



30 JULY – 3 AUGUST *Los Angeles*
SIGGRAPH 2017
COURSES

Summary and Outlook



James Tompkin



BROWN
Computer Science



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HOW DID WE GET HERE?



- 360 video



- Stereo 360 video



- Light field video



HOW DID WE GET HERE?



- Technical foundations:
 - 360 video: getting easier to capture, edit, distribute.



HOW DID WE GET HERE?



- Technical foundations:
 - 360 video: getting easier to capture, edit, distribute.
 - Stereo 3D video and panoramas panoramas.

No blending

Flow-based blending



HOW DID WE GET HERE?



- Current practice:
 - Art, storytelling, and tools to support creators

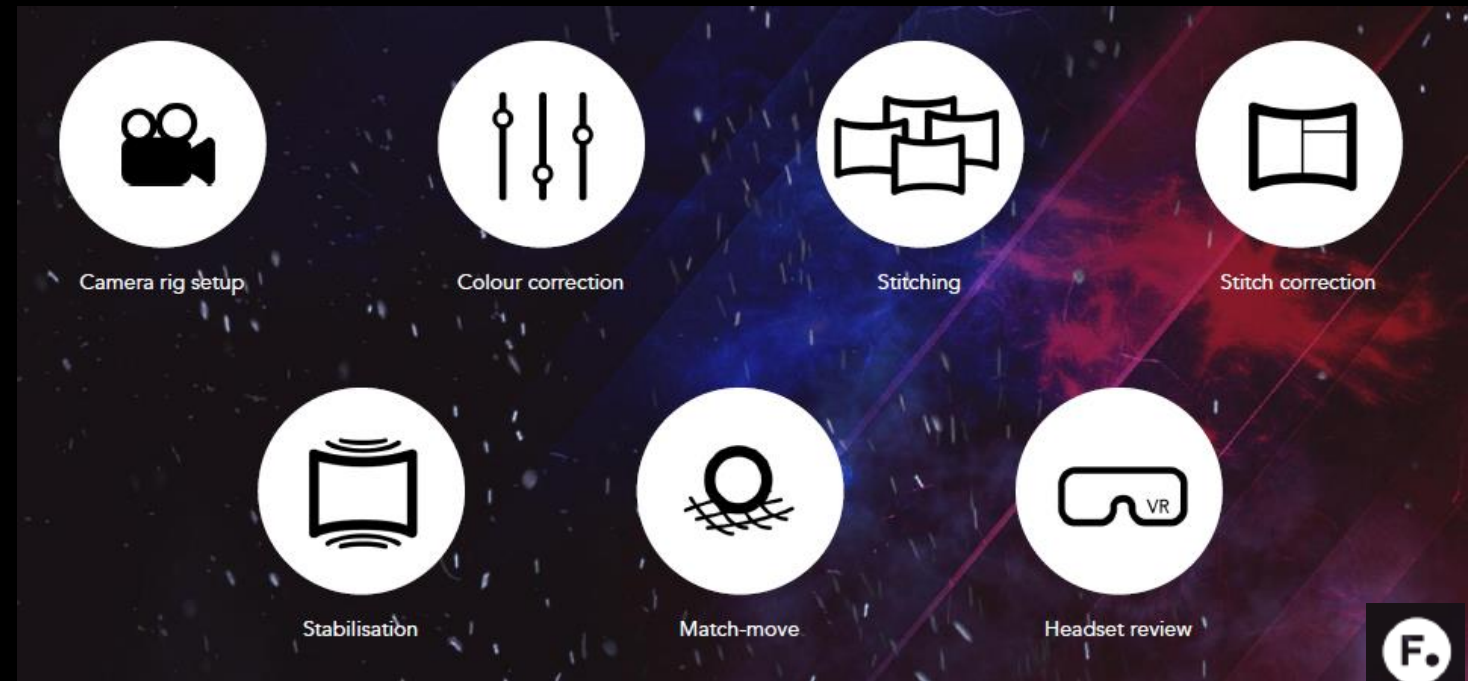


[Vremiere]

HOW DID WE GET HERE?



