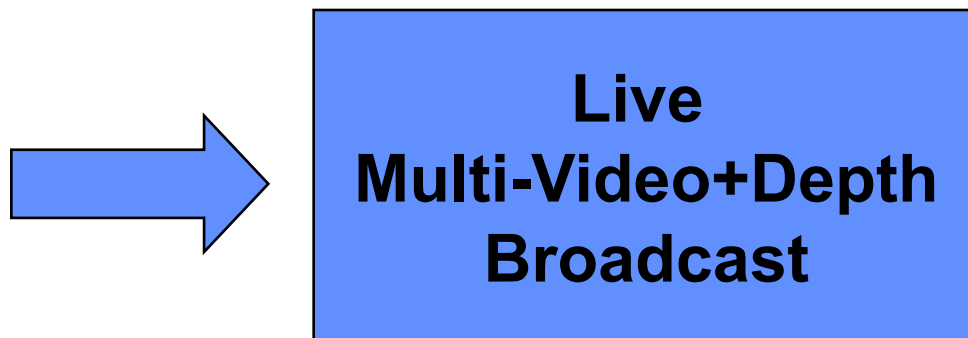
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Beyond Stereo: Scenario for Multi Video + Depth

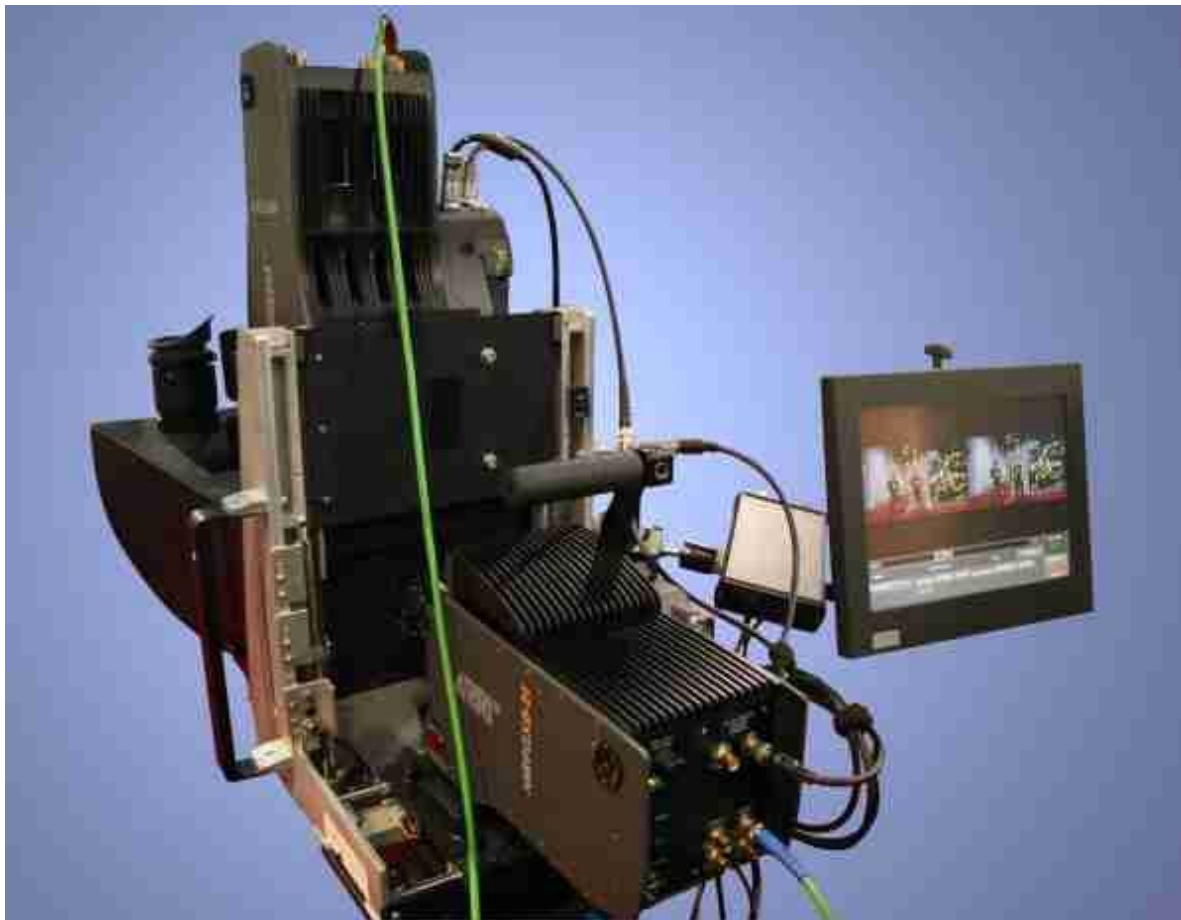


Depth estimation more efficient for registered and color corrected data



The Product

**With Touchscreen to see
at NAB Show 09**



The Product

**With Touchscreen to see
at NAB Show 09**



Conclusions and Outlook

- STAN: Camera Assistance System for 3D Production
- Proof of Concept and Algorithmic Prototype
- NAB'09: First Presentation to Public
- First Hardware Prototype Planned for NAB'10
- Extensions under Development
 - RT Capture of Video-Plus-Depth
 - Application to Multi-View Stereo
 - Live Broadcast (incl. Zooming)