

The Development of Virtual Production in Film Industry in the Past Decade

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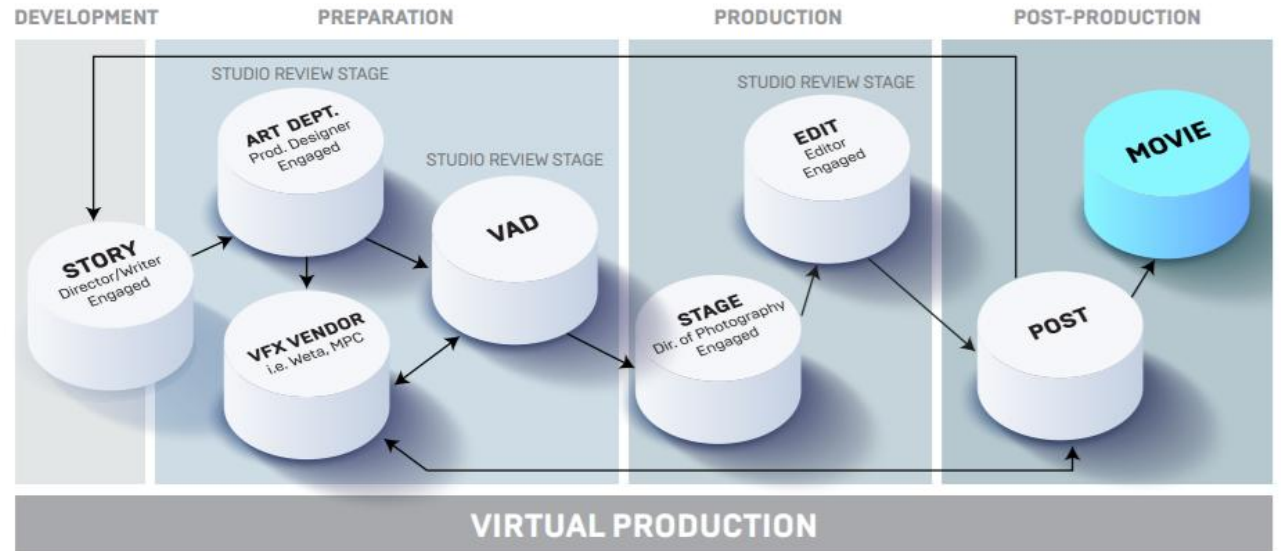
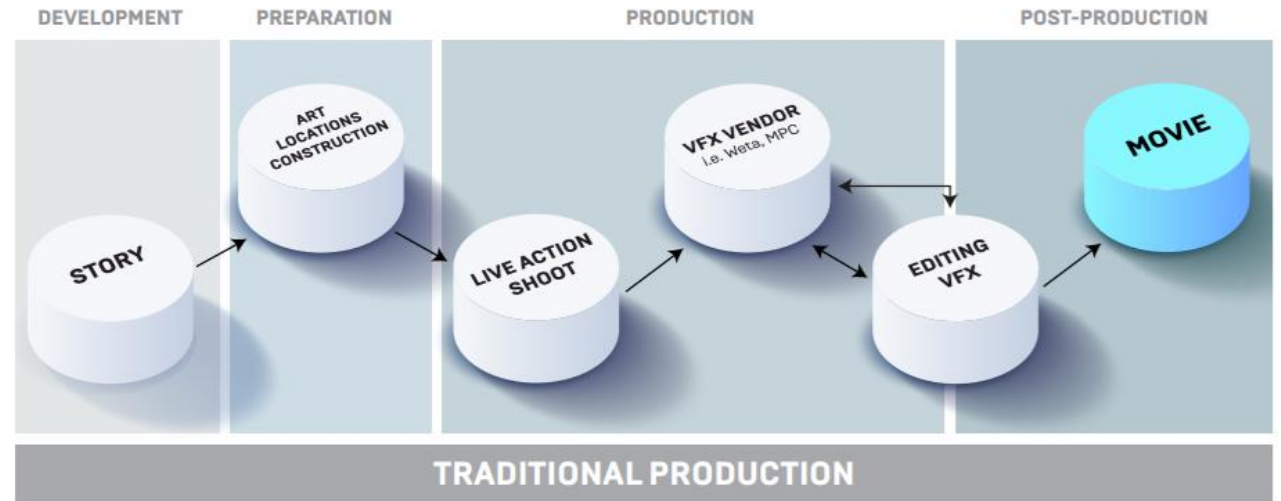
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Presenter: Zhiyuan Yu

Introduction

Virtual production combines virtual and augment reality with CGI and game-engine technologies to enable production crews to watch their scenes unfold as they are composed and captured on set.



Introduction

Unlike traditional CG films' linear production method, virtual production provides a "Real-Time" preview.

Film artists can make creative decisions on the set while scouting and filming in virtual scenes.



