VISUAL EFFECT COMPOSITION

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Abstract

Visual effects are Commonly Known as Visual FX or VFX, which contain the Various Computerized Processes by which Images are created and Manage outside the Context of a live Action in Video. VFX involves the Combination of live Actions Footages and Computer- Generated Imagery (CGI) to Create Virtual Environments. The 3D Characters are rendered in Green Screen, Black Screen, and Blue Screen to merge with 3D Environments Design. This Technique is Complete Through the 3D Animation, Video Editing and Motion Graphics Software. The cinematographer had a major role in making the special effects scene either by making the whole effect in camera or combined with the optical effects in laboratory after shooting. Before the digital era most of the effects were done by the camera or in the production house.

Keywords

Visual Effects Compositing, Animation, Digital Compositing, Computer Generated Imagery (CGI)

1. Introduction

1.1 Visual Effects: A definition and overview

Visual Effects as "Visual Effects involve the Integration of live Action Footage and Generated Digital Effects to Create Environments, in Animate Objects" [1].

Visual Effects Compositing is Nothing else it Known as Visual Effect. The First time Visual Effect

Technique to introduce early 1900s [2]. Visual Effects (VFX) is the Process of Digital or Optical Effects is created outside the Context of a Live Action Shot in Filmmaking [3]. The Visual Effects Compositing Major Focus on The Application of Compositing Techniques Specifically to the Visual Effects and 3D Animation Field for the Television Episode, Advertisements and Gaming field. The First Indian Visual Effects were done for the television series Captain Vyom by Animation [4]. Visual Effects using Computer-Generated Imagery have recently become accessible to the Independent filmmaker with the introduction of affordable and Easy-to-use animation and compositing software [5]. VFX is variously called "Chroma Key", "Chroma Screen", "Blue Screen", "Green Screen", "White Screen" and Other Names.

1.2 History

The first ever special effect or 'Illusion' as they were known then, was produced in 1895 by Alfred Clark in The Execution of Mary Queen of Scots [6]. These films made use of the single frame method which involved images projected at a high volume of frames per second [7]. Gertie the Dinosaur created by sketch artist Winsor McCayz in 1914 is believed to be the first successful animation short film [8]. Another one of early Hollywood VFX used included stop motion photography, which involved a series of hand-drawn illustrations or photographs of realistic puppets of models that are used one frame at a time to create the illusion of movement. King Kong, released in 1933 was among the pioneering movies to use this technique [9]. **Superman, released in 1978, was another milestone in the special effects industry. By using cables, blue screen and some clever camera tricks, the movie makers created the illusion of a flying superhero** [10]. In India, the larger-than-life Bollywood films use an average of 500 to 1500 VFX shots. Films such

as Dhoom, Chennai Express and the Bahubali have used special effects to perfection in recent times [11].

1.3 Visual Effect Composition Advantages

1.3.1 Chroma Key Cutting Edit a video and the background is not suitable for the scene then you can change background with the help of Chroma Key Cutting feature [12].

1.3.2 Text Animation Create a Text Animation in Video.

1.3.3 Camera Tracking Edit the original video making changes such you want to add any text in video or make some other changes in the video [13].

1.3.4 Color Grading Change the colors of all of the elements of your video such can clear the skin [14].

1.3.5 Motion Graphics Animation Take different images and can add motion to them and can also apply the animation to it [15].

1.3.6 Light and camera with layer animation your video look more beautiful, effective and attractive [16].

1.4 Visual Effect Composition Limitations

i.   Takes away from the original art of making the film.
ii. The better the effect, the less credit there is for it [17].
iii. In many people's views VFX are simply become overused [18].
iv. Visual effects are audience manipulation.

1.5 Application Areas

1.5.1 Rotoscoping

Rotoscoping is an animation technique in which animators trace over live-action film movement, frame by frame, for use in animated films [19].

Originally-recorded live-action film images were projected onto a frosted glass panel and re-drawn by an animator [20].

This project equipment is called a rotoscope, although this device has been replaced by computers in recent years. In visual effects industry, the term rotoscoping refers to the technique of manually creating a matte for an element on a live-action plate so it may be composited over another background [21].

Fig. 1. Rotoscoping [1]

1.5.2 Compositing

It is the combining of visual elements from separate sources into single image, often to create the illusion that all those elements are parts of the same scene [22].

Compositing is taking real-life elements with computer generated element and putting them together-so they seem like they were shot together - so they seem like they were shot together [23].

Live action shooting for composting is variously called "Chroma key", "Blue screen", "Green screen" and other names. Today most of though not all, composting is achieved through digital image manipulation.
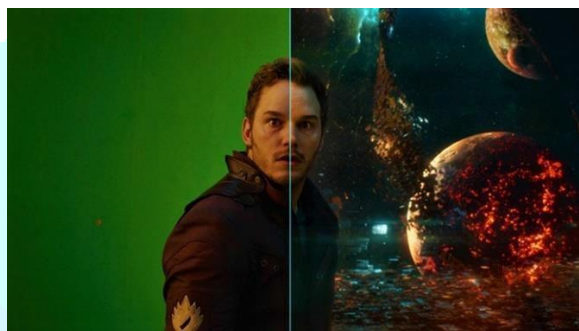

Fig. 2. Compositing [2]

1.5.3 Matte Painting

A matte painting is a painted representation of a landscape, set, or distant location that allows filmmakers to create the impression of an environment that is unreal in real life, otherwise be too expensive or impossible to build [24].

Historically, matte painters and film technicians have used various techniques to combine a matte-pained image with live-action footage [25].

At its best, depending on the skill levels of the artists and technicians, the effect is continuous and creates environments that would otherwise be impossible to film [26].

In the scenes the painting part is static and movements are integrated on it.

Fig. 3. Matte Painting [3]

1.5.4 Rigging

Skeletal animation is a technique in computer animation in which a character is represented in two parts: an external representation used to draw the character and a hierarchical set of interconnected bones used to animate humans or more generally for organic displaying [27].

This technique is used in virtually all animation systems where simplified user interfaces allows animators to control regularly complex algorithms. However, the goal of the technique is never to copy real framework or physical processes, but only to control the twist of the web data [28].

Fig. 4. Rigging [4]

1.5.5 Motion Capturing

Motion capture is an effective 3D animation tool for realistically capturing human motion. In cinematography, match moving is a cinematic technique that allows the insertion of computer graphics into live-action footage with correct position, rule, direction, and motion relative to the photograph objects in the shot [29].

The term is used lightly to describe several different methods of extracting camera motion information from a motion picture.

Sometimes analyze to as motion tracking or camera solving, match moving is related to rotoscoping and photogrammetry.

