HOLOGRAFIKA

Shaping the 3D industry

Péter Tamás Kovács
CTO
Holografika, Hungary
www.holografika.com

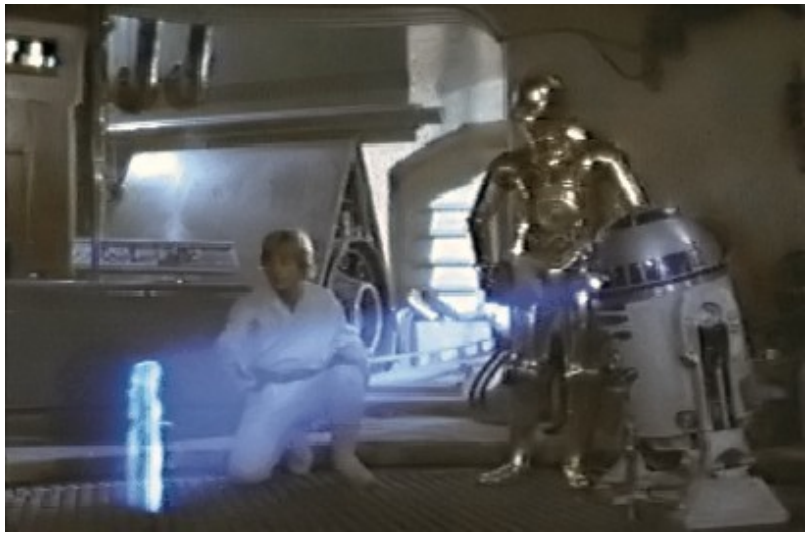
The Company

- Hungarian venture, active in the holographic, opto-electronic and 3D display technologies
- Developed unique **proprietary 3D light-field** display technology with strong IP
- Manufacturing **HoloVizio™** displays and pushing related 3D technologies : acquisition, software, compression…
- Hi-tech SME, 5% owned by Videoton, the largest electronic manufacturer in Hungary
- Game changing player, the 3D Light Field display conception pioneered by Holografika is acknowledged by the industry, brand building
- Awards: latest - 2014, Nvidia „One to watch”:

What is possible?

- *„We can make miracles immediately, for the impossible you should wait a few days...”*

- Law of physics – *today...*
  - Is it impossible or just difficult?
  - Easy self-check to look like an expert: “C*ould the light beams reach my eyes, as shown?”*
  - No one ever saw a light ray making a turn in free space – “*Where did those light beams come from?”*



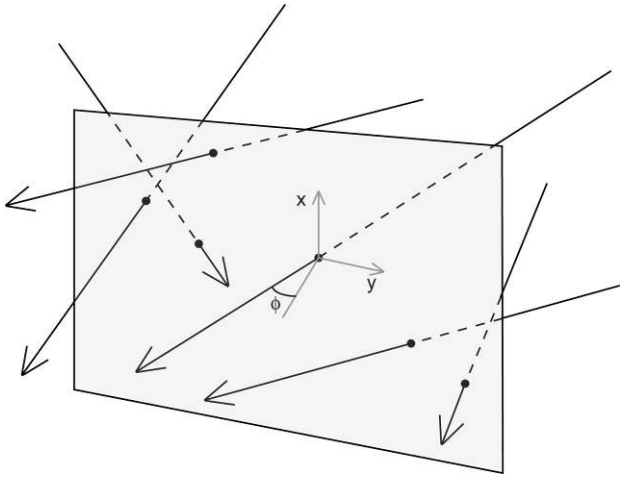
3D Displaying basic rules

- The goal of displaying is to provide perfect representation of real/synthetic scenes
  - Life-like view
  - The ultimate display will be like a window...