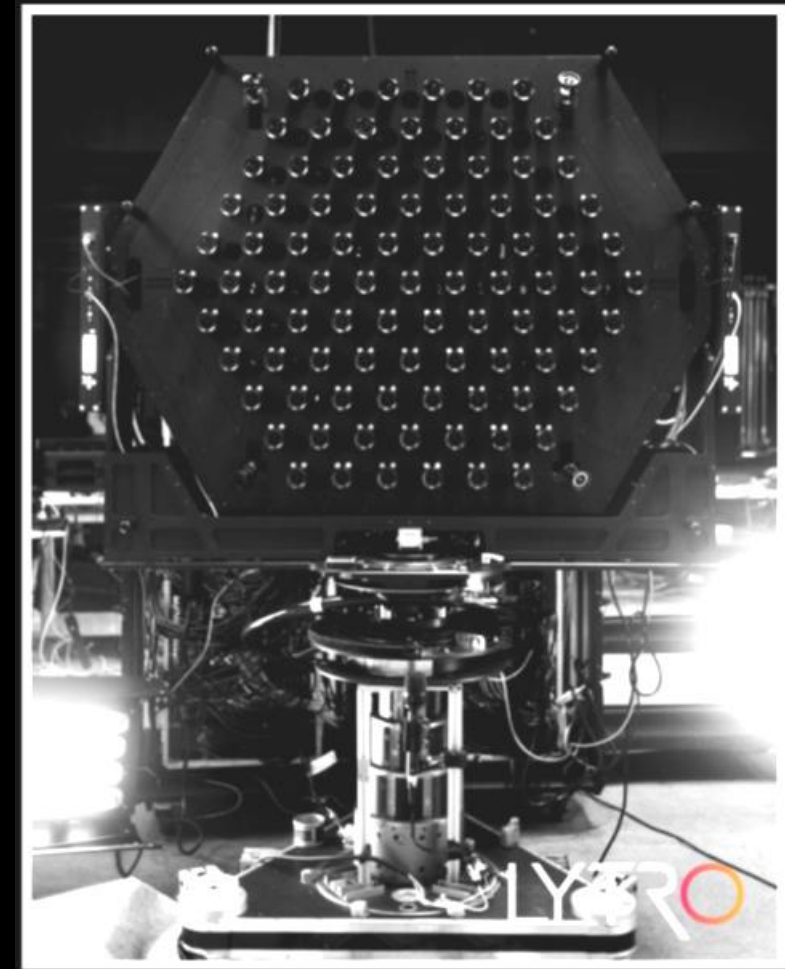
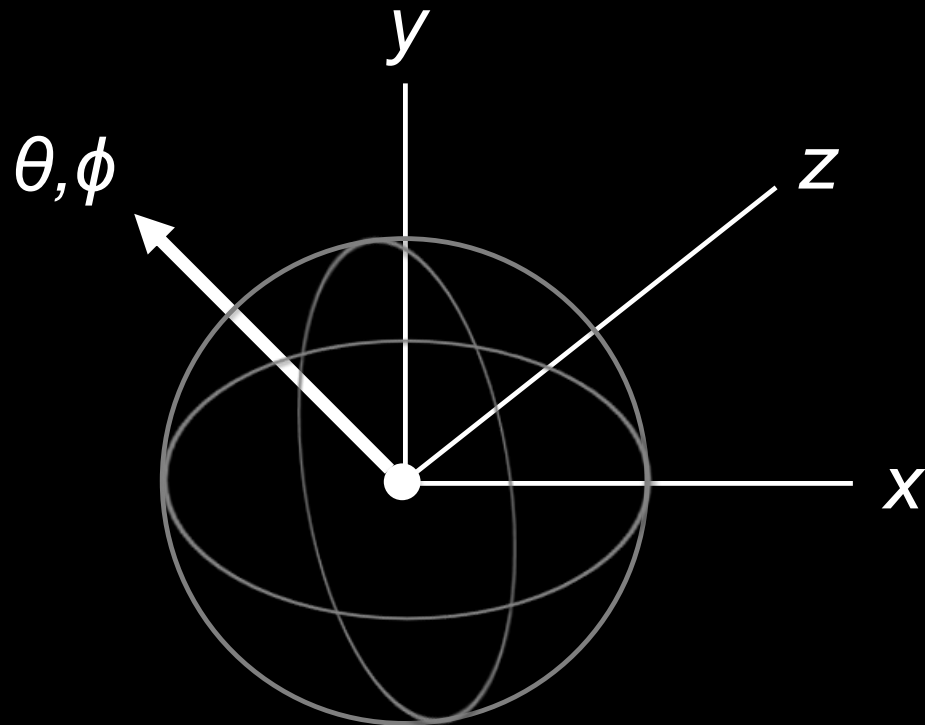
- Current practice:
 - Art, storytelling, and tools to support creators
 - Stereo 360 video production and post-production pipelines



HOW DID WE GET HERE?