Fig. 5. Motion Capturing [5]

2. Literature Reviews

Though it has been studied for a long time in computer graphics and computer vision, it still remains as a difficult problem in practice because it requires a reliable solution to the camera tracking problem, one of fundamental problems, especially in computer vision [30]. Motion capture has been originally designed to record the motion of human or props with sensors, including cameras, and then digitally map the recorded motion data, called Mocap data, to Computer-Generated creatures [31]. At now, a change of Mocap techniques, including the visual motion capture system, are used for VFX in TV and film production [32]. In this paper, we employ an optical Mocap technique to solve the camera tracking problem in TV and film production [33]. Specially, the composition of CG animation and real on-set images, so-called mechation, is very popular in film production [34]. The Mocap unit records the Mocap data of human by computing the 3D coordinates of optical markers in the Mocap manage system [35]. We showed another demonstration of digital special makeup effect with our CG/real image composition system [36]. We presented a Mocap-based camera tracking method to create VFX by composing Mocap-driven CG animation with real on-set images for TV and film production [37]. We showed that our CG/real image composition system could use to create some VFX like fast motion, connected and digital special make-up [38].

The high development of evolution and science technology, 2D animation has been unable to meet the needs of the people's vision and technology [39]. 3D animation come along as a developing technology and gets the favor of the community [40]. This article focuses on the process which combined with 3D software Maya and the most common compositing software After Effects to achieve complex visual effects [41]. Well-known, Maya has close links with

After Effect and has a bright future [42]. Besides, animation has three absolute advantages [43]. The first, When the really making a scene needs a high cost, it can be completed through three-dimensional animation to reduce costs [44]. Secondly, the dangerous really making can instead by three-dimensional animation [45]. Thirdly, three-dimensional animation can complete which the really making can't reproduction lens by reproduction and it has improving effect to the performance of the product [46]. As the various advantages of 3D animation,3D animation has a bright future [47]. Maya is a word-class 3D software which

produced by America Autodesk company [48]. It is applying to television and advertisement, character animation and movie [49]. Maya has a very strong function, such as effective, flexible, easy to learn, efficient and highly representative rendering [50]. AE is a graphic and video process software which produced by Adobe company [51]. It is applied to animation, post- production and multimedia. Maya and AE belong to animation software [52]. But Maya more tend to early modeling and character animation. AE belong to postprocessing Software [53]. Maya and AE have been widely used in animation production and they have a good compatibility [54]. It can fusion some static frame pictures and video which is plain and simple [55]. And can realize some simple three-dimensional [56]. However, Maya is the world's leading 3D authoring software [57]. This makes up less than AE. But the advantage of Maya is pre- production, the post fusion needs rely on AE [58]. So, they are commonly supporting relationship [59]. At present, film packaging and television production titles are basically completed by Maya and AE [60]. They focused on different direction [61]. Which have been widely used two-dimensional is Photoshop, the most common three-dimensional are premiere, After Effects and Burning [62]. Among them, premiere focuses on editing [63]. Combustion is also post-editing, but it largely compatible with 3D Max [64]. It is mainly directed against three- dimensional clip [65]. But AE is highlighting on title animation and text areas not Non-linear editing [66]. It is the leader in film and television production titles [67]. Because of their balancing, the perfect match of Maya and AE can better reflect each other's control [68].

Visual effects are the creation of genuine elements image or motion image by using computer to generate elements that are not from filming and then mix elements into the shot, for creating the result that came from imagination of film director [69]. This visual effect can reduce costs and risk from filming [70]. There are 4 main steps to create visual effects breakdown & analysis, research & development, digital element creation, the image sequence output [71].it is discussion between director and visual effects controller to identify the number and type of required visual effects shot [72]. The discussion needs storyboard, plan design, 3D animatic or footage for easily to design and the looks of the digital element [73]. The next discussion will focus on type of the

visual effects by using reference image [74]. In the research

& development process, the best technique or solution is selected to create visual effects with appropriate time [75]. The research & development team develop technique, software, plugins

and then create CGI test shot for checking the look of visual effects [76]. **The film director needs to see the CGI test shot before moving to next process [77]. In the digital element creation, it is the process of create digital element and integrate it to footage [78].** The result of this process is image sequence [50]. Then, the visual effects supervisor will meet the director for checking the image sequence result in the image sequence output process [79]. In this paper, the novel management model is applied to the VFX process in order to enhance the productivity of the film [80].

In the latter part of the composition, you can use the special effects software to sort or modify the pre-shooting material, such as changing the color of the screen, the composition of the screen, the position of an element in the picture [81]. in order to pursue a special mood, the film in the post- Common fusion methods. In order to achieve the management of digital film color, control the relationship between the main color and opposite color in the picture is particularly critical [82]. **A specific color is always only one opposite color, to be a simple experiment to know [83].** When we observation at a piece of red cloth with his eyes for a long time, and then quickly moved to the side of the white wall, the visual sense of the green wall full of green [84]. Keying technology is a digital film in the early stage of filming and post fusion of the most closely linked, keying technology using standard blue or green as the background, for specific people or objects, shooting scene material into the computer using special effects software for blue Green screen background separation [85]. Typically blue screen used in television shooting more, the green screen used in the film more, the actual operation is not to define this, but giving to the late need to use, using blue and green screen keying technology, will produce a very pushy scene , In the works showing a different visual effects [86].With the fast development of computer technology, many traditional film productions can't be done with the computer lens, or the use of computer technology will make the film more attractive [87]. So, the outdated film introduces digital technology [88]. At present digital film technology is approaching maturity, the creative staff from the past simply the use of digital special effects and gradually transformed into traditional shooting, traditional stunt blend of expression techniques [89]. In order to encourage thinking, invention and practice through the current visual communication design [90]. Any film-related technology innovation and the integration of new technology will have an important impact on the films, and the most representative is the digital

technology on the film late reflective effect [91]. Digital imaging performance is to convey a people-oriented to the film audience as the main essence [92]. Digital post-production, digital

virtual effects, not only make the rejection of the traditional film language, but also the film's language with more new words [93].

The way of seeing images needs to be justified in order to give people an opportunity to stop and think about the specifics of how the brain notices what our eye realizes [94]. Visual effects can enhance the audience understanding on each scene displayed on the screen due to its ability to fetch it to life [95]. Hanson (2006) in his slide presentation stated that FX Animation Brings Life, Believability to Static Scene [96]. Normally visual effects combined live action and cell animation to enhance or simulate the real scene [97]. hu (2010) stated that successful visual effects often depend on the careful manipulation and seamless combination of elements with live action related situations [98]. still due to the progress of the technology vfx can be applied in animation through 2d and 3d computer graphic tools that involved painting, image warping, digital compositing, image processing, modeling, animation and rendering. This study aims to observe part of the process in applying visual effects in part of the Scene a short 3d movie [100]. It also aims to analyze the roles of environment design in Relation to the character elaborate. By observing and analyzing both items will help us to Identify the effective and fastest way to produce the final rendered images, later will Speed up part of our production process [101]. The final result from the process will give a Great effect on the audience specially in viewing quality images on the screen [102]. Two hundred students who have undergone three courses, Motion Graphic, 3DAnimation and Digital Illustration and Art and Creative Technology are involved in this study [103]. **The images of the environments and the character complex in the future scene are included in the device [104]. The roles of the character are described clearly in the device reflecting the roles of the character** [105]. Both images of the environments and the character are then analyzed using descriptive analysis [106]. Cross tabulation is also used to observe the association of the environment and the character [107]. It will also observe the roles between two characters [109].

