Visual Effects in Indian Cinema: A Study of the *Bahubali* Film Series

Angana Datta & Ruchi Goswami

Abstract

Films have come a long way from the silent era to the present day, but the creation of visual effects has been vital in portraying some magical, scientific, or action situations in all blockbusters. The term "visual effects" (or "VFX") refers to the process of combining live action footage, special effects, and computer-generated imagery (CGI) to make environments, objects, animals, and creatures that look real. Over the past few years, the name "Bahubali" has become a household word across much of India and even in some foreign countries. Under the direction of S.S. Rajamouli, hundreds of VFX artists carefully crafted the film's captivating moments. Due to the enormous scale of the storyline, almost 90% of this film series is made with the help of composited visual effects. The purpose of this research is to identify the most commonly used software and latest technologies in the film series, which are used to create an aesthetically pleasing imagined environment and other key sequences, as well as to identify the number of VFX shots and sequences created by professional VFX studios in the film. This paper focuses on obtaining data from secondary sources. Through the use of the qualitative method, secondary data sources are incorporated.

Keywords: Blockbuster; Composited VFX; Computer-Generated Imagery (CGI); Special Effects (SFX); S.S. Rajamouli.

1. Introduction: The history of Indian cinema is rich and it is populated by skilled filmmakers who have given a great deal to the art form and the advancement of cinematic technology. Every year, thousands of films incorporating technology are released. Multibillion-dollar film ventures are now common in India. Despite the differences between 3D animated films and regular commercial films, VFX is currently being used in almost all film projects. Many well-known Indian film filmmakers have

employed VFX to effectively portray their vision. (Kumar) Telugu cinema has existed since 1930 and is a subset of Indian cinema. It has grown and achieved new heights with the efforts of numerous technological professionals, renowned artists, and others. Filmmaker S. S. Rajamouli is a gift to Indian film since he has brought Telugu to a global audience and expanded the language's scope to include all of India. From Bhakta Prahlada to Bahubali, Telugu movies have risen quickly, and many film critics and observers have written about this. The commercial value of Telugu cinema has increased thanks to the success of films like Magadheera, Bahubali, and Eega. (Sama and Krishna) Telugu cinema makes hundreds of movies every year and it has also been made better in terms of technology. (Kumar) People used to think that only Hollywood movies needed fancy visual effects, but the recent success of Indian blockbusters has shown that this is not true. The best "epic-drama" films that come to mind are The Lord of the Rings trilogy, Gladiator, and the American television series Game of Thrones; no Indian films come to mind. This is no longer the case, thanks to Bahubali's pioneering work in Indian cinema. (Mahale and Mahale) Bahubali is a film that was directed by S.S. Rajamouli and released in April 2017. This fictional film utilized a flashback narrative structure. It was released under the titles Bahubali: (The Beginning) and Bahubali: (The Conclusion). The content featured numerous VFX and special effects. It received a positive response from the audience. Additionally, it earned the biggest box office gross and was a smashing success. (Kumar et al.)

1.1 VFX Production Process: In filmmaking, VFX is when live-action footage and computer-generated images are used together to create environments that look real but would be dangerous, expensive, or impossible to film. The majority of VFX work (using a variety of tools and techniques such as computer graphics, modelling, and animation software) is accomplished in the post-production process, but it is meticulously planned and choreographed throughout pre-production and production, while special effects such as explosions and car chases are created on location. Most of the time, a VFX supervisor is involved in the production from the very beginning. This allows them to collaborate closely with the production and the film's director in order to develop, direct, and lead the teams required to create the desired effects. (Pardeshi and Karbhari)

1.2 VFX Techniques: VFX techniques that are popular in the film industry right now include digital compositing, animatronics, morphing, animation, scale modeling, the use of prosthetic makeup, and computer graphics imagery. These are examples of VFX technology that has a profound impact on the film's narrative and treatment. Adding special effects to a

movie makes the scenes more memorable and interesting to watch. The shots are made more appealing by the use of VFX. Therefore, even the trailers of movies that are true crowd-pullers now include a few moments with tremendous VFX to affect the opinion of the audience before the movie is released. A movie with the magic of VFX can attract people's attention even if it doesn't have a well-known cast or director. (Verma, Mukherjee & Sharma)