Aim and Objective:

Discover and analyze the development trend of Virtual Production in filmmaking in the past ten years, predicate the prospect of Virtual Production in the film industry.



Research Question:

1. What is the development trend of the application of VR technology in CG film production in the past decade?
2. What is the future prospect of the application of VR technology in CG film production?

Research Cases:



Avatar
2009



The Jungle Book
2015



Ready Player One
2018



Lion King
2019



DEL DIRECTOR DE 'TITANIC'

Literature Review

Avatar, 2009

James Cameron had started to use primary VR concepts and techniques, applying motion capture technology to the cinematic camera, creating a virtual-camera system called "Simul Cam."

A virtual camera with the same track in the CG world was generated so that the live-action scene and CG scene were able to be composed in low quality, but director could preview the CG shot in real-time.



Literature Review

Avatar, 2009

It is undeniable that it laid a foundation for virtual-production in the film industry.

Avatar's VR technology is described as the "shoulder of giant" and plays the role of inspiration in many reviews below.



Literature Review

The Jungle Book, 2015

Most of the shots in the film are done in a closed virtual-studio. This new production model is called the **Warehouse model**.

A new department named "Digital Domain" was high-lighted in the Jungle Book.

Digital Domain is the primary virtual-production vendor on the film, in charge of everything from supporting the virtual art department.



Literature Review

The Jungle Book, 2015

The technical director of the digital domain introduced a unity video-game engine used in The Jungle Book, called Photon.

Photon was the first time a game engine was deeply applied to the feature film and previsualized the entire film from start to end.



Literature Review

The Jungle Book, 2015

Through the review, virtual production in The Jungle Book can be regarded as a revolutionary development.

The game engine began to participate in the rendering work, and the physical camera was gradually replaced by virtual-camera.

A BETTER REALITY AWAITS

A STEVEN SPIELBERG FILM
**READY
PLAYER
ONE**
COMING SOON

Literature Review

Ready Player One, 2018

Virtual artists in Ready Player One using Maya and other 3D modeling tools create virtual sets, props, vehicles, characters, and environments that could run in a modified version of real-time rendering game engine.

One of Jungle Book's changes was that filmmakers could scout the virtual sets in VR, which was considered an improvement after 2015.

MUSIC BY ALAN SILVESTRI, EXECUTIVE PRODUCERS ADAM SOMNER, DANIEL LUPI, CHRIS DE FARIA AND BRUCE BERMAN
BASED ON THE NOVEL BY ERNEST CLINE, SCREENPLAY BY ZAH PENN AND ERNEST CLINE, PRODUCED BY DONALD DE LINE, P. 13
STEVEN SPIELBERG, P. 23, HASTIE MACDOSHO HRIEGER, P. 23, DAN FARAH, P. 23, DIRECTED BY STEVEN SPIELBERG
SEE IT IN 3D

A BETTER REALITY AWAITS

A STEVEN SPIELBERG FILM
**READY
PLAYER
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COMING SOON

Literature Review

Ready Player One, 2018

In Ready Player One's production, director could reach anywhere in OASIS with his virtual camera, like shooting films in the real world.

Compared with The Jungle Book, director owned more controls on the VR world created by the game engine.

It was more accessible and more flexible for filmmakers to scout and design the virtual scene by wearing VR Head-Mount Display.

MUSIC BY ALAN SILVESTRI, EXECUTIVE PRODUCERS ADAM SOMNER, DANIEL LUPI, CHRIS DE FARIA AND BRUCE BERMAN
BASED ON THE NOVEL BY ERNEST CLINE, SCREENPLAY BY ZAK PENN AND ERNEST CLINE, PRODUCED BY DONALD DE LINE, P. 3. A
STEVEN SPIELBERG, P. 3. A. HASTIE MACDOSHO HRIEGER, P. 3. A. DAN FARAH, P. 3. A. DIRECTED BY STEVEN SPIELBERG
SEE IT IN 3D



Disney

JULY 19

Literature Review

Lion King, 2019

With the previous experience, Favreau brought virtual production element into Lion King.

To create lifelike CG scenes, the team shot footage of wildlife in Kenya, Africa, and used them as references for rendering CG shots.



Disney

JULY 19

Literature Review

Lion King, 2019

The virtual production team rendered an entire large CG landscape of Africa grassland, which helped relieve the physical limitations of filming, all the shots could be reshot at any time.

The boundaries between filmmaking and game-making had been blurred gradually.

Methodology

Longitudinal studies refer to collecting data at several different points in time to describe the development and change of phenomena and explain the connection between various phenomena.

This research selected "**trend studies**" as methodology.

Following the method of trend studies:

The "**secondary data**" about the VP of those four-film cases including videos, sounds, interviews, and texts were assembled and connected.