3. Tools & Technology of Visual Effect Composition

3.1 Tools

3.1.1 Autodesk Maya

Autodesk Maya is commonly introduced to Maya, is a 3D Computer Graphics Software. Originally Developed by Alias Systems Corporation and currently owned and Developed by Autodesk Inc. [110].

It is used to Create Visual Effects, 3D Animation, Video Games, Animated Films etc. It is written in C++, Python and MEL [111].
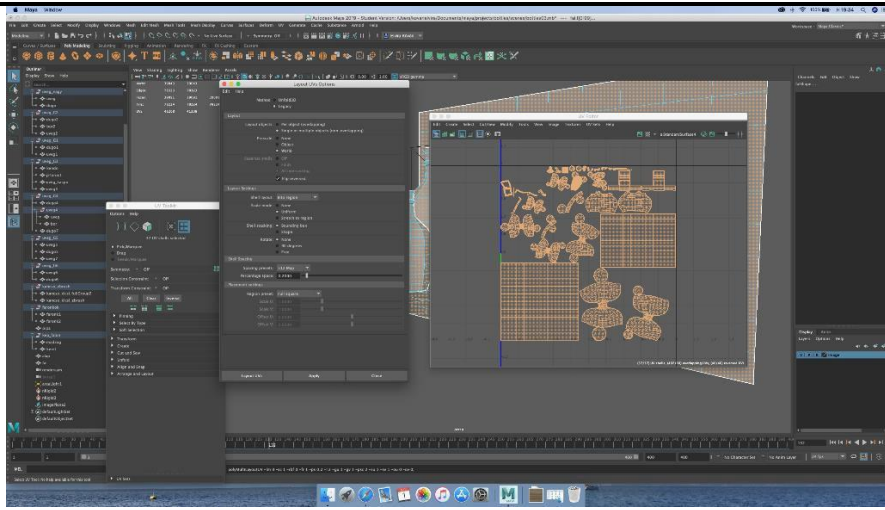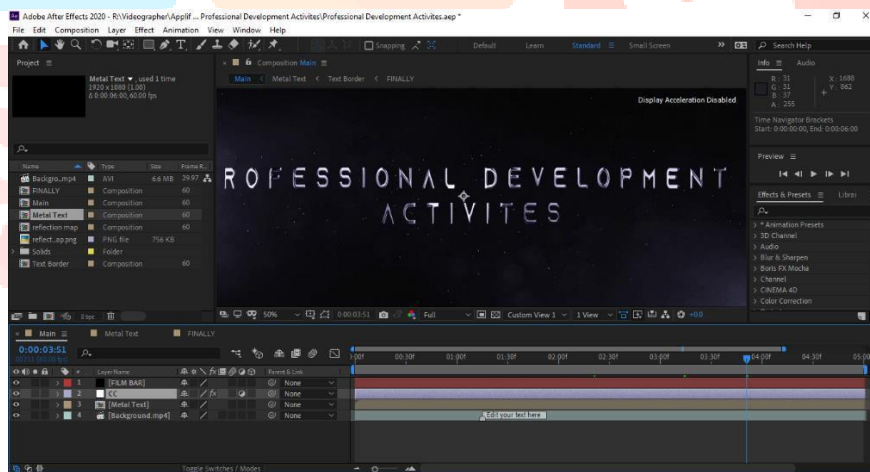
Fig.12. Autodesk Maya Layout [12]

3.1.2 After Effects

After Effects is a Digital Motion Graphics Visual Effects and Compositing Software Developed by Adobe [112].

It is used to Post-Production Process of Film Making and Television Production. It is

written in C++ only [113].

3.1.3 Filmora

Filmora is a Video Editing software built for starters who would like to spend less time Understanding the basic Functionalities of a Video Editing software, and focus on their task of Creating and Editing Videos [114].

Filmora community was founded this Software. It is
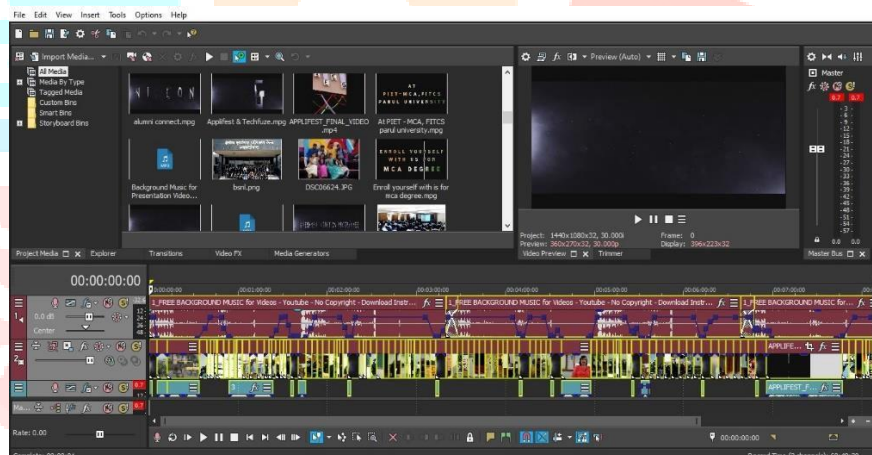
written in C++ [115].
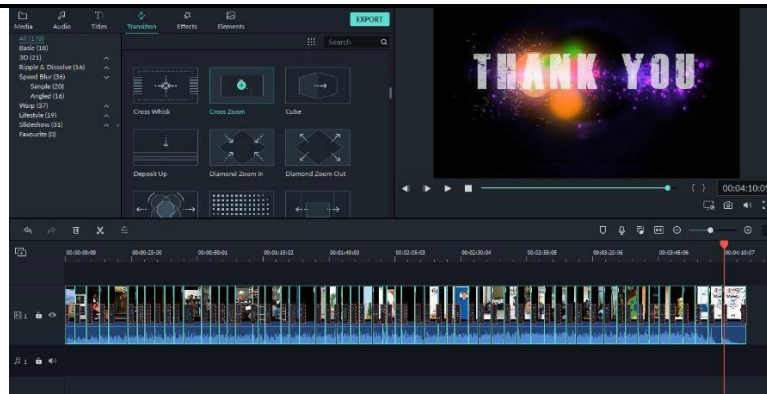
3.1.4 Vegas Pro

Vegas Pro is a video editing software Package for Non-Linear Editing.

Original authors Sonic Foundry (1999–2003), Sony Creative Software (2003–2016), VEGAS Creative Software (2016–present) [116].

It is used to Create Visual Effects, Video Editing and Cinematography Effects etc. It is written in C#, Jscript [117].

3.1.5 Blender

Blender is a free and open-source 3D computer graphics software toolset used for Creating Animated Films, Visual Effects, Art, Models, Motion Graphics, etc. [118].

Original author Ton Roosendaal Developers Blender Foundation [119]. It is written in C, C++ and Python [120].

Fig.13. Blender Layout [13]

3.2 Visual Effect Composition Technologies

3.2.1 Computer-Generated Imagery

Computer-Generated Imagery is the most widely used technique organized to make computer graphic images, which can be used in print media, films, art, videos, television programs, and more [121]. CGI is used for visual effects because the quality is often higher and effects are more manageable than other more physically based processes, such as building miniatures for effects shots or hiring extras for crowd scenes, and because it allows the creation of images that would not be feasible using any other technology [122].

3.2.2 Bullet Time

Bullet Time is a visual effect technique that isolates the space and time of a camera from the visible theme [123]. It can be seen in film advertisements, films and graphics in video games [124]. It is technically known as time-slicing, virtual cinematography, and view transforming [125].

3.2.3 Virtual Cinematography

Virtual Cinematography includes a variety of subjects (like real objects), multi-camera setups [126].We've taken a look at the differences between sound mixing and sound editing, and wanted to do the same on the visual side [127]. Virtual production tools in live action tend to relate mostly around the capturing of action, often with virtual cameras [128]. **These are effectively screens acting as virtual cameras that can be tracked just like motion captured actors are tracked, so that someone looking at the screen – a director – can see an almost-finished composed image of what the final shot may look like** [129]. The whole idea is to simply replicate what you might do with a live action camera, but that you can't do with such a camera because you might be creating a fake world or artificial characters that cannot be filmed for real [130].

3.2.4 Digital Compositing

Digital Compositing comprises get-together of multiple images to create a final image, screen display, or movie [131]. By far the most difficult part of this digital compositing process is producing the integrated result an image that doesn't deceive that its creation was due

to multiple source elements [132]. **In particular, we are usually trying to produce images that could have been believably photographed without the use of any post processing [133]. They should look real [134].** Even if the elements in the scene are clearly not real one must be able to believe that everything in the scene was photographed at the same time, by the same camera [135]. This process is run using digital image use [136].

3.2.5 Motion Control Photography

Motion Control Photography is a VFX technique in motion photography that enables control and optional duplication of camera actions [137]. This involves filming various elements using the same camera motion and finally, combining these components into a single image [138].

3.2.6 Stop Motion Animation

Stop Motion Animation is a special effect where still objects appear to move on their own [139]. This technique can include an object, models, humans, household appliances [140]. The best example is the traditional flip book that involves sequential drawings on separate pages [141].

3.2.7 Chroma Key

Chroma Key is also known as blue or green screen effects, where two different videos are combined [142]. This is a new technique and can be mostly seen in movies in the form of travelling mattes [143].

3.3 Comparison of Technologies

3.3.1 VFX and CGI Technologies Comparison

Preferences	VFX	CGI
Definition	VFX stands for Visual Effects [1].	CGI stands for Computer Generated Imagery [2].
Usage	VFX are used to create imagery out of a	CGI is used to create images, print media,

	combination of live actions shots and Digital Images.	commercials, animations and videos, and other digital work. Mostly used for 3D Computer Graphics.

| **Characteristics** | Timing is one of the most important criteria for VFX [3].
When and how an effect is created plays an important part in making of a film or a video [5].
It is mostly used in the post-production process but planned during the building phase.
Live Action Effects is also a critical part of this process [6].
It involves engaging of resources and then editing them by using blue and green screening [8].
Matte Painting is the process in which multiple mixed images and objects are combined and are edited to get a single image of the required result [10].
Digital Animation and Compositing plays an important role [12]. | CGI is much harmless than using Physical Effects. The quality of VFX using CGI is very high, standardized and manageable compared to the physical ones [4].
The CGI helps in the creation of images and effects that cannot be achieved using other techniques or methods [7].
CGI is much more effective and costs saver method when creating images and videos [9].
CGI is made with wireframe models. These models can be modified and assigned any type of setting at any point in time [11].
This is a time-saving method.
The user need not create libraries and materials again and again [13].
Once created CGI can be |

VFX is mostly used in Digital Animation involving 3D platform [14].

Some of the Effects are rotoscoping, Particle Effects and Digital background settings [16].

Creating 3D models by using materials and objects involve VFX [18].

Motion Capture also involves the use of VFX [20].

Motion Capture is the process of recording the movement of objects and materials. Using specialized software such as Motion Builder the recordings can be used for Visual Effects in the final process [22].

reused if required [15].

The film was created using CGI effects and tools. The CGI digital effects appeared real but they were actually created virtually [17]. Today, CGI has expanded so much popularity that it is used in almost every field of education and learning [19].

Engineers and Architects also use CGI in the form of 3D models, Architectural maps, blueprints and what not. This is achieved by using CAD software that helps users [21].

Table 1 VFX vs. CGI Comparison

3.3.2 Animation and VFX Comparison

Preferences	Animation	VFX
Definition	It is the technique of applying vision on the painting/ sketches/ drawings of puppets or human pictures so, they can move and react as we see in the cartoon series [23].	It is applying to real things, human beings and scenes/ frames/ footage. VFX is the combination of real things and special effects that are implemented to life to the real on the roll [24].
Software's uses	Autodesk Maya and 3Ds Max software's are used in animation [25].	3Ds Max, Foundry's Nuke, Blackmagic fusion, Adobe Photoshop, Autodesk Maya and Adobe after effects software's are used in VFX [26].
Career	Animator, 3D Modeler, Flash Animator, Art Director, Graphic Designer, etc. are career options in Animation [27].	VFX Artist, Lightning Artist, Layout Artist, Roto Artist, Compositor, Matter Painter, etc. are career options in VFX [28].
Applications Area	There are many Applications area such as Animated websites, advertising campaigns, CDs, Pogo TV cartoon series [29].	In VFX Technology Applications Area are All Films and Documentaries [30].

Types	3D computer animation, Traditional animation, 2D Vector-based animation, stop motion and Motion graphics are types of Animation Technique [31].	Pre-visualization, Rotoscoping, Keying, Color Correction, Matte Painting, Motion Tracking are types of VFX Technique [32].
Was used in this	Dragon Ball Z, Pokémon, Chota Bheem, Motu Patalu etc. use in this cartoon [33].	Zero, Sultan, Chennai Express, Fan, Bahubali etc. use in this movie [34].

Table 2 Animation vs. VFX Comparison

3.4 Comparison of Visual Effect Tools

3.4.1 Cinema 4D and Maya Tools Comparison

Preferences	Cinema 4D	Maya
Definition	Its modeling, animation, motion graphic, and rendering application [35].	Its 3D computer graphics application that runs on Windows, macOS, and Linux [36].
Invention	Cinema 4D was developed by Maxon Computer GmBH in Germany [37].	It's was developed by Alias Systems Corporation [38].
Programming language	COFFEE is a computer scripting language. It's a propriety 3D graphics application [39].	Maya Embedded Language (MEL), it's one of the scripting languages used to simplify tasks in Autodesk's 3D Graphics software Maya [40].

Usages	It's easy to learn in motion graphic and faster than 3DS Max [41].	Maya is excellent with tasks that involve character rigging and animation covering [42].
Features	Lens Distortion support, graphic view for Motion Tracker, new spline tools, shaping improvements, sketch up integration [43].	It enables video professionals who work with animated films television programs, visual effects, and video games [44].
System Requirements	It's requires 64-bit, 8 GB RAM requires, 75 MB disk space for installation.	It's 64-bit Intel core or AMD multi-core processor, 8 GB or more than RAM, 4
		GB of free disk space to install the system.

Table 3 Cinema 4D vs. Maya Comparison

3.4.2 Blender and Maya Tools Comparison

Preferences	Blender	Maya
Definition	Maya is an Autodesk Software, it's mostly designed for animation and texturing [45].	Blender is a software designed by the blender foundation, it's mainly used for animation and visual effects [46].
License	Free to use General Public License [47].	Trialware/Student/Commercial License [48].
Marketability	In this tool marketability Small and freelance projects [49].	In this tool marketability Huge or Industry standard [50].

Features	It has more of 3D animation and texturing features [51].	Blender has more animation and visual effect features, mainly for films and entertainment sectors [52].
User Experience	Difficult to learn but once you know about Maya in and out, there is nothing better for 3D modeling and animation [53].	Learning Max is not all that difficult because, unlike in Maya, it starts showing automated results after few steps [54].
Interface	The interface is complicated, you might need experienced guidance to smoothly handle the vast arena to tools available [55].	Blender too, like Maya, is a bit complicated to learn. It has its own way of functioning and you need to know those exact ways to get the desired result [56].
Motion Graphics / Special Effects	Fabric, Fur and Hair Textures, Smoke, Fluid, Fire and Surface Meshes [57].	Collision Simulation, Object Interaction [58].
Developed in Language	It is developed in Python 3 [59].	It is developed in MEL [60].

Table 4 Blender vs. Maya Comparison

4 Recent Research & Development in Visual Effect Composition

4.1.1   New Latest VFX Techniques

Augmented reality:

This is used to create a virtual environment using real settings of the world location. It increases the information which is already visible to us in a more detailed and efficient manner [144].

Crowd simulation:

This involves creating a large set of crowds in an animated world. Scenarios like war, parties, crowded beaches, etc, use this technique to create the impression of large groups of people [145]. The interaction of the crowd with graphics and changes in the environment are supplemented to make it believable [146].

Projection mapping:

This is the latest in-demand technique that is being used by national and international companies during product launches. It enhances the user experience by displaying artwork, light and sound or a combination of all, for enhancing the event/movie [147]. This is fast becoming the preferred choice to promote and inform.

Camera mapping:

In this scenario, the animation is done from the point of view of the camera and not the object. This is the process of taking still images and bringing them to life in 2D & 3D animation by using various applications [148]. It is mostly used for films and TV shows & ensures reduction of cost and increased flexibility.

Sound & light effects:

Advancement of technology has aided animators in adding a rich experience to the art of movie making [149]. This ensures that movies have the proper setting and light effects to give a proper cinematic experience with believable reality.

4.1.2 Current ongoing development in the field of VFX

Animation and VFX Market is expected to register a healthy CAGR of over 9% during the forecast period (2020 - 2025) [150]. The demand for animation and VFX has expanded with the increase in the appearance of the media sector gearing up meaningfully in the scope of the multimedia ecosystem [151]. The fast development of technology has made a n i m a t i o n & VFX available to the masses has drove the

section to become one of the fastest-growing sections in the global animation and gaming market [152]. **The demand for animation in gaming part has expanded with the increase in the broadcasting content by cable and satellite TV, availability of low-cost internet access, along with the circulation of mobile devices over the growing popularity of streaming videos [153].** Further, the demand for Animation and VFX content to power immersive experiences such as Improved Reality and Virtual Reality is growing exponentially, thereby fueling the application of the market across the developing economies [154]. **Nowadays, consumers are engaging in high-definition visual experiences [155].** Movie is demanding high-quality productions with engaging visual effects and accurate animation and studios which includes more animation and VFX shots into films [156]. Also, consumers are consuming more immersive content across channels such as ultra-high-definition TVs, tablets, and smartphones to head-mounted devices [157]. **Animation, VFX and games content is being consumed not only on OTT streaming services such as Netflix, Amazon Prime, and but also on YouTube, Twitter and Facebook [158].**With the growing internet circulation and access to multimedia devices, customers are spending more time for streaming digital content, due to which streaming video has become the fastest-growing segment in the distribution channel for animation, thereby witnessing a high-growth and is expected to continue during the forecast period [159].We have written a lot on locational VR this year, like the unexpected ways in which it could end up in your home and how it powered up London's first VR arcade [160]. **The buzz surrounding it is persisting as 2019 ends, with domestic name brands lending their IP to locational VR experiences such as Marvel's Collab with The Void which is evidence to an enduring interest and sensitivity from the public in general [161].This really did make me feel like I was stepping inside of the cinematic universe rather than just playing a quick vertical slice of mostly unrelated content**

[162]."This is just one example of how Location-based Entertainment has fulfilled its promise and our prediction that in 2019, it will be increasingly tied to film releases as a way of allowing fans to engage with the cinematic universes they've come to know and love [163]. Elsewhere, in the Five of the biggest trends from FMX 2019, we touched on "a novel technique that sees rollercoasters augmented with virtual reality headsets a glimpse into a potential future of theme park attractions [164]." This came to execution thanks to VR Coasters, and you can read all

about the amazing things they've done with locational VR here [165]. As unusual use cases like these become more universal in everyday life, the added exposure this gives to high-quality VR experiences might be enough to make a positive cultural shift toward people trying, and accepting, VR as the next standard in household media and entertainment [166]. **After all, how will consumers accept that VR is the future of technology and entertainment espoused time and again if they never have a chance to try it for themselves [167]? So, has VR found its home, outside of the home thanks to LBE It certainly seems that way, and 2020 may see it settle in and extra comfortable in its own defined space [168].** Safe to say, it's not going anywhere soon [169].

4.1.3 VFX challenges

With regard to research timescales, the universities and companies differ [170]. **The companies need solutions to their current problems, on a timescale of 6 to 24 months [171]. The universities need to work on problems that will become pressing in 5 to 10 years' time or on problems for which no solution is obvious to industry [172].** The latter are those problems to which no company will apply resources but for which a solution would be useful, if one could be found [173]. Our principal goal was thus to identify problems that universities could work on effectively, whose solutions would be useful to this creative industry [174]. The following three sections list the problems that were identified [175]. Our own research groups could effectively contribute to the first of these the other issues need to be tackled by groups in other areas or by the industry itself [176]. **Animation and visual effects are at the heart of modern film production [177].** Digital production as we know it began in the early 1990s with movies such as "Terminator 2" and "Jurassic Park [178]." Those movies broke new ground in what could be done with visual effects [179]. Then, "Toy Story" in 1995 became the first full-length digitally generated animated feature, and the rest is film history [180]. **Concurrent with the production of these movies was the "democratization" of visual effects [181].** This began in the early 1990s with open source products and proprietary packages being productized and sold by companies, replacing in-house tools available only to industry pioneers [182]. Standards such as file formats also began to be established, which allowed the emerging ecosystem of digital production tools to be linked together into flexible processing pipelines [183]. **A VFX**

production pipeline is complex, with many processes and many among them [184]. The biggest challenge is managing the sheer volume of information required to produce photorealistic imagery [185]. A single creature might be composed of hundreds, if not thousands of digital assets. It is often necessary to assemble terabytes of data that must be rendered and/or composited [186]. Volumetric data which is essential to many bread-and-butter effects, including clouds, dust, water, fire, and fluids, is another example of extreme complexity [187]. The data is challenging both because of its large footprint and because it often requires conversion to other formats before it can be used by other tools [188].

4.1.4 Recent Preference

The muscular sweep of S.S. Rajamouli's direction to the process of the production design, nothing else would have mattered had the Visual Effects been anything like what we have come to expect from our films.

Fig. 6. Muscular Sweep [6]

VFX was used to shoot all the thrilling scenes in Dhoom 3. Such wide use of motion control made it likely for the audience to believe that they were watching two characters on-screen at a time.

Fig. 7. Thrilling Scenes [7]

Most of the Chennai Express scenes were shot indoors in a virtual environment, and almost all the outdoor shots were created through VFX technology.

Fig. 8. Indoors Shoot [8]

A team of about thirty artists produced over 150 shots of VFX covering the Commonwealth Games and the events held in Tokyo & Rome. Show crowds in the stadium using CGI Technology.

Fig. 9 Show Crowds Using CGI Technology [9]

The entire movie was shot in a swimming pool with a stuff toy playing the role of Richard Parker. It could be when Pi got a once in a life time experience with the Great Bengal Tiger

using   Visual   Effect   Technique.

Fig. 10. Put Bengal Tiger using Visual Effect Technique [10]

The Matrix was revolutionary in a way with eye-catching action sets and one of the most jaw-dropping effect that were seen during that time.
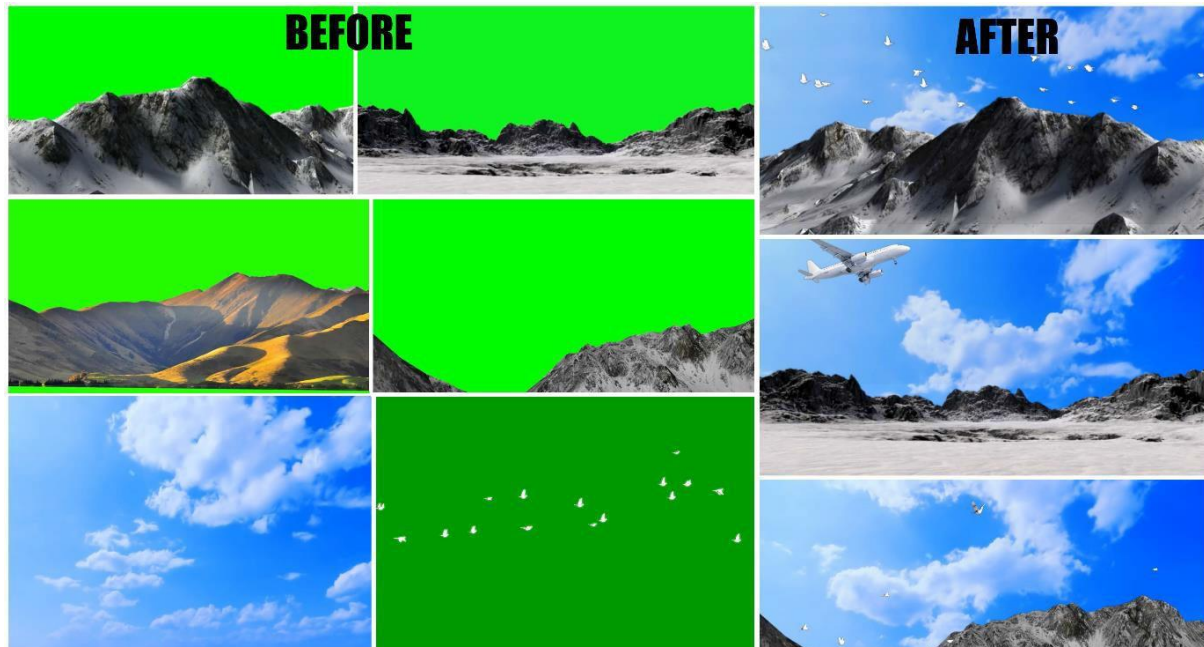

Fig. 11. Jaw-Dropping Effect [11]

5. Our Works

Project: 5.1 Compositing Technique

Green screen is the use of a single color as a background in filming to make it simpler and easier to add backgrounds, characters or other images. In films depicting far away or imaginary places, compositing may be used along with green screens to create convincing background visuals.

Project Video Link:

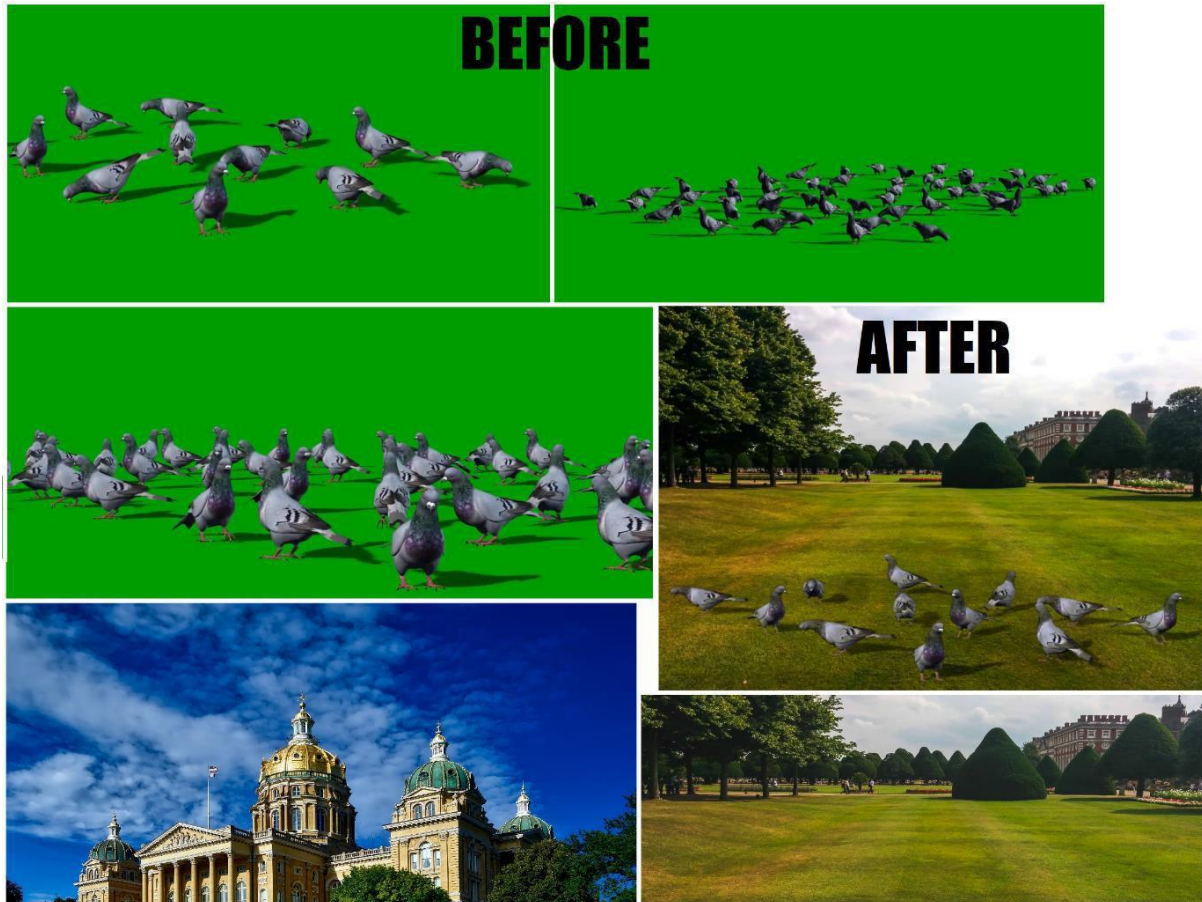https://www.youtube.com/watch?v=D_5czx3o_z8&list=PLgenVdUg3hkrl6ZQtOVUiTfyLqu8LTT0-&index=12

Project Files Link:

https://drive.google.com/drive/folders/13pbhvt72Jx0TBJ-SoiFOwZXIkbgD5KJY?usp=sharing

Project 5.2 Using Matte Paintings Technique

Though most matte paintings these days are created in computer programs with the live action composited digitally, old school matte paintings use careful double exposure of the film to create the illusion of the live action happening in the painted scene. The original technique involved

painting a photorealistic scene on a sheet of glass with either paint or pastels, leaving parts of the glass clear where live action would be inserted later.

Project Video Link:

https://www.youtube.com/watch?v=2HsPXJe65W8&list=PLgenVdUg3hkq7bSEv6rn_QXXB2g QAp7lF&index=9

Project Files Link:

https://drive.google.com/drive/folders/1sby5Y05HrMb4Xz06yl3mDFKaC3XVm-R5?usp=sharing

6. Conclusion

In the future, there can be the presence of virtual reality for everyone as well as people can do anything in that virtual world. Furthermore, it is little by little reducing the border between reality and virtual world. The transformation from reality to virtual will become a milestone for humans. With more such VFX-rich content being rolled out, not just movies but also other platforms are utilizing it to reach the world audience. Therefore, today's media and entertainment industry are improved or one can say overloaded with the amazing VFX technologies that can bring almost anything to life. In recent years, the VFX and Animation industry has been developing exponentially and so are the opportunities associated with it. A profession in VFX is today a fulfilling and creatively beneficial. The opening for jobs in the VFX business is rising like never before. It is the right time to enter this profitable and satisfying industry if you are consuming about movies and visual effects.

References

[1] Online Journal of Art and Design, volume 1, issue 2, 2013, Zahari Hamidon, Kong Ho, Abdullah Mohd Noor

[2] Anoop Chaphekar, September 22, 2016, Toolbox Studio, https://www.toolbox-studio.com/blog/history-of-vfx-in-hollywood/

[3] Online Journal of Art and Design, Embedding Visual Effects in 3D Animated, volume 1, issue 2, 2013, Zahari Hamidon, Kong Ho, Abdullah Mohd Noor

[4] Reality & Effect: A Cultural History of Visual Effects, Jae Hyung Ryu, Georgia State University, March 3rd 2007

[5] MumbaifilmAcademy, https://www.mumbaifilmacademy.com/course/VFX

[6] Matt Leonard, Digital Dreams & Visions Ltd. September 2001, SphereVFX, http://www.spherevfx.com/the-history-of-computer-graphics-and-effects/

[7-11]History, Anoop Chaphekar, September 22, 2016, Tool Box Studio, https://www.toolbox-studio.com/blog/history-of-vfx-in-hollywood/

[12] Zahari Hamidon, Kong Ho, Abdullah Mohd Noor, EMBEDDING VISUAL EFFECTS, Online Journal of Art and Design, volume 1, issue 2, 2013

[13-15] Reality & Effect: A Cultural History of Visual Effects, Jae Hyung Ryu, Georgia State University, March 5th 2007

[14-16] Zahari Hamidon, Kong Ho, Abdullah Mohd Noor, EMBEDDING VISUAL EFFECTS,

Online Journal of Art and Design, volume 1, issue 2, 2010

[17-18] Reality & Effect: A Cultural History of Visual Effects, Jae Hyung Ryu, Georgia State University, March 5th 2007

[19-29] Application Areas, Mr. Mits Shah Student at Lambton College, Ontario Toronto, Canada Area, Canada

[30-38] Jong-Sung Kim, Hye-Mi Kim, Jae-Hean Kim , "MoCap-based Camera Tracking for VFX" , ICACT 2010.

[39-68] Liying Huang, Yijian Pei , School of Information Science and Engineering Yunnan University , CISP 2010.

[69-80] Metharat Yothino, Worasak Rueangsirasak, Roungsan Chaisricharoen , Visual Effects Production Improvement for Thai Film Industry , JICTEE 2014.

[81-93] Xiao Han , Research on Special Effects Aesthetic Presentation and Reflection of Film Digital Technology , MSETASSE 2016.

[94-109] Zahari Hamidon , embedding visual effects in 3d animated environment design for short movie , 2013.

[110] Autodesk Maya, March 13th 2016, MaacIndia, https://www.maacindia.com/blog/these-vfx-software-are-used-frequently-to-create-out-of-the-world-visual-effects

[111]Autodesk Maya Developed in, Autodesk, https://www.autodesk.com/products/maya/ [112]After Effects, May 13th 2016, Maacindia, https://www.maacindia.com/blog/these-vfx-software- are-used-frequently-to-create-out-of-the-world-visual-effects

[113] After Effects, Developed in, After Effects, https://www.adobe.com/in/products/aftereffects.html

[114-115]Filmora, Comparecamp, http://comparecamp.com/filmora-review-pricing-pros-cons-features/

[116]Vegas Pro, VFX Basics of Vegas Pro, Bobby Grubic September 15, 2017, Provide coalition, https://www.provideocoalition.com/vfx-basics-with-vegas-pro/

[117]Vegas Pro Written in, google, https://www.google.com/search?q=sony+vegas+pro+written+in+language&rlz=1C1GCEO_enIN854IN854&oq=sony+vegas+pro+written+in+language&aqs=chrome..69i57j33l2.18827j0j4&sourceid=chrome&ie=UTF-8

[118-119]Blender, Blender Animation Studio, https://blender.studio/ [120]

Blender Developed in, Blender, https://www.blender.org/about/ [121-122]

EDUCBA , Educba , https://www.educba.com/vfx-vs-cgi/

[123-125]FILMTVMOVIINGIMAGE , filmtvmovingimage , March-2017 , https://filmtvmovingimage.wordpress.com/2017/03/15/the-digital-visual-effects-in-the-matrix-bullet- time/

[126-130] Ian Failes , Novemember-2018 , https://www.cartoonbrew.com/vfx/a-virtual-

production-explainer-what-it-is-and-what-it-could-mean-for-your-project-166554.html

[131-136] Juan Olivares , domestika , Novemember-2018 , https://www.domestika.org/en/courses/488-introduction-to-digital-compositing-in-post-production

[137-138] Film Studies , ukessays , December-2016 , https://www.ukessays.com/essays/film-studies/motion-control-techniques-in-visual-effects-industry-film-studies-essay.php#citethis

[139-141] Ken_A Priebe , ANIMATIONWorld Magazine ,June-2011,https://www.awn.com/animationworld/advanced-art-stop-motion-animation-visual-effects- part-1

[142-143] Amit Mozar , thevirtualassist , January-2016 , https://thevirtualassist.net/benefits-and-drawbacks-of-chroma-shooting/

[144-149] MAYA ACADEMY OF ADVANCED CINEMATIC , maccindia , July 2, 2014 , https://www.maacindia.com/blog/futuristic-visions-for-vfx

[150-159]Current ongoing Development, Mordor intelligence, https://www.mordorintelligence.com/industry-reports/animation-and-vfx-market

[160-169] Insights HUB , December 01, 2019 , https://www.foundry.com/insights/film-tv/wrap-up- vfx-trends-2019

[170-176] Neil Dodgson , University of Cambridge John Patterson , University of Glasgow , 12- 03-2010

[177-188] Qumulo Team , 04-03-2019 , https://qumulo.com/blog/vfx-rendering-storage-challenges

LIST OF FIGURES

[1] Rotoscoping, No Film School, https://nofilmschool.com/beginners-guide-rotoscoping

[2]Compositing, 17 MAY 2017, Infocusfilmschool, https://infocusfilmschool.com/compositing- vfx-diploma-program/guardians-before-and-after/

[3] Matte Painting, Quora, https://www.quora.com/Are-2D-drawing-artists-still-relevant-in-CGI-movies

[4] Rigging, rana_talha7271, 2D 3D Visual Effects VFX CGI Compositing Artist, Fiverr, https://www.fiverr.com/rana_talha7271/3d-character-or-static-object-rigging-animation

[5] Motion Capturing, David Bordwell, Tuesday, February 23, 2010, http://www.davidbordwell.net/blog/2010/02/23/motion-capturing-an-oscar/

[6] Muscular Sweep Bahubali Movie, Livemint, Release Year-2015, 23 Apr 2017, 12:43 PM IST, https://www.livemint.com/Leisure/E6nRlg9Kc2XIrupCSVZZrL/Baahubali-mass-effects.html

[7] Thrilling Scenes in Dhoom Movie, Release December 2013,

[8] Indoors Shot, Chennai Express Movie, Release August 2013, Dhumor,

https://dhumor.in/before-and-after-vfx-scenes-in-bollywood-films/

[9] Show Crowds Using CGI Technology, Release July 2013, AnimationBoss, http://www.animation-boss.com/vfx_300713.html

[10] Put Bengal Tiger using Visual Effect Technique, November 2012, Scoopwhoop, https://www.scoopwhoop.com/entertainment/visual-effects-in-movies/

[11] Jaw-Dropping Effect, Matrix Movie, Release March 1999, Gosocial, http://www.gosocial.co/category/omg/page/134/?sa=X&ved=0CBoQ9QEwAThQahUKEwjUku TZj_PGAhXKpYgKHdE-CUg

[12] Autodesk Maya Layout, Autodesk Community, https://forums.autodesk.com/t5/maya-modeling/maya-layout-uv-unfold3d-doesn-t-preserve-3d-ratios/td-p/8699331

[13] Blender Layout, Blender, https://www.blender.org/

LIST OF TABELS

[1-22] VFX vs. CGI, Educba, https://www.educba.com/vfx-vs-cgi/

[23-24] Animation vs. VFX, Definition, Pixelloid Studios, July 17, 2019, Pixelloid, https://pixelloid.com/

[25-26] Animation vs. VFX, Software's uses, Pixelloid Studios, July 17, 2019, Pixelloid, https://pixelloid.com/

[27-28] Animation vs. VFX, Career, Avantika Bade, February 11th 2016, School of Media Design, http://schoolofmediadesign.com/blog/vfx-vs-animationwhat-is-animation-and-visual-effects

[29-30] Animation vs. VFX, Applications, Pixelloid Studios, July 17, 2019, Pixelloid, https://pixelloid.com/

[31-32] Animation vs. VFX, Types, Avantika Bade, February 11th 2016, School of Media Design, http://schoolofmediadesign.com/blog/vfx-vs-animationwhat-is-animation-and-visual-effects

[33-34]Animation vs. VFX, We used in this, Map Systems India, https://mapsystemsindia.com/resources/various-uses-of-animation.html

[35-44]Cinema 4D vs. Maya, Educba, https://www.educba.com/

[45-46] Blender and Maya, Definition, Educba, https://www.educba.com/maya-vs-3ds-max-vs-blender/

[47-48]Blender and Maya, License, Techjockey, https://www.techjockey.com/blog/autodesk-maya-vs-blender

[49-50]Blender and Maya, Marketability, Techjockey, https://www.techjockey.com/blog/autodesk-maya-vs-blender

[51-52] Blender and Maya, Features, Educba, https://www.educba.com/maya-vs-3ds-max-vs-

blender/

[53-54] Blender and Maya, User Experience, Educba, https://www.educba.com/maya-vs-3ds- max-vs-blender/

[55-56] Blender and Maya, Interface, Educba, https://www.educba.com/maya-vs-3ds-max-vs-blender/

[57-58]Blender and Maya, Motion Graphics, Techjockey, https://www.techjockey.com/blog/autodesk-maya-vs-blender

[59] Blender and Maya, Developed in Language, Blender, https://www.blender.org/get-involved/developers/

[60] Blender and Maya, Developed in Language, Autodesk, https://knowledge.autodesk.com/support/maya/learn-

explore/caas/CloudHelp/cloudhelp/2018/ENU/Maya-Scripting/files/GUID-0F7C50D1-FF45- 4868-8EBC-FE044F54B82E-htm.html