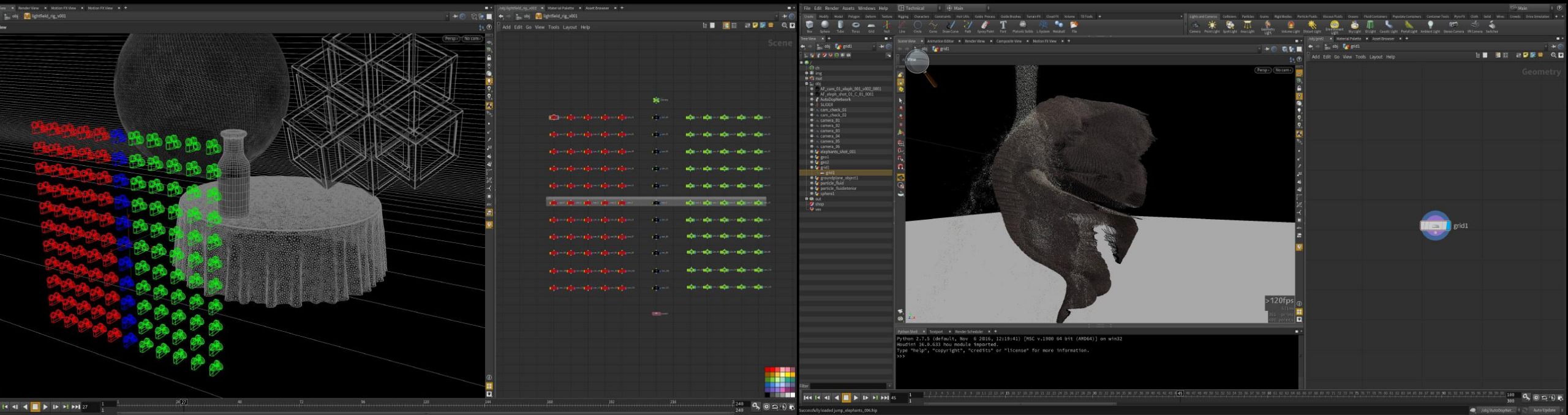
- Cutting edge:
 - Light field basics



HOW DID WE GET HERE?



- Cutting edge:
 - Light field basics
 - Light field videos production



ARE WE THERE YET?



- Does VR video look and feel real?
 - ‘Retina’ resolution = invisible pixels

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 - 6 degrees-of-freedom (6DoF) capture + display

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 - High dynamic range (HDR)
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 - 6 degrees-of-freedom (6DoF) capture + display
 - Accurate object appearance: flawless geometry, view-dependent reflectance effects, e.g., mirrors, transparency

ARE WE THERE YET?

