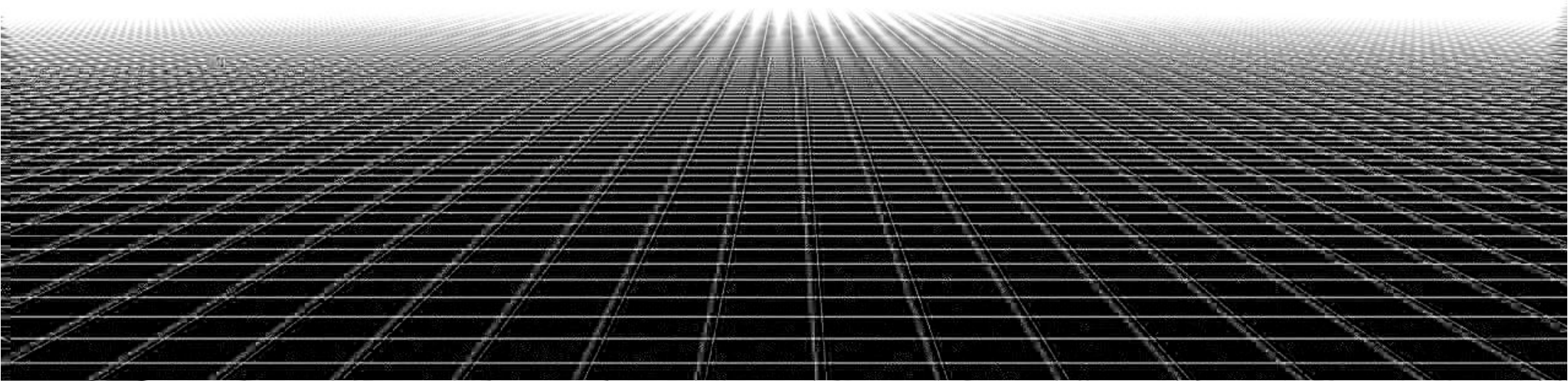


Stereoscopic 3D Visualization



1. Introduction
2. Techniques
3. Stereoscopy Revisited
4. New Developments
5. Pros and Cons
6. @ Bielefeld University
7. Seminar

2
Overview



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Introduction



- The Commercial Dawning

- Avatar

- James Cameron
 - 2009



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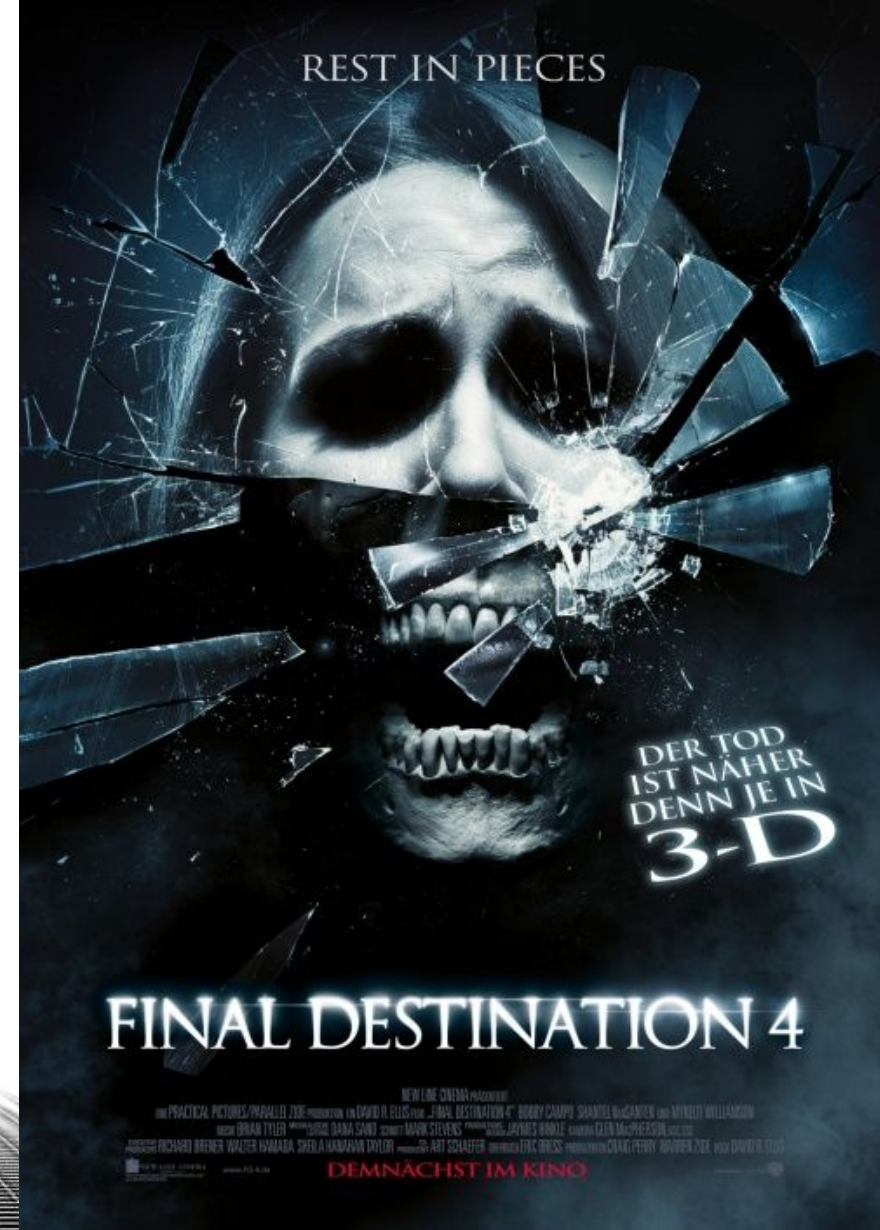
Introduction



