Keynote: Ralph W. Brown, SVP & CTO, CableLabs®

The future of TV…

Will not be TV!

Let's talk about the near future

https://www.cablelabs.com/thenearfuture/

Evolution of immersive experiences

- Flat pixels
  - Legacy image/video capture
  - Legacy displays
  - stereoscopy
  - AR/VR on HMDs
- Interaction
  - Games
  - AR/VR
- Holographic pixels
  - Light field capture
  - Light field display technology

Flat pixels

- Each pixel
  - is a single color (R,G,B)
  - projects light at only one intensity
  - And in only one direction

- Represented in raster format
  - A rectangular grid of RGB values

- Raster is captured
  - at a certain moment in time
  - with a certain amount of ambient light
  - at a certain camera location
  - for a certain point of view
  - at a particular resolution

The best you will get with flat pixels

Flat panel resolution greater than what eye can detect at normal viewing distances. Panels also able to do excellent upscale from HD to UHD. All panels support some type of renderer.

Social interaction ALWAYS limited. Headsets that are less $$$ deliver poor visual experience (strap mobile phone inches from your eyes). Headsets that cost more $$$ are tethered, expensive, deliver better but still inadequate visual experience.

MPEG-I (Immersive) all flat pixels

- Omnidirectional MediA Format (OMAF)
  - Signaling and metadata to project 360° video into 2D video coding format

- Versatile Video Coding (JVET)
  - Call for Proposals Oct 2018
  - Standard complete Oct 2020
  - More of the same (8K, 16K)

- Point cloud coding
  - Assumes all object surfaces are lambertian (i.e. do not reflect light)
  - Results look cartoon-ish
  - First version based on video coding tech! (have hammer; the world is full of nails)

- So far**, all about flat pixels** and camera-captured content

- Workflow Guidelines

- 3 Degrees of Freedom
  – Yaw, Pitch, Roll

- 6 Degrees of Freedom
  – Yaw, Pitch, Roll
  – Up, Down, Forward (Back)
  – Not an easy problem to solve with flat pixels (raster data).
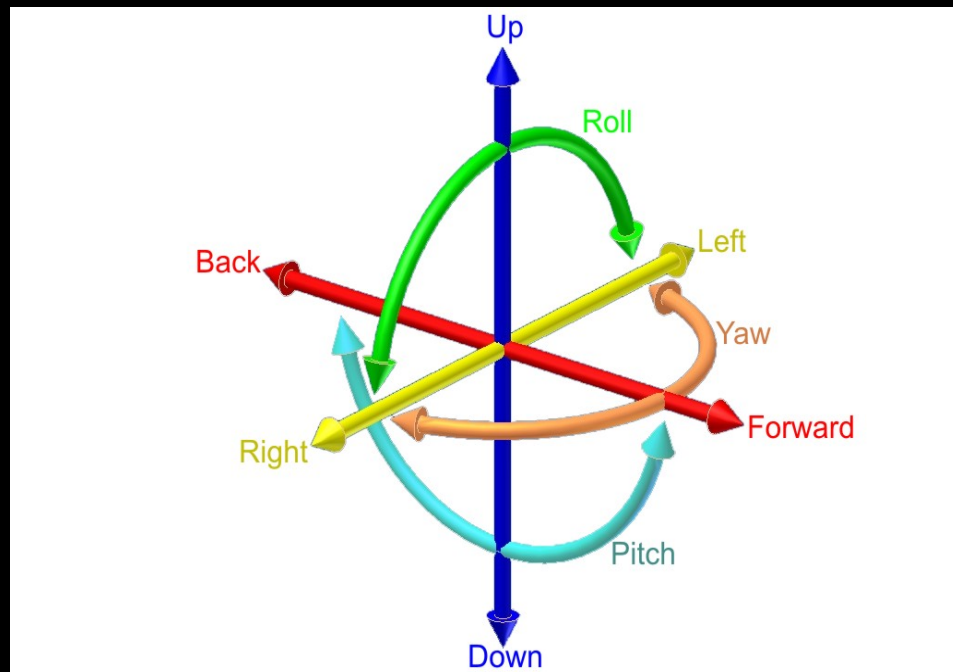
Holographic pixels

- Each holographic pixel
  - Comprised of **dense** array of holographic subpixels

- Each holographic subpixel
  - Collimated rays of light
  - Analogous to a vector (specific **direction** and **intensity**)

- Represented in vector graphics format
  - Formats used for visual effects
  - For both real world and CGI content

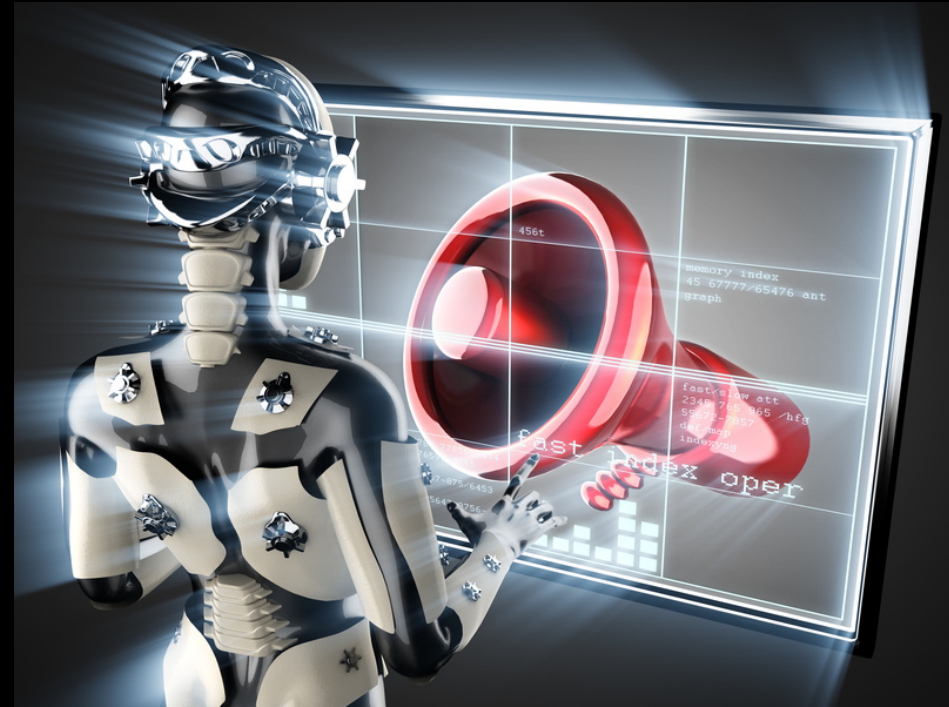- Essential for light field displays

Implications on ecosystem

- New technologies for capture, distribution, display

- Requires much more bandwidth

- New media format (ORBX)

- New standards and standards organizations

- Leverage of existing 3D modelling tools

- Can replace televisions

- Different business models

- Already getting started …

Conclusion

- Flat pixels for legacy TV
  - Raster-based
  - Only type supported in MPEG, VRIF
  - 2D video, higher resolutions
  - Addressing marketing perception that more flat pixels is better

- Holographic pixels are the future
  - Vector-based
  - Supports visual cues (e.g. 6DoF)
  - Used in light field displays
  - Potential to build holodeck
  - Easy to replicate flat pixels