Data Collection



Quantity and Form of Data:

16 literal data (From XJTLU Library database & other website)

- Journal article (Hollywood Reporter, American Cinematographer.....)
- Conference paper
- Web article
- Web news report

15 video data (From YouTube)

- “Behind the Scene” documentary
- Interview of director, cinematographer, producer, VFX supervisor.....
- Live Talk about “Virtual filmmaking” (Unity, Unreal Engine)
- Recorded video of conference about “Virtual filmmaking” (SIGGRAPH)

Data Collection: Journal article & Web article

To Be King



Scar (Chiwetel Ejiofor), Mufasa's nefarious brother, forms an alliance with the hyenas.

Legato: It's a big master file that has the animation and the setting in 360 degrees, and it's 'waiting' for the virtual camera and virtual lighting — and then we walk into it in VR and start to become specific. 'Put the sun over here, put a rock in the foreground, and this is where I'm going to photograph with a 50mm lens.' It becomes viewable [on a traditional screen] when you enter the program

and photograph it. You have to think of it as a live-action set — you're staging the master scene, which is contained in the file, and then picking apart the scene throughout the day by relighting and reshooting various moments for close-ups and multiple angles. We shoot with a single camera — you don't need multiple cameras, because the action is going to be repeated exactly the same way each

time, so it's easier just to move the camera.

Deschanel: [When starting work on a scene, Sam Maniscalco, lead lighting artist from visual-effects studio Moving Picture Company (MPC), would look at it, and based on where we were in the story, begin to light it — considering the time of day, the location and so forth. We would also pick the sky to go with the scene; we needed to consider the mood, and we had 350 skies we could choose from. We would find the right clouds and sky color, and then adjust the sun



The *Lion King's* system of virtual capture allows for the overlay of movement elements, which Legato compares to "music that you're overdubbing. For example, if we loved what [operator] Henry Tiri did with his delicate Steadicam choreography, but the composition wasn't exactly right, then we could 'steal' his move and let Caleb operate over the top of that — we could remove the original panning and tilting and add Caleb's. You can

just separate it out, so one element is prerecorded and the other one is operating remotely."

Alternately, he adds, after a given shot, "we might say, 'let's erase the focus pull, replay the recorded shot, and then have 1st AC Tommy Tieche do another take of it' — without having to reshoot everything just to do another focus take. It's literally like visual overdubbing."

Journal article

'Ready Player One' Juxtaposes Real, Virtual Via VFX From Three Shops

By Paula Parisi



Courtesy of Warner Bros.

Director Steven Spielberg set an ambitious goal for himself and his "Ready Player One" VFX team: weaving viewers in and out of a virtual world within the storytelling parameters of a traditional film. The movie, released by Warner Bros. in March, is one of five up for a visual effects Oscar this year.

To adapt Ernest Cline's 2011 young adult novel about kids who escape a dystopian 2045 by immersing themselves in a massively multiplayer online simulation game, the talents of no fewer than 11 tech firms were required. The bulk of the work fell to three companies: Digital Domain, Industrial Light & Magic and Territory Studio.

The plot focuses on teenage gamer Wade Watts (Tye Sheridan), who, like most of the underemployed population, spends what seems like every waking hour role-playing inside the virtual world called Oasis. In the game, he competes in a series of puzzles, the successful completion of which will result in ownership of the Oasis itself.

The film's two distinct worlds — a dingy, overcrowded reality in which people live piled on top of each other in housing units called stacks, and the vividly extravagant Oasis — provided a natural division of labor for the effects teams: Digital Domain managed previsualization for the entire film, handled motion capture and virtual sets and also created the real-world effects. ILM conjured the CGI for the Oasis; Territory Studio created graphics that bridged the two worlds — seen mainly on

Web article



Virtual cameras and game cinematography

These advantages, continues Paolo Burelli, "allow virtual cameras to film scenes with much higher freedom and expressiveness; however, this can potentially contrast with the filming conventions developed in traditional cinematography. Such conventions describe aspects like the way the camera should be placed or the way it should be moved to make a transition between two different scenes, and adherence to these conventions is often important to generate a cinematographic experience and not to disorient the viewer — e.g. by crossing the line of action (Arijon, 1991).

The author also points to the fact that "the relationship between **game cinematography** and its traditional counterpart is extremely tight as, in both cases, the aim of cinematography is to control the viewer's perspective and affect his or her perception of the events represented" stating that "however, game events are not necessarily pre-scripted and player interaction has a major role on the quality of a game experience; therefore, the role of the camera and the challenges connected to it are different in game cinematography as the virtual camera has to both dynamically react to unexpected events to correctly convey the game story and take into consideration player actions and desires to support their interaction with the virtual world."

Web article

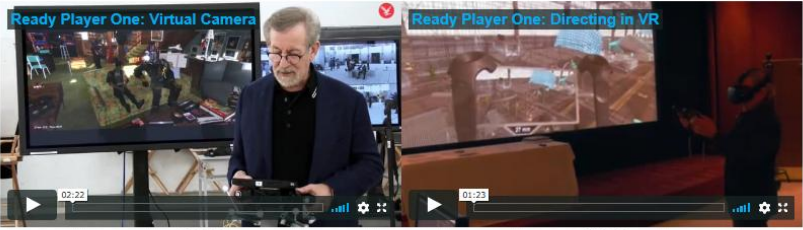
Data Collection:

Documentary video



▶ AVATAR (2009) - Making Of and Behind The Scenes

Avatar 2009



Ready Player One: Virtual Camera Ready Player One: Directing in VR



HTC VIVE x READY PLAYER ONE - Utilizing VIVE In The Filmmaking Process

Ready Player One 2018

Data Collection:

Interview of filmmakers



Jon Favreau on Directing 'The Lion King' in VR and Working with Beyonce

2,543次观看 · 2019年7月30日

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Interview of Jon Favreau (Lion King)



30 Minuten mit Steven Spielberg & Ernest Cline - Über die 80er, digitale Welten & Ready Player One

Interview with Steven Spielberg (Ready Player One)

Data Collection:

Conference and live talk about Virtual Production

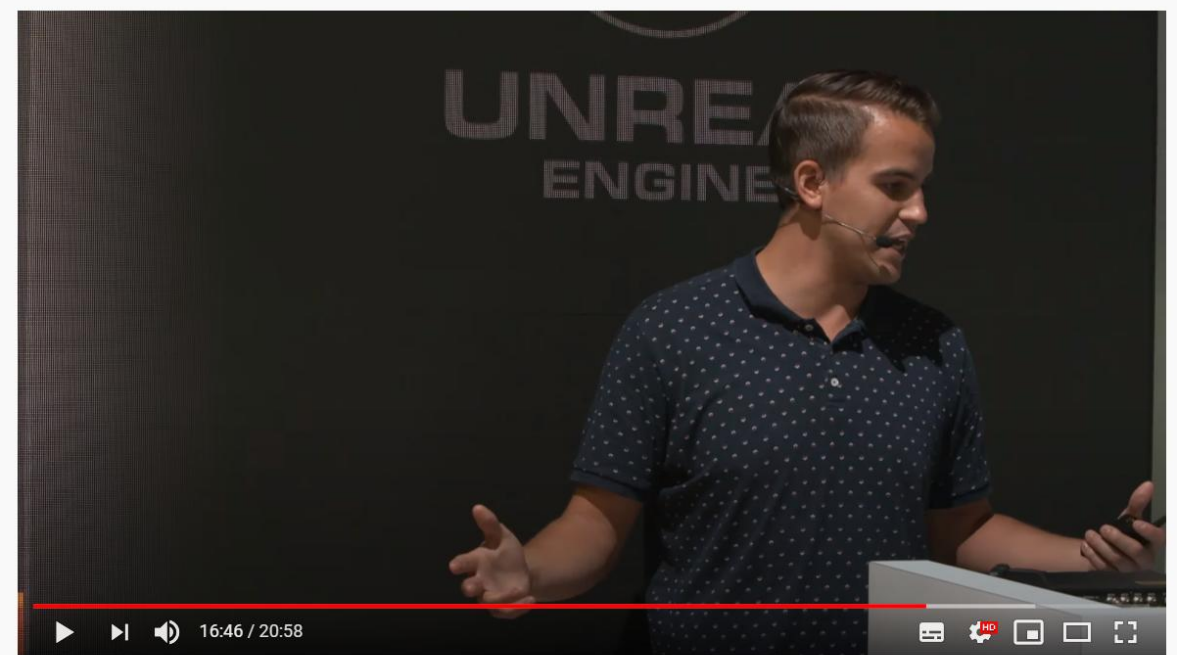


Siggraph 2018 - Using a Real-Time Engine in Movie Production

10,720次观看 · 2018年9月21日

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Unity's talk in SIGGRAPH 2018



Fox VFX Lab - Virtual Production and Collaborative Filmmaking | SIGGRAPH 2019 | Unreal Engine

Unreal Engine's Talk in SIGGRAPH 2019

Database of the Research

Note of Video Data Unique No. & Title Timecode & key quote (important evidence)

No.1.2 AVATAR (2009) - Making Of and Behind The Scenes https://www.youtube.com/watch?v=_Y8Buy5b6DQ&t=22s
10:20 Rob Logan used virtual camera but in a post-production method, and he had the idea to apply the same thing to the performance capture. Jim and John visited a bale wolf set which is a blind cap which means reference camera only for the performance of actors and not seeing any rendered environment.
11:30 We put you in a special volume, the volume is the stage. Markers are on the actors' body and be picked up by hundreds of cameras on the top which provide different views.
12:00 When I hold the camera, I don't see the actors, I see the characters (already rendered), so I'm basically holding a monitor, no lens, just a marker on the set to see where the actors are moving. It is called a camera, but it's not a camera.
13:32 First, I designed the concept illustration of Pandora's environment, which was inspired by the mountains of Guilin in China and the jungles of South America.
21:58 For VFX of character clothing, there is no reference in reality, so the real object should be made first, and then simulation should be converted into animation.
44:54 Virtual camera & reference camera (two different things) virtual camera shows what the shot will look like with the CG character and the world combined. Reference cameras are absolutely critical for getting exactly the moment that we want, and the animators take the referenced footage.
50:00 Build physical layout to help actor performance everything in the digital environment is modular, we can move or scale a big stone by only a few second. Don't need to wait for the lighting and set different from traditional filmmaking.
53:00 Jim directs the actors how to perform with CG creature, because in the virtual world they are all there for him. Jim needs to view the virtual camera (monitor) to know about the virtual set.
56:00 Before making the CG scene, design the concept illustration first.
58:00 Jim could use the virtual camera (monitor) to scout the set and environment and adjust the set.