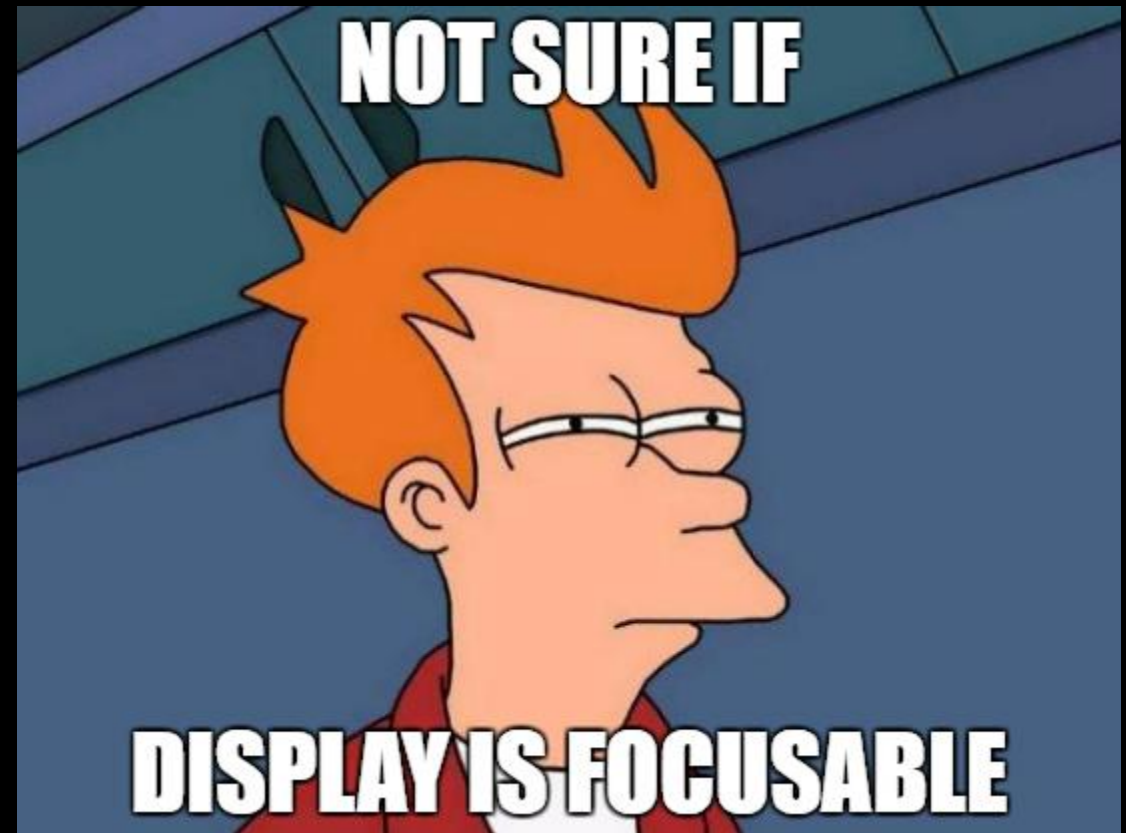


-
- *A lot* of data to capture, store, process, distribute.
 - Limits effective resolution.
 - Editing!
 - Consistent representations (exploit correspondence).
 - Physically-meaningful representations (easier to edit).
 - Especially materials and reflectance.
 - Consumer cameras and tools.

WHAT ABOUT ACCOMMODATION?



- Focusable displays
- Eye tracking + depth of field rendering
- Many neat display systems on show at SIGGRAPH.



Q & A: ASKING OUR TEAM...



Aaron
Hertzmann

Oliver
Wang

Jon
Starck

Jordan
Halsey

Christian
Richardt

James
Tompkin



*What single thing would
most improve video for VR?*



Aaron
Hertzmann

“High quality capture and
authoring for 6DoF.”





Oliver
Wang



“Display technology is the big limitation now.

We need comfortable HMDs that have wide field of view, high pixel density, variable focus, and good tracking.”



Christian
Richardt



“Putting the past two things together [will most improve VR video].

High-quality 360 degree environment (video) capture, processing and display in 6DoF with light field displays.”



Jon
Starck

FOUNDRY.

“6DoF cats.”



Cats And VR

The Future iz Meow!

www.catsandvr.com



Jon
Starck

FOUNDRY.

“Content is king’ – content drives adoption.

‘Wow factor’ needs a *huge* budget.
Complexity and cost to create high-quality
content is the real barrier.

We need simple accessible tools to
experiment and create VR video,
with a platform to deliver it.”



Jon
Starck

FOUNDRY.

“There is a perpetual argument about the type of content appropriate for VR.

What's clear is that VR makes sense for experiential content. Better tech (displays, 6DoF) will make it ‘as if you were there’.”



Jon
Starck

FOUNDRY.

“I still wonder though...

...even if there is high quality 360 content, with high quality displays and full 6DoF support...

What will make people put on a headset at home?”



Jordan
Halsey

VR Playhouse



“Better information extraction from imagery.

32-bit+ depth, planar+ surfaces, SV-BSDFs...

Everything for physically-based rendering.

Integrate modalities to help (lidar + video).

Machine vision for surface recognition to fill in what we can't sample.”



Jordan
Halsey

VR Playhouse



“People on mass will put on headsets when they look good, are untethered, and can function as AR glasses.

Everything is preparation for that day.

Until then, it's Netscape in 1992.”



James
Tompkin



Reducing sickness.

Live-streaming video = telecommunications.

VR video elements for augmented reality.

What sells? *Sex and Sports.*

QUESTIONS FOR YOU



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- What depictions and experiences are best suited to VR?
 - What kinds of experiences do you *want*?
 - Where will experiences go next?
 - How would you convince mass market of strengths of medium?
 - How long until 6DoF will be cost effective?



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Thank you!

<http://richardt.name/pub/Video4VR/>



Q & A prompts:

Aaron: “High quality capture and authoring for 6DOF.”

Oliver: “Displays. Wide FOV, dense pixels, variable focus, good tracking.”

Christian: “Only by combining these two.”

Jon: “Content is king; better content tools.”

Jordan: “Physically-based reconstruction.”

James: “Sickness. Sports. Streaming.”