-
- BLU-RAY 3D™
- Blu-ray Disc
- + BLU-RAY™
- JOHNNY DEPP
- Disney
- UN FILM DE TIM BURTON
- ALICE AU PAYS DES MERVEILLES
- 3D
- Disney Studios Privileges
- TITRE PARTICIPANT
- Disney 3D Blu-ray™

StereoSonic Stereo

- How it should be not!
 - Final Destination 4
 - David R. Ellis
 - 2009



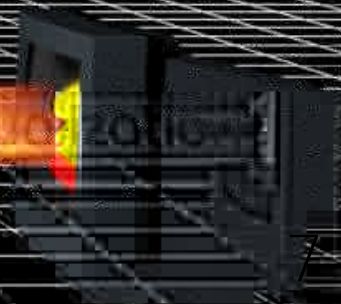
6

Introduction



- Resulting Questions

- Is Stereoscopy used to make bad movies better, or even worse?
- Is Stereoscopy only useful to increase the income of the cinemas?
 - CinemaxX Bielefeld, Thu-Sun, Adults:
 - Regular Prize: 7,50 €
 - 3D Prize: 11,50-12,00 €
 - CineStar Bielefeld, Thu-Sun, Adults:
 - Regular Prize: 7,50 €
 - 3D Prize: 10,50 € + one time 1 € for 3D glasses



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Techniques



- Cheap Glasses



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Techniques

- Active and Passive Glasses

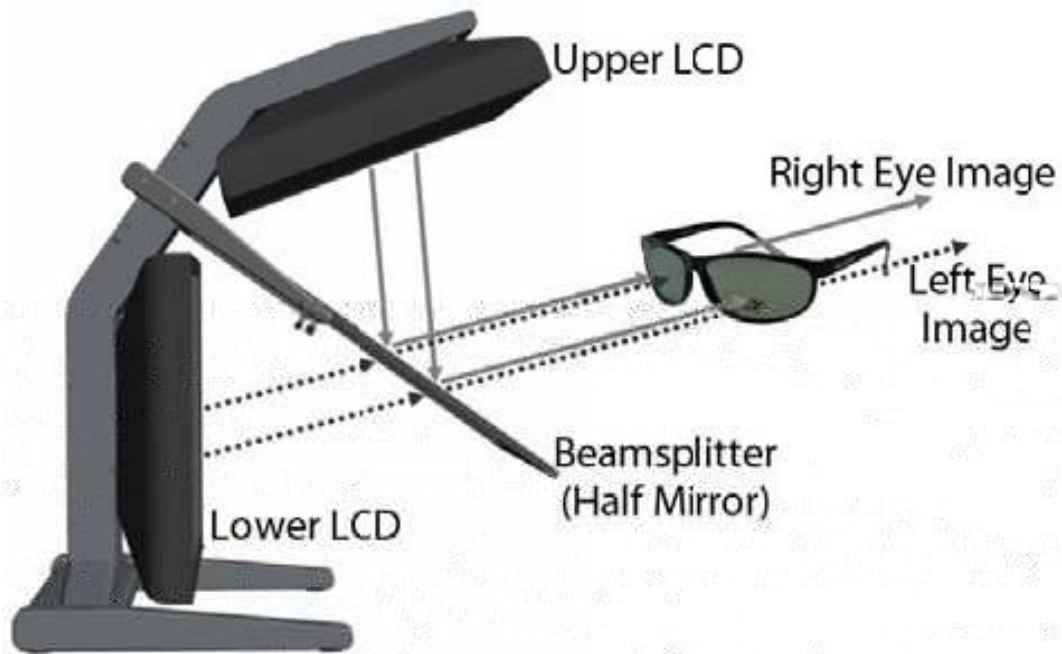


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Techniques



- Planar StereoMirror™



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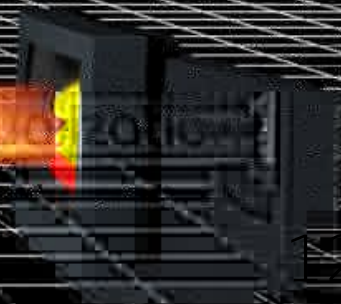
Techniques



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Stereoscopy Revisited

Stereoscopy Revisited



- Why Stereoscopy?
 - Avatar
 - Hinduism: manifestation of a deity
(from Sanskrit: avatāra)

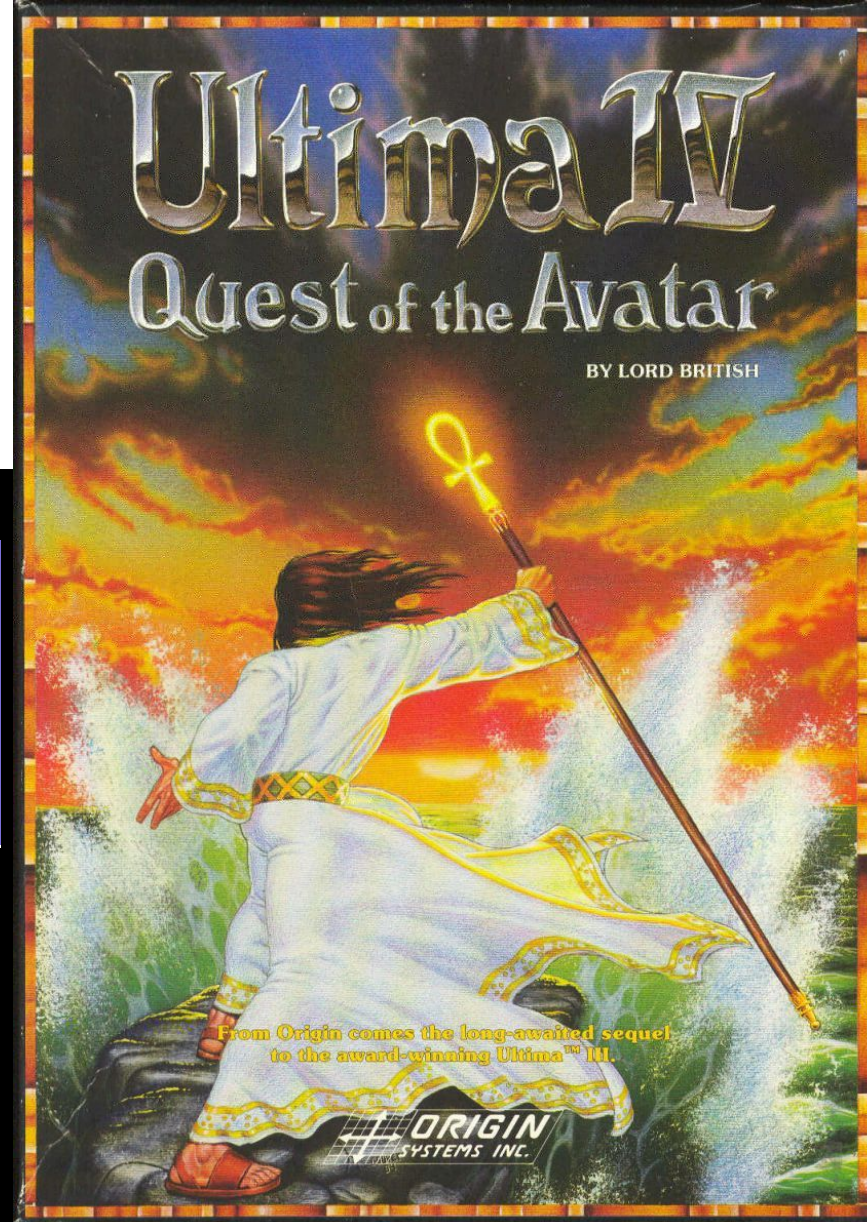
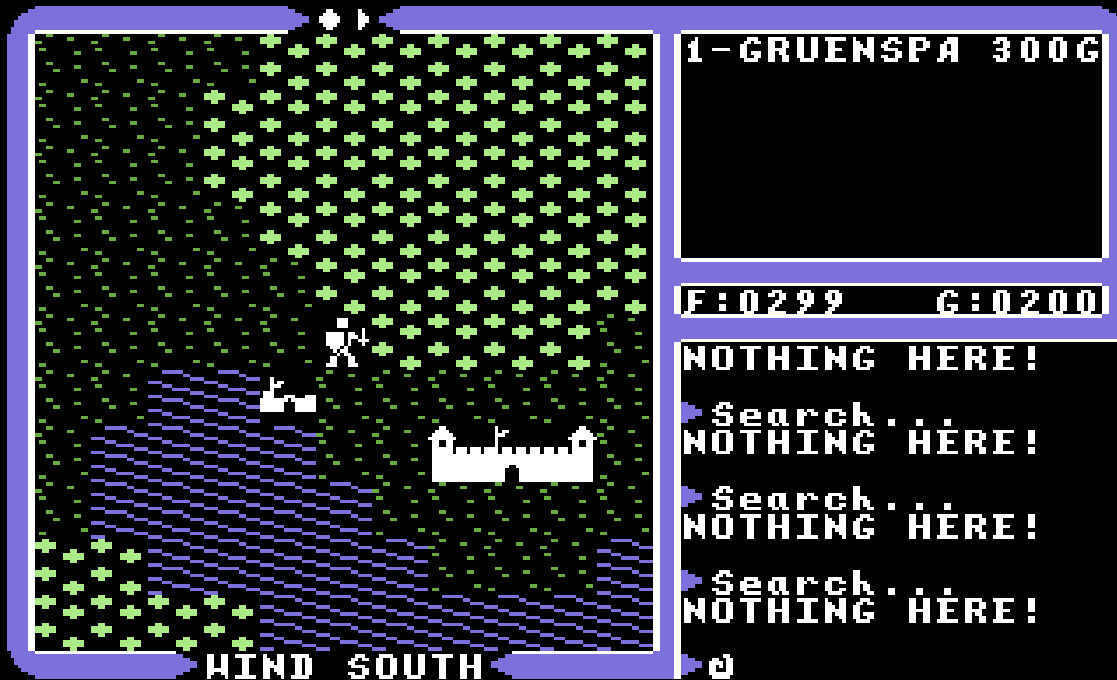


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Stereoscopy Revisited

Stereoscopy Revisited

- The Original Avatar
 - Lord British/Richard Garriott
 - 1986 (PC, C64, NES, ...)



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Stereoscopy Revisited

- Sensorama
 - 1956
 - Morton Heilig
 - Head inside a wooden TV cabine
 - Full Immersion
 - stereoscopic film projection
 - stereo sound
 - olfactory system
 - haptical effect by shaking of cabin
 - no interaction



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Stereoscopy Revisited

- 3D Head Mounted Display (HMD)

- 1968
- Ivan Sutherland
- the first 3D Head Mounted Display
- extremely heavy
- viewing direction mechanically tracked
- grid models only
- first stereoscopic object in a computer system was a grid cube of 5 cm length, as floating light object



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Stereoscopy Revisited



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Stereoscopy

New Developments



- CeBit 2011
 - March 2011
 - Schneider Digital
 - Mini-VR Wall
 - 6 Megapixel
 - operating costs:
1,60 €/h



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New Developments



- CeBit 2011
 - nVidia/PNY Quadro Cards Generation
 - nVidia/PNY G-Force 3D Vision™
 - GTX 570
 - ATI Fire GL Generation



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New Developments



- CeBit 2011

- EX3D

- mission:
no more
ugly 3D
glasses

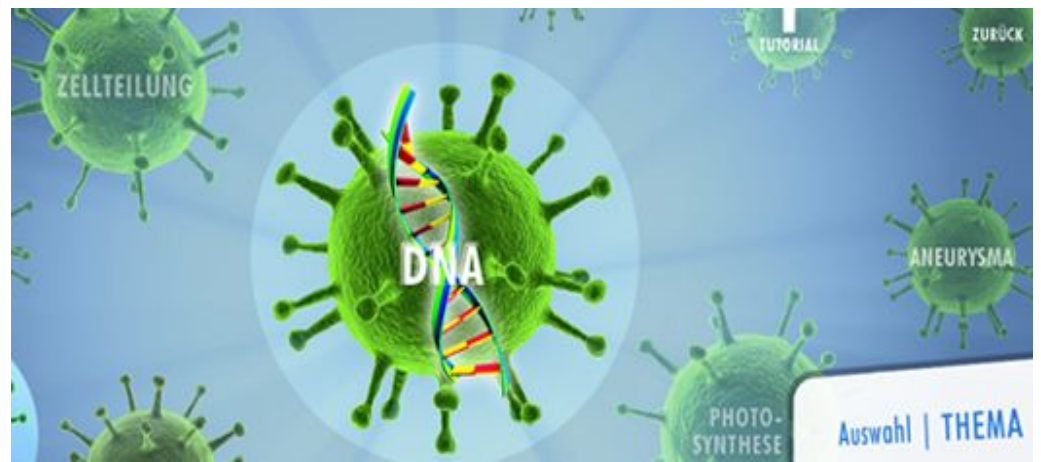


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New Developments



- CeBit 2011
 - Cyber-Classroom
 - Visenso GmbH



<http://www.cyberclassroom.de>

http://www.youtube.com/watch?feature=player_embedded&v=TT3M0NyPLWg

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New Developments

Stereoskopische 3D-Visualisierung



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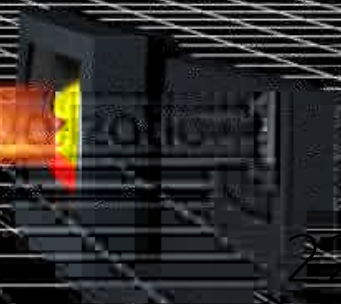
- CeBit 2011
 - Trideltity AG
 - Autostereoscopic Displays



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New Developments

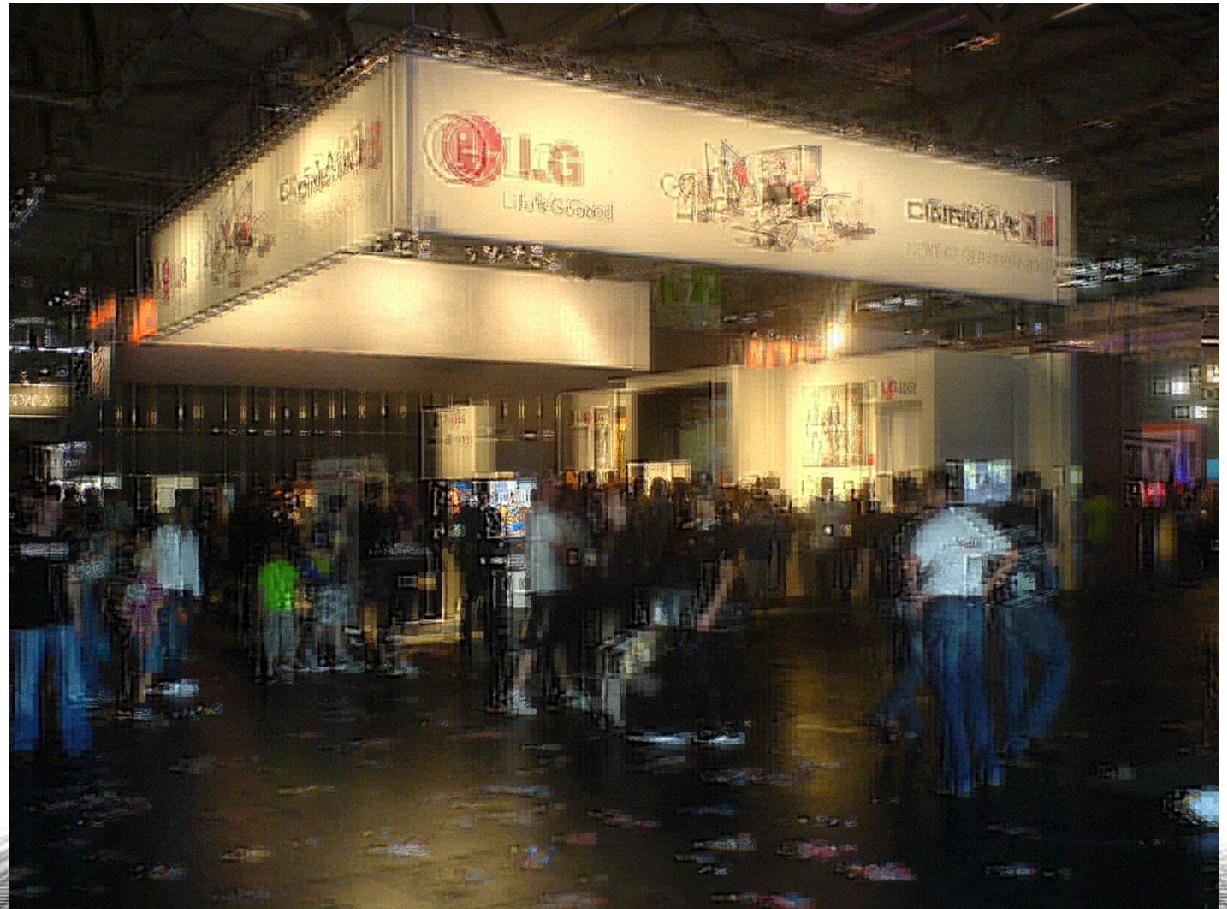
Stereoscopic Display



- GamesCon 2011

- LG

- Booth



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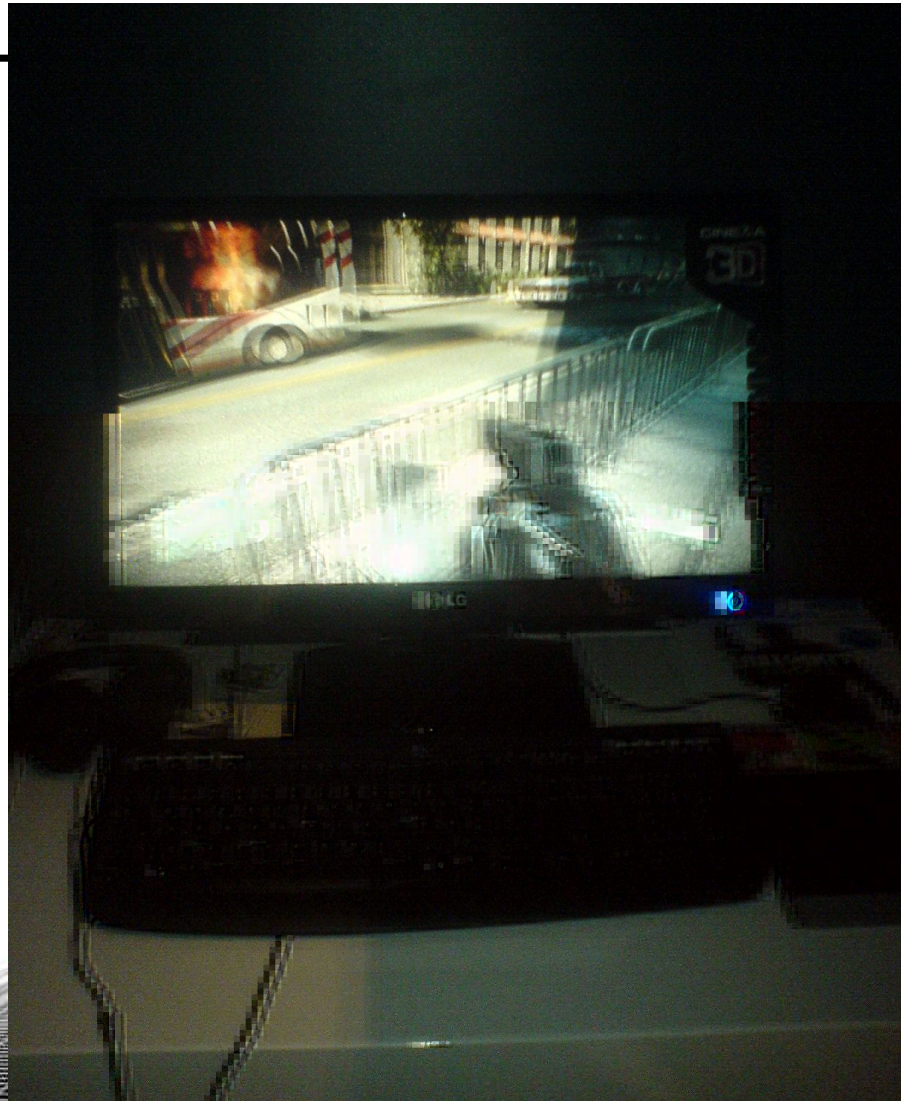
New Developments



- GamesCon 2011

- LG

- Gamer LCD
 - D2342P
 - ca. 240 €
 - passive stereo
 - Test (+):
Call of Duty



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New Developments



- GamesCon 2011

- LG

- A520
 - High-End 3D FullHD Notebook
 - passive stereo
 - Test (-): StarCraft



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New Developments



- GamesCon 2011

- Samsung
 - Booth



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New Developments



- GamesCon 2011

- Samsung

- LCDs
 - active stereo



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New Developments



- GamesCon 2011
 - Samsung
 - Active Glasses



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New Developments



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Pros and Cons



- Advantages

- ability to pick out camouflaged objects
- easier relative depth judgements
- ability to concentrate on objects located at different depth levels
- better judgement of surface curvature
- better perception of surface material

[BHH+09]

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Pros and Cons



- Disadvantages
 - Knot Counting Problem
 - Ghosting Effect
 - Technical Difficulties
 - Costs
 - Individual Optical Problems

[L07]

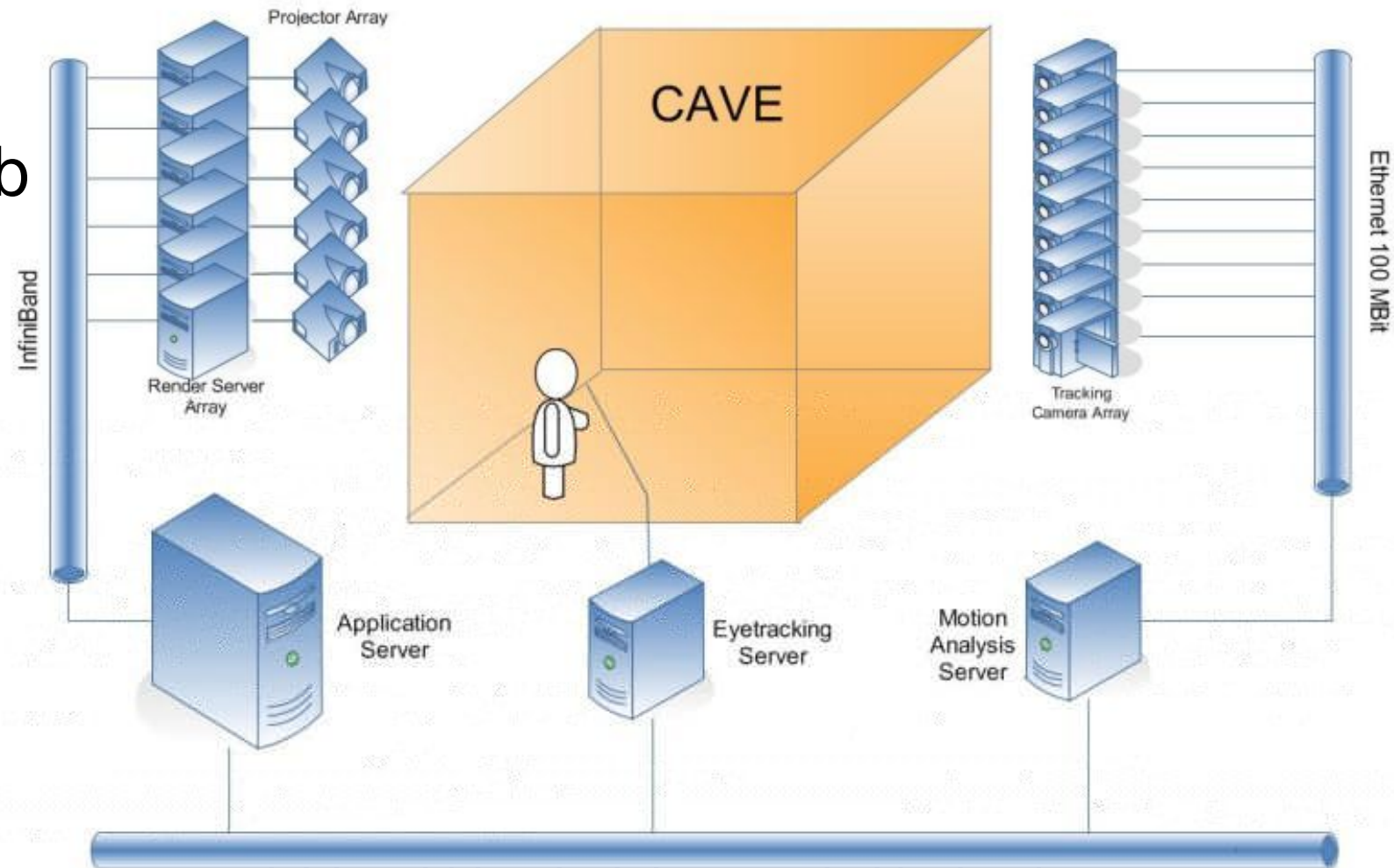
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Pros and Cons



University

- CAVE
 - VR Lab
 - A.I. group
 - Since 1995



<http://www.techfak.uni-bielefeld.de/ags/wbski/labor.html>

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@ Bielefeld University



- Powerwall
 - CELLmicrocosmos Lab
 - B.I. group
 - Since 2003
- More next week ...

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@ Bielefeld University



- Marc Tönsing, Fabian Hemmert, Philipp Anders
 - Speculars 3D, Bachelor Thesis in Mediengestaltung
 - 2006
 - http://www.marctv.de/blog/2006/02/01/bachelorarbeit_speculars_3d/



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Stereoskopische 3D-Visualisierung

@ Bielefeld University

- Stereoscopy-related Lectures
 - Virtual Reality: Thies Pfeiffer (past: Marc Latoschik)
 - Date: Fr. 10-12
 - Start: 14.10.2011
 - Room: H8
 - Einführung in die Computergrafik: Mario Botsch
 - Date: Tue. 14-16; Thu. 16-18
 - Start: 11.10.2011
 - Room: T2-205

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Seminar: Topics



- History of Stereoscopy
 - Analogue Stereoscopy
 - Digital Stereoscopy

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Seminar: Topics



- Stereoscopic Techniques
 - How does it work?
 - Mathematical Basics

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Seminar: Topics

Stereoscopic Techniques

- 2D vs. 3D
 - Comparison of different techniques
 - Movie analysis
 - (Dis-)Advantages

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Seminar: Topics

Stereoscopy



- nVidia vs. ATI
 - Graphiccards
 - Quadro vs. Stereo Vision vs. Fire GL



- Active vs. Passive vs. Autostereoscopic
 - monitor and glasses techniques
 - comparison
 - case studies
 - (Dis-)Advantages



- Stereoscopy in the Cinema

- Which Movies?
- Which Cinemas?
- Top or Flop?
- Techniques
- (Dis-)Advantages

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Seminar: Topics

Stereoscopy in the Cinema



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- Stereoscopy in Science
 - Molecular Visualization
 - Architecture
 - Automotives
 - Medical Visualization and Modeling
 - (Dis-)Advantages

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Seminar: Topics



- Stereoscopy in TV
 - Übertragungsmöglichkeiten in der Zukunft
 - Which Movies?
 - Which Companies?
 - Techniques
 - (Dis-)Advantages

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Seminar: Topics

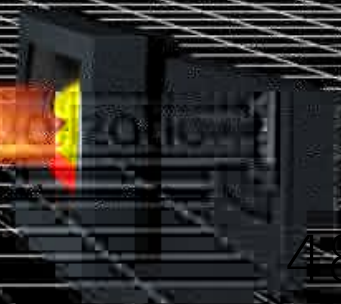


- Stereoscopy in-game
 - PC vs. Game Console vs. Handhelds
 - Techniques
 - (Dis-)Advantages

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Seminar: Topics

Stereoscopy in-game



- Health Aspects
 - Risks or undesired side effects
 - Improvement of spatial perception

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Seminar: Topics



- Stereoscopy in Programming (practically oriented)
 - DirectX/OpenGL
 - Java3D
 - OpenCL
 - 3D Vision/Quadro/SLI

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Seminar: Tasks



- 3CP: 25 min talk, text: 2 Din A4 pages

Studiengang/-angebot	Gültigkeit	Variante	Untergliederung	Status	Sem.	LP	
Bioinformatik und Genomforschung / Master			Individueller Ergänzungsb	Wahl	1.	3	unbenotet
	(Erschreibung bis SS.2011)		Individueller Ergänzungsb.	Wahl	5.	3	unbenotet
Medienwissenschaft, interdisziplinäre / Master			Hauptmodul 4	Wahlpflicht	1.	3	unbenotet
Molekulare Biotechnologie / Master			Individuelle Ergänzung	Wahl	1.	3	unbenotet
Naturwissenschaftliche Informatik / Master			Individuelle Ergänzung	Wahl	1.	3	unbenotet

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Seminar: Workload

- Science \Leftrightarrow Consumer market
 - New ideas ...
 - Optimum: A manuscript/publication
- More next week ...

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Seminar: Aim



- Stereoscopic Excursion planned

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Seminar: Excursion



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Further Reading



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- Yeh, Y. Y., and L. D. Silverstein. "Limits of fusion and depth judgment in stereoscopic color displays." *Human Factors: The Journal of the Human Factors and Ergonomics Society* 32, no. 1 (1990): 45-60.
- Hubona, G. S., P. N. Wheeler, G. W. Shirah, and M. Brandt. "The relative contributions of stereo, lighting, and background scenes in promoting 3D depth visualization." *ACM Transactions on Computer-Human Interaction (TOCHI)* 6, no. 3 (1999): 214-242.
- Ware, C., and P. Mitchell. "Reevaluating stereo and motion cues for visualizing graphs in three dimensions." In *Proceedings of the 2nd Symposium on Applied Perception in Graphics and Visualization*, 51-58. ACM, 2005.
- [L07] Lipari, N. G. "Evaluation of Stereoscopy and Lit Shading for a Counting Task in Knot Visualization." In *The 2007 International Conference on Computer Graphics and Virtual Reality*. Citeseer, n.d.
- [BHH+09] Van Beurden, M., G. van Hoey, H. Hatzakis, and W. A. Ijsselstein. "Stereoscopic displays in medical domains: a review of perception and performance effects, Human Vision and Electronic Imaging XIV." In *Proceedings of the SPIE*, 7240:72400A-72400A, 2009.