No.4.5 The Lion King and Virtual Filmmaking (with Caleb Deschanel) GCS179 https://www.youtube.com/watch?v=9sjhdU9FB7Q
06:52 MPC studio went to Africa and photograph grass, trees and rocks.
10:53 Lions are so closed to the cinematographer.
27:54 The technical team will attach the virtual dolly to the real a real dolly on stage (so that the shot will have a human feel, not just mechanical).
29:40 Stedicam operator needs to adapt the VR tools. In virtual reality the ground is tilt up or down but in stage is flat surface
35:30 Lens are designed with some aberration. Shot made by a perfect lens looks unreal. Most of the lens have anamorphic and distortion.
38:30 LIGHTING: We could virtually keep the sun in the same place all the time (if in live-action movie, the position of sun change and make the shots disconnected).

No.4.6 The Lion King 2019 - Making Of - How it was filmed in a realistic way https://www.youtube.com/watch?v=KCnayCnM6Zk&pbjreload=10
06:12 Production Design Conceptual Art: illustrators render up an idea of a vision of the world at a high level of resolution, then going back to building blocks inside the computer, shaping, adding elements and dressing.
06:35 We are doing 100 miles radius circle of open vista landscape with grass, trees and rocks. Develop simulation to grow grass in different height, water erode certain surface.
08:14 Digital shots done by computer is perfect, but that perfection leads to a feeling that it's artificial, so we need to make it look likes it is really filmed.
09:02 We go inside the volume, a technology blank place, filled with grids that hold VR sensors : tell the computers where the virtual cameras, stedicam, dollies, cranes are in space. These are all feel like and look like real filmmaking equipment, except no camera attached. "We are giving the filmmakers all the analog tools that they are familiar with", their instincts are reliable, but the output is all through the real-time game engine.
10:26 VFX Supervisor Robert: the films we loved, there are some great shots looks like an accident, the computer eliminates that, nulls all "accident" out.
11:27 DoP Caleb: VR giving us the experience of being in the set.
15:30 Jon and his team (production designer, cinematographer) sitting in a small room, putting on VR headset and scouting the scene, discussing angle, composition of the shots (BEFORE animated character).

No.5.3 Fox VFX Lab - Virtual Production and Collaborative Filmmaking SIGGRAPH 2019 Unreal Engine https://www.youtube.com/watch?v=ai6PH61PMvM
Virtual Production helps Collaborative Filmmaking
2:26 In the past, the VFX film production is linear, many decisions have to be made in post-production
5:10 Through VP, different artists could work together in the stage and create "Happy Accident"
5:48 Collaborate with actor Collaborate with cinematographer (Have More Creation Freedom, Inspire each other)
6:38 Save time and money
Change order: In traditional VFX film, VFX are set and done by team, it's hard to change, but in VP, director could find out the problem immediately in the set
More artists could work together, and things could be done at the same time (moving set, moving light)
10:25 Gamifying Film bring automatic and simplify for filmmakers, let them more comfortable to make film, put the control to the hands of the artists (They are not VP experts, and they don't need to be)

No.5.4 Real-Time engine for virtual production https://www.youtube.com/watch?v=U_NG7Wfo17s
4:38 Virtual camera in game (the freedom to fly the camera anywhere and look at anything)
12:00 Location scouting (staffs from different departments could view the set and location visualize. (the great thing for this technology is we could bring Steve in and he could scout the set virtually.
13:19 It is difficult for director and actor to make film in a white room and white ceiling, it is hard to imagine the environment they are. So Steve ask the actors to also put on the VR helmet.
14:02 (little story) when Steve scout the location, he always has to put off the visor to drink, so they set markers on the drink and make it virtually.
24:24 comparison between Maya (keyframing camera) and Expozure (real-time virtual camera) in Tom Hank's new film.
26:00 Starting to demonstrate virtual photography, the line between game and film production is very blurred.

Database of the Research

Avatar			
No.	Form	Title & Link	Content
1.1	article	https://doi.org/10.3969/j.issn.1092-6142.2010.03.002	Introduction and analysis of technology in Avatar
1.2	video	AVATAR (2009) - Making Of and Behind The Scenes https://www.youtube.com/watch?v=_Y8Buy5b6DQ&t=22s	"Behind the Scene" documentary of Avatar

Jungle book			
No.	Form	Title & Link	Content
2.1	article	Motion Capture and the Future of VR Computer Graphics World http://search.ebscohost.com/login.aspx?direct=true&db=edg&AN=edgcl.526809777&site=eds-live&scope=site	Motion capture and virtual production in Jungle Book
2.2	article	Welcome to the Jungle. (cover story) http://search.ebscohost.com/login.aspx?direct=true&db=eh&AN=115370431&site=eds-live&scope=site	Behind the scene of Jungle Book
2.3	video	JUNGLE BOOK reveal BBC https://www.youtube.com/watch?v=BpRQU6avHM	Interview of VFX supervisor from MPC in Jungle Book
2.4	video	The Jungle Book (2016) Production B-Roll https://www.youtube.com/watch?v=69PWu5DlwI4	Production b-roll of Jungle Book
2.5	video	Go Behind the Scenes of The Jungle Book (2016) https://www.youtube.com/watch?v=zTebgHNSe_4	"Behind the Scene" documentary of Jungle Book

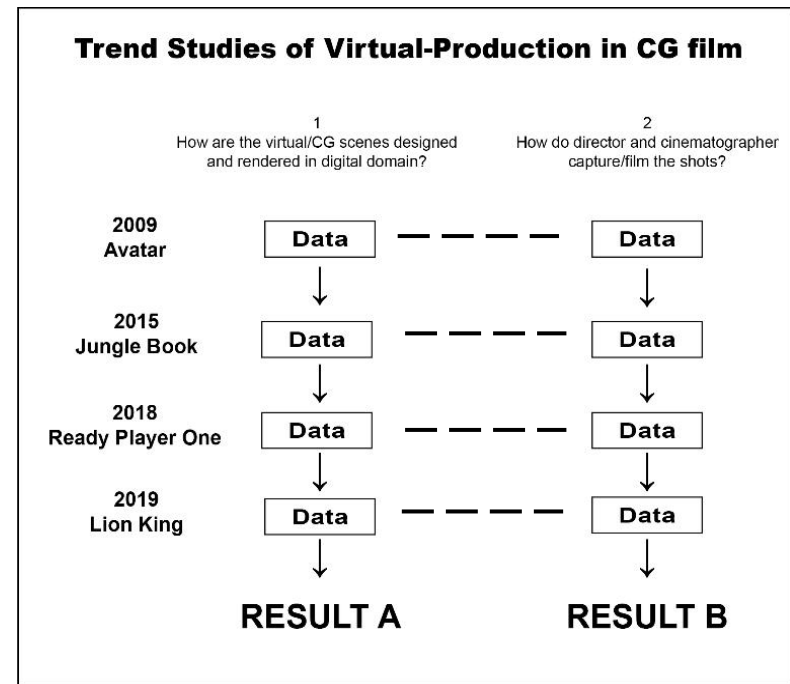
Ready Player One			
No.	Form	Title & Link	Content
3.1	article	VIRTUAL INSANITY. (cover story) http://search.ebscohost.com/login.aspx?direct=true&db=eh&AN=128637787&site=eds-live&scope=site	Virtual production in Ready Player One
3.2	article	Virtual Reality: Ready Set Go. http://search.ebscohost.com/login.aspx?direct=true&db=bn&AN=130345595&site=eds-live&scope=site	Virtual production in Ready Player One
3.3	article	How 'Ready Player One' Combined Virtual Production And Motion Capture Tools To Create Digital Characters https://www.cartoonbrew.com/vfx/how-ready-player-one-combined-virtual-production-and-motion-capture-tools-to-create-digital-characters-157821.html	Virtual production and motion capture in Ready Player One
3.4	article	'Ready Player One' Juxtaposes Real, Virtual Via VFX From Three Shops https://variety.com/2019/artisans/production/spielberg-ready-player-one-vfx-1203144265/	Virtual VFX in Ready Player One
3.5	video	STEVEN SPIELBERG'S READY PLAYER ONE https://girishbalakrishnan.com/redesign/portfolio-posts/ready-player-one/	"Behind the Scene" documentary video of Ready Player One
3.6	article	Cinematographer Janusz Kaminski Warns That Directors of Photography Are Losing Control of Images They Shoot https://www.hollywoodreporter.com/behind-screen/cinematographer-janusz-kaminski-warns-directors-photography-are-losing-control-images-they-shoot-1101082	DoP's opinion in Ready Player One
3.7	video	VRLA 2018 - From Today's VR To Ready Player One - A Roadmap https://www.youtube.com/watch?v=MCPSZOKUV1Q	VRLA 2018 Conference Recording Video
3.8	video	30 minutes with Steven Spielberg & Ernest Cline - About the 80s, digital worlds & Ready Player One https://www.youtube.com/watch?v=dykZLJ2Ua9o	Interview of Steven Spielberg about the production of Ready Player One
3.9	video	Steven Spielberg: From Pong to Ready Player One https://www.youtube.com/watch?v=ChYTrf85pxXs	Interview of Steven Spielberg about the production of Ready Player One

Lion King			
No.	Form	Title & Link	Content
4.1	article	Jon Favreau. Hollywood Reporter http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=138218269&site=eds-live&scope=site	Introduction of Jon Favreau and Lion King
4.2	article	Hollywood's New King: 'Virtual Production. http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=137583463&site=eds-live&scope=site	Virtual production in Lion King
4.3	article	To Be King. American Cinematographer. http://search.ebscohost.com/login.aspx?direct=true&db=eh&AN=137653348&site=eds-live&scope=site	Virtual production and cinematography in Lion King
4.4	article	RETURN OF THE KING. (cover story). http://search.ebscohost.com/login.aspx?direct=true&db=eh&AN=136084958&site=eds-live&scope=site	Behind the scene of Lion King
4.5	video	The Lion King 2019 - Making Of - How it was filmed in a realistic way https://www.youtube.com/watch?v=KCaayCaM6Zk&pbjreload=10	"Behind the Scene" documentary video of Lion King
4.6	video	The Lion King and Virtual Filmmaking (with Caleb Deschanel) GCS179 https://www.youtube.com/watch?v=9sjhdU9FB7Q	Radio interview of the director of photography of Lion King
4.7	article	'THE LION KING' AND 'THE MANDALORIAN'S' JON FAVREAU IS ALL-IN ON VIRTUAL PRODUCTION, REAL-TIME AND LED WALLS https://beforeandafters.com/2019/07/30/the-lion-king-and-the-mandalorian-jon-favreau-is-all-in-on-virtual-production-real-time-and-led-walls/	Report of Jon Favreau's talk on Siggraph 2019
4.8	video	Jon Favreau On The Lion King, The Mandalorian And Virtual Production - BBC Click https://www.youtube.com/watch?v=0aiAP_zjub	Interview of Jon Favreau about virtual production
4.9	video	Jon Favreau on Directing 'The Lion King' in VR and Working with Beyonce https://www.youtube.com/watch?v=nBWg8PqBJPg	Interview of Jon Favreau about the production of Ready Player One
4.10	article	The Lion King: a film shot inside a game engine, with VR and Virtual Production https://www.provideocoalition.com/the-lion-king-a-film-shot-inside-a-game-engine-with-vr-and-virtual-production	Game engine and virtual production in Lion King

Virtual Filmmaking			
No.	Form	Title & Link	Content
5.1	article	THE VIRTUAL PRODUCTION FIELD GUIDE https://cdn2-urrealengine-1251447533.file.myqcloud.com/Unreal%20Engine%2FVPFieldguide%2FVP-Field-Guide-V17_Digital-27611325301895169b008441b09fe595ecf31E2.pdf	Field guide of virtual production (by Unreal Engine)
5.2	article	Introduction of virtual cinematography (by unity) https://unity.com/madewith/virtual-cinematography	Introduction of virtual cinematography (by unity)
5.3	video	Real-Time engine for virtual production https://www.youtube.com/watch?v=U_NG7W6l7s	Unity's live talk of virtual production in Siggraph 2018
5.4	video	Fox VFX Lab - Virtual Production and Collaborative Filmmaking SIGGRAPH 2019 Unreal Engine https://www.youtube.com/watch?v=ai6PH61PMvM	Unreal Engine's live talk of virtual production in Siggraph 2019
5.5	video	Unreal Engine User Group at SIGGRAPH 2019 https://www.youtube.com/watch?v=apLzZBqfgeU	Unreal Engine User Group conference at Siggraph 2019 recording video



INITIAL RESULT & ANALYSIS



INITIAL RESULT & ANALYSIS



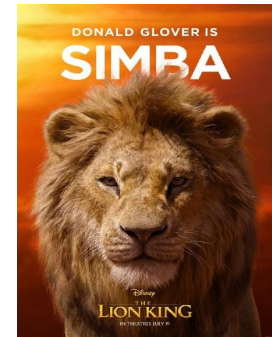
Avatar
2009



The Jungle Book
2015



Ready Player One
2018



Lion King
2019

STAGE 1

STAGE 2

STAGE 3

INITIAL RESULT & ANALYSIS



Avatar
2009



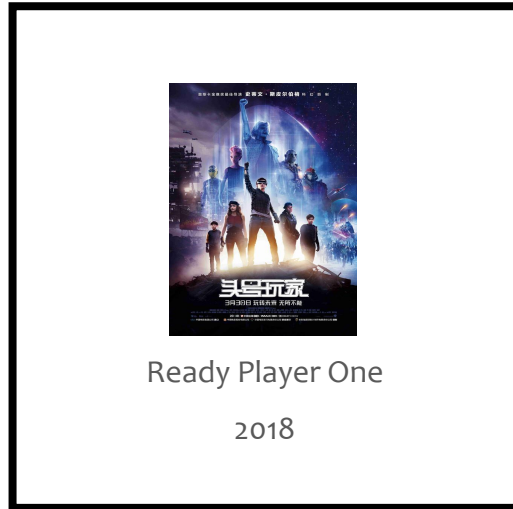
The Jungle Book
2015

STAGE 1

- Application of Simul Cam (virtual camera system)
- Achieve real-time preview of VFX shots in low quality
- Initial interaction between actor and CG elements (In 2D monitor)
- Using traditional animation software (Maya) to create CG elements
- **DIRECTOR** participate in the virtual production
- **BUT PRODUCTION DESIGNER, CINEMATOGRAPHER did not** participate in the virtual production



INITIAL RESULT & ANALYSIS



STAGE 2

- **Game Engine** support the render of the virtual scene, set and character
- Application of VR headset (VIVE)
- Immersive VR production design and scouting of the film scene
- **PRODUCTION DESIGNER** participate in the virtual production
- Virtual cinematography (Camera inside the VR environment)
- **CINEMATOGRAPHER did not** participate in the virtual production

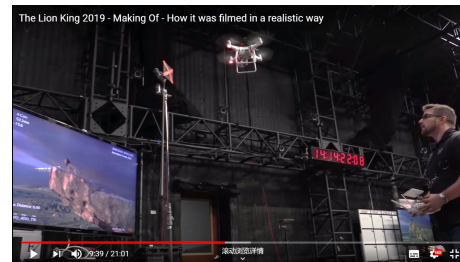


INITIAL RESULT & ANALYSIS



STAGE 3

- Construct the entire film scene and CG animals in **Game Engine**
- Immersive VR production design and scouting of the film scene
- Combination of virtual production and **classic film crew**
- Use **classic cinematography equipment** to film in **virtual environment**
- **LIVE -ACTION CINEMATOGRAPHER** participated in the virtual production
- Create **familiar cinematographic experience** and **“Happy Accident”** (make it seems like a live-action film)



INITIAL RESULT & ANALYSIS



Avatar
2009



The Jungle Book
2015



Ready Player One
2018



Lion King
2019

A TREND / PROCESS THAT:

The digital mode and tools of CG scene and character creation transformed from traditional animation software to game engine.

The participation and collaboration of various filmmaking roles in Virtual-Production increased gradually.

The combination of Virtual-Filmmaking and classic filmmaking culture enhanced gradually.

INITIAL RESULT & ANALYSIS

The participation and collaboration of various filmmaking roles in Virtual-Production increased gradually.

STAGE 1



Avatar
2009

Director



The Jungle Book
2015

STAGE 2

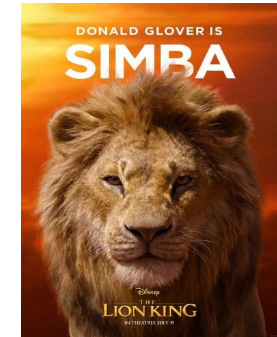


Ready Player One
2018

Director

Production Designer

STAGE 3



Lion King
2019

Director

Production Designer

Cinematographer

INITIAL RESULT & ANALYSIS

FUTURE PROSPECT OF VIRTUAL FILMMAKING

- Real-Time LED Screen
- Interaction of actor and virtual environment
- Enhance the immersion experience of actor



Epic Games – Unreal Engine

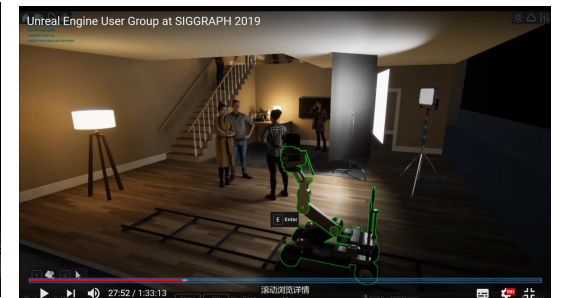
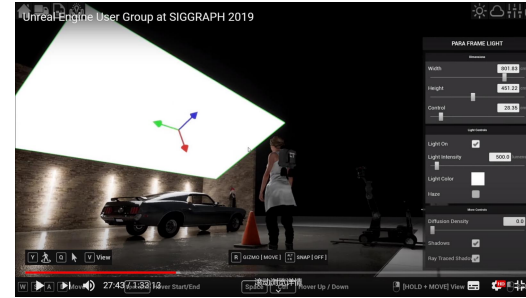
Real-time LED Virtual Production Demo

INITIAL RESULT & ANALYSIS

FUTURE PROSPECT OF VIRTUAL FILMMAKING



Real-Time VFX



Cine Tracer
(cinematography & lighting simulator)



THANK YOU