2. Review of Literature: Within the film industry, VFX has the ability to create a new world that can amaze a viewer. Films that can do this seem to be the most important sign of the recent change in visual forms. A brief literature survey of Indian films for the proposed study reveals that many studies have been conducted so far to assess the narrative, visual styles and many other aspects of film. The high-end VFX technologies push creativity to an unimaginable level of fantasy in the Indian film industry, which is something to be discussed now. According to the auteur theory, a film's tone, style, and themes should be visibly those of its director, who is viewed as the film's primary "auteur" (the French term for "author"). The film is considered an artistic creation under the law, and its original copyright belongs to the director (or "auteur"). In addition, Alexandre Astruc's caméra-stylo, or "camera-pen," contributes to auteur theory by encouraging filmmakers to treat the camera like a pen. (Caughie) Therefore, an auteur can enhance their vision through the use of lighting, camerawork, staging, and editing.

In his book, the author talks about both traditional and new VFX techniques, showing how the new ones build on the old ones. He talks about how to set up a shoot and the different kinds of equipment used. Early problem-solving is essential for selecting the best method for a scene and organizing the shooting schedule. This process includes script breakdown, storyboards, and shot planning. In addition, the book discusses VFX shots, compositing elements, mattes and their development, VFX tools and planning, camera types and their corresponding in-camera effects, projectors, and projection. (Perisic) So, this book has helped in understanding what kind of technical knowledge is needed for cinematography in VFX films.

The author provides a concise, comprehensive introduction to the use of computer graphics in film. As a CG production genius, Patel in his book debates how a studio creates excellent animation or VFX. This book talks about the differences between making VFX for live-action projects and fully animated ones. It also talks about the parts of the production process and the trade-offs that come with making important design decisions.

(Patel) Thus, this book is beneficial to get a sense of the work done by the directors and producers, studio executives, and artists in a digital VFX studio.

This book shows how digitally enhanced films are a continuation of the narrative and artistic traditions that have characterized American cinema for decades. Prince contends that digital technology may be used to enhance realistic films. He examines each technique in depth, from lighting to picture capture to stereoscopic 3D. (Prince) So, from an aesthetic, historical, and theoretical standpoint, this book is useful for this research on digital VFX.

Furthermore, the author provides a complete guide to achieving photorealistic effects in VFX, architecture, product visualization, and games. Dinur explains the complicated interaction of light, surfaces, atmospherics, and optical effects, then discusses how to create this complexity digitally, in both 3D and 2D. He includes artwork, case studies, and interviews with top VFX, visualization, and gaming artists. He also explains a convincing and elegant way to get photorealism in digital media and make images that look like they were taken from real footage. (Dinur)

The book says that the use of still "matte" paintings in conjunction with live-action film has been used to generate astonishing special effects since the invention of motion pictures. Until recently, matte painting techniques were closely guarded secrets that were never shared outside the studio. The author explores the history of VFX that has shaped cinema as we know it, from Gone with the Wind and Citizen Kane to Star Wars and Titanic. (Barron, Craig, and Vaz, Mark) Therefore, this book helps in learning about matte painting for VFX films.

In this study, the author first explains matchmoving basics, 2D tracking, 3D calibration and tracking, automatic tracking, cameras, integrating matchmoves, and stereoscopy. He explains how match-movers collaborate with the rest of the VFX team using cameras and perspective. (Dobbert) In another book, the author discusses how to smoothly integrate rotoscoping and digital painting into each shot. Bratt provides step-by-step guidance to articulate mattes, digital painting in moving video, motion tracking, and advanced rotoscoping and digital painting techniques. (Bratt) So, the above books are helpful in the context of rotoscoping and matchmoving, unseen art forms that are an important part of making VFX.

In this research study, the researcher talks about the director's process of

making a movie, which is usually shown by things like working on the script, designing the shots, and watching what the actors do. She discusses the digital pipeline, the sequential technical approach used to create computer-generated graphics, which explains how directors conduct such activities for films that make considerable use of digital effects. Her research compares a widely accepted methodological approach to directing films with few or no digital effects to one in which such effects are dominant. Her research contends that the advent of digital effects has altered the director's approach; it illustrates a typical digital effects workflow and compares it to the industry norm. (Bhalla) So, the above research study of modern filmmaking shows that it depends a lot on these effects and how they affect things.

In another research study, the researcher discusses green screen keying, a technique used for cinematic VFX. The research also explored the film industry format, which keeps better quality footage as well as a standard approach to making mattes in the VFX industry. A full review of chroma subsampling and various typical methods of subsampling accessible for film and digital data encoding are also described. As a second important aspect of green or blue screen keying, a set of linear and log color space principles are also mathematically explored. The research in his study concludes with a streamlined procedure for utilizing this strategy in real productions. (Zhi) Hence, this research has helped to learn about one part of VFX, called green screen or blue screen keying, as well as another way to get keying results.

The researchers in their paper explain that CGI is also known as Computer Graphics or Computer-Generated Imagery in the computer science field. Graphics are created using computer-generated images. CGI at times blurs the barrier between reality and virtuality, making it difficult to tell the difference between CGI and the genuine thing. It takes a lot of time and effort to achieve the jaw-dropping results, but it's worth it. In this research paper, the researchers aim to provide a general overview of the CGI pipeline method and technique. (Jain and Jain) So, this paper helps understand the CGI process, production pipeline, and software needs for modeling, texturing, rigging, animation, VFX, lighting, and rendering.

In this article, the researcher focuses on merging live action and computer-produced visuals in Indian cinematic storytelling. The recent box office success and great audience reaction revealed that visual effects are helpful for the Indian film industry. They reveal that animation and VFX are now appearing in films, TV, and commercials. The number of VFX studios

in India will continue to grow, as will their capacity to deliver projects requiring both creative and technical competence. Finally, they conclude that due to increased competition and VFX studio numbers, major VFX companies will continue to seek opportunities abroad. (Kumar and Vats) So, this article gives an overview of the history of Indian cinema and how the animation and visual effects industries have affected the growth and popularity of top animated and VFX movies.

In this article, the researchers opine that VFX and animation can be very useful in the Indian film industry. They show how new digital technology has made a big difference in the quality and content of movies. Also, it displays how Indian movies have changed their themes and stories. They declare that this new CGI technology closes the gap between the ways films are made in developed and developing countries. New generation film directors have a lot of good things to say about the use of VFX and special effects in film production. Even though it raises the cost of making the movie, it gives more freedom in the creative phase. Films like Bahubali show that there is a bright future for content-based films that can be sold around the world. Their case study about the movie "Kochadaiyan" demonstrates how motion capture technology has changed in the Indian movie industry. In the end, their article concludes that the Indian movie industry has changed a lot because of new VFX and animation technology. (Kumar and Jothi) So, this article talks about the latest news and trends in the Indian film industry, including Bollywood, Kollywood, and Tollywood.

This article provides an overview of VFX technology, its evolution from the 1990s to now, and its significance in the film industry. In his essay, he explains how digital compositing is used in filmmaking to make live-action and 3D movies look realistic. Sharma also discusses some advanced VFX software utilized to boost film production efficiency. He further adds that VFX is the ultimate blend of picture art and reality, where viewers are immersed in film art. At the end, he concludes in his article that using digital technologies such as blue screen or green screen enabled filmmakers to work faster and more efficiently while maintaining a low production cost. (Sharma) Therefore, this article is very important because it talks about all the VFX technologies used in filmmaking from 1960 to the present day, including software, and how they have changed.

Another article says that Telugu cinema has scaled the Himalayas and in the past two decades, the Telugu cinema industry has established new trends. Several filmmakers are acknowledged as trend-setters. The re-

searchers believe that Telugu cinema's success is largely attributable to its daring producers, inventive directors, talented cast, and high technical standards. Many of the films directed by renowned filmmaker Rajamouli have received worldwide acclaim and adoration. The article also discusses the director's story, writing, and emotional portrayal. They also discