gCubik : A Cubic Autostereoscopic Display for Multiuser Interaction

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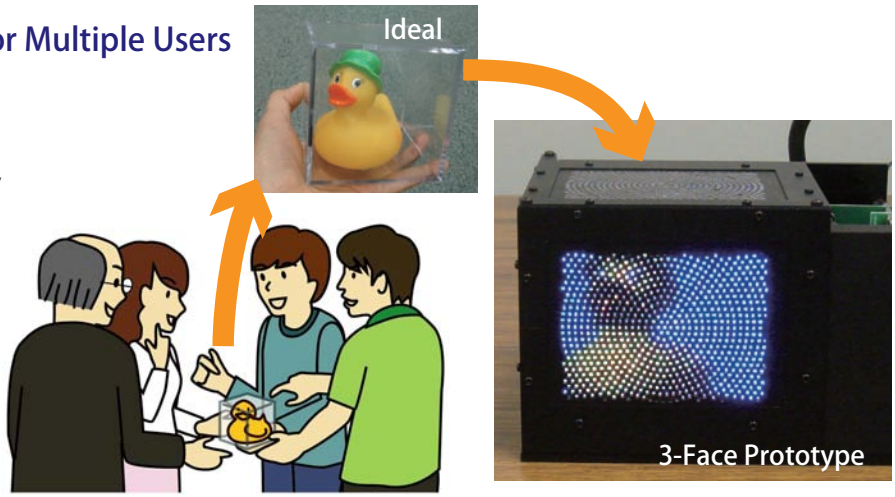
gCubik - Concept

▼ A Cubic Autostereoscopic Display for Multiple Users

- **G**roup-sharing of 3D images
- **G**raspable virtual objects
- **G**lasses-free autostereoscopic display
- **G**lazed-showcase like display

▼ Applications

- Edutainment (games)
- Medical treatment (discussion)
- Intuitive solid modeling



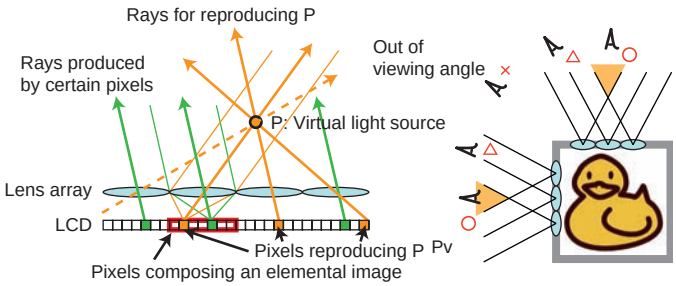
3 -Face Prototype

▼ Proposed Autostereoscopic Display

- Employs Integral Photography (IP)
  - Each cube's face is an IP display
  - Assumes a 3D model inside the cube
  - Reproduces model's light field for each face

▼ Problem with IP displays in a cubic shape

- Viewable from any direction : **Wide Field of View**

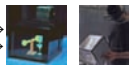


▼ gCubik and Related Approaches

	Natural		Public	Shared		Multimodal
	Glass-free	No. of Users	Viewing dir	Shared space	Pointing	Grasping
Stereoscopic Display	Yes	Few	Front	Next to	Air	Air
Volumetric Display	Yes	Any	Any	Any pos.	Inside case	NA
Related Works (footnote)	No	One	Any	Single User	Inside case	Whole Box
gCubik 's goal	Yes	Any	Any	Any pos.	Inside case	Whole Box

Related Works : Hand-held displays
- MEDIA³ (Tokyo Univ.) Motion parallax by tracking observer
- SCAPE (Arizona Univ.) Stereoscopic Images (3D)

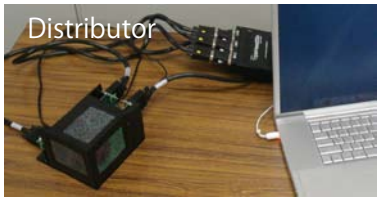
Left Fig. →
Right Fig.→



▼ gCubik : System Overview

- 3 sets of 3.5-inch LCD and IP Lens Array Plate
  - 120-deg Field-of-view IP lens array
  - 20×20 directional views per lens

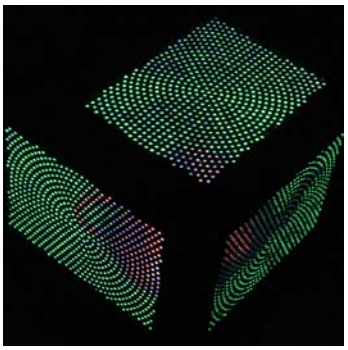
gCubik
3-face ver.

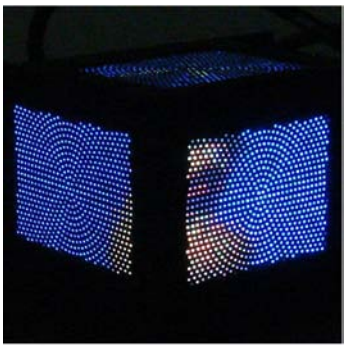


Rendering:
- OpenGL
- VGAx3

▼ 3D Image Rendering

- Light field rendering (IP)
- Pre-rendered Animation
- GPU- based realtime animation (on progress)





Conclusions and Future

- Confirmed the possibility of displaying a 3D image inside a cube by building a 3-face prototype 3D image viewable from 50 cm and from any direction. Pre-rendered animation.
- Improve image quality (brightness, resolution), 6-face cube prototype, interaction design

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