- True 3D displaying - reconstructing the light-field as present in the natural view
  - Producing light beams with the same parameters the human perception is capable to process: direction, position, intensity, color (but polarization, phase)
  - „…Let the display work, not the brain…”

Light Field

- General representation of 3D information that considers a 3D scene as the collection of light rays that are emitted or reflected from 3D scene points. (M. Levoy, and P. Hanrahan, “Light Field Rendering”, 1996.)
- The visible light beams are described with respect to a reference surface (screen) using the light beams’ intersection with the surface and angle.
- The LF is defined as a function of position (2 or 3 parameters) and direction (2 parameters): L(x,y,[z],Θ,Φ)



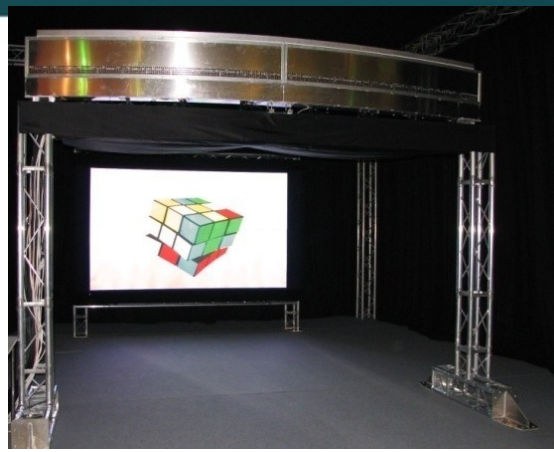
Overview of 3D technologies

- Stereoscopic (2x)
  - Sweet point, viewer dependent view, tracking for motion parallax
- Multiview (5-9x and up)
  - Jumpy image, limited are repeated FOV, small depth budget
- Integral Imaging (16-32x and up)
  - Multiview with vertical parallax, resolution issues
  - Directions at the expense of resolution - for systems based on 2D panels, except time multiplexing: multiview: 1/n; integral: $1/n^2$
- Volumetric (20 slices and up / time sequential)
  - The addressed slices/planes/spatial positions enabled by the projection technology, moving components
  - Multi-layer solutions: depth resolution discreet
- Light-field (64x and up for continuous parallax)
  - Horizontal parallax now, possible to do full parallax
- Holographic displays (~10^6x and up)
  - Pure holographic solutions: laboratory models, small image size, slow updates, viewing angle limited

The HoloVizio Technology:
„let the display work not the brain”

Products - Displays

On the market under the HOLOVIZIO™



- The world first glasses-free 3D Cinema system
  - **HoloVizio C80** - 140” (3m x 1,8m) reflective holoscreen,

- Large-scale HoloVizio system
  - **HoloVizio 722RC** 72”, 73 Mpixel
- Digital signage HoloVizio system
  - **HoloVizio 361** 45”, 36 Mpixel

- HoloVizio monitors
  - **HoloVizio 80WLT** 30”, (16:10) 78 Mpixel
    the full angle total freedom 3D experience

Next generation displays in the product development pipeline

Professional HoloVizio applications

- Applications, use cases
  - Medical – diagnostics, surgical planning
  - Automotive
  - Scientific visualization, CAD/CAM
  - Geospatial visualization
  - Professional 3D evaluation display
  - Oil&gas exploration visualization - integration with custom software
  - Event rental

FP7 Projects

- Holografika gained experience with FP7 projects
- Major contribution to accelerate development

COHERENT

MUSCADE
MUltimedia SCAlable 3D for Europe

holovision

DIOMEDES

3D PHONE

safros
Patient Safety in Robotic Surgery

Holonics

Prolight-IAPP

3D VIVANT

VISUALIZATION
DATA INTENSIVE DIVA AND ANALYSIS

SEVENTH FRAMEWORK PROGRAMME

H2020

- Holografika participated in proposals of several themes:
  - Leadership in enabling and industrial technologies (LEIT) ICT
  - Future and Emerging Technologies
  - Societal Challenges
  - Marie-Sklodowska-Curie Actions
  - SME Instrument

LEIT-ICT

- Very similar to FP7 STREP/IP projects
- Multinational consortium, several major objectives
- Technical deliverables, regular technical reviews
- Research and Innovation Actions (RIA) or Innovation Actions (IA)
  - Focus is very different (80%-20% vs. 20%-80% research-innov.)
  - From funding rate point of view, it's all the same for Universities, but it makes a big difference for companies
- Good instrument IF
  - There are suitable and competent partners to work with
  - Your topic fits one of the work programme topics
- Example: OptIntegral

OptIntegral

- Advertisement displays manufactured by hybrid in-mould integration
- In ICT-03-2014: Advanced Thin, Organic and Large Area Electronics (TOLAE) technologies
- Innovation Action, Large Project (6.6M EUR), 9 partners
- Technological objectives
  - Develop the in-mould hybrid integration process for TOLAE LED displays manufacturing
  - Develop the design protocols for plastic optics to be integrated with flexible lighting electronics with injection over-moulding
  - Develop three groups of advertisement displays demonstrators: back-lighted, light-pipe and glasses-free 3D
  - Set up three pilot manufacturing lines
  - ...

Marie-Sklodowska-Curie Actions

- Holografika involved in Innovative Training Networks
- Focus is on training Early Stage Researchers (ESRs)
  - Training through research
  - PhD enrolment is strongly recommended for all ESRs
- Group of ESRs are hired by the project partners, their salary is fully covered
- ESR's topics synhronized to enable collaboration
- Participating institutions are not required to make new developments – ESRs do that
- Good instrument IF
  - You can find good ESRs who can fit in the organization easily
  - You can find good balance between research, learning, and producing tangible results

Marie-Sklodowska-Curie Actions

- ESRs have fixed term contract with one of the project partners
- ESRs are required to come from abroad (mobility rule)
  - Makes hiring process very difficult if they come from non-EU countries (which is quite typical)
- Secondments of ESRs between partners are required
- Joint training events organized by the project
- Partner Organizations support these activities

- Example: QoE-Net, ETN-FPI

QoE-Net

- innovative Quality Of Experience maNagement in Emerging mulTimedia services
- 12 ESRs are hired for 3 years each, at 8 partners
- Objectives
  - Set up a multi-national doctoral training network program for interdisciplinary training and research and development of QoE modeling, optimization and management and their application for new and emerging multimedia services (mobile gaming, social TV, web services)
  - Train early-stage researchers for the development of required knowledge and skills in the interdisciplinary fields
  - To provide Fellows training opportunities in relevant industry organizations
  - Support fellows, through supervision, coaching, mentoring schemes and skill development plan, to develop complementary transferrable skills

ETN-FPI

- European Training Network on Full Parallax Imaging
- 15 ESRs are hired for 3 years each, at 8 partners
- Objectives
  - Advance the theory and practice of 3D scene sensing and content creation and develop new imaging systems
  - Advance the theory and practice of lightfield data analysis and interpretation for novel FPI
  - Develop novel effective representations for lightfield data and associated reconstruction and conversion algorithms.
  - Develop computationally-efficient compression and processing methods utilizing modern parallel computing platforms
  - Characterize optimal visualization of 3D visual scenes onto various displays
  - Organize network-wide training program […] for the ESRs helping them to become excellent researchers

SME Instrument

- New funding instrument in H2020 (much awaited!)
- Targeted for SMEs or SME consortiums
- Single SME can apply, collaboration is not mandatory
- Topic is free to choose: ICT-37 Open Disruptive Innovation Scheme can cover a wide range of topics
- Application procedure is quite simple (30 pages max)
- Up to 2.5M EUR funding
- Extremely competitive
- Good instrument IF
  - You can foresee a big impact and describe it convincingly
  - Your business plan is sound (treat it like an investor will read it)
  - You have reached TRL6 already (Technology demonstrated in relevant environment)

Questions?

p.kovacs@holografika.com
www.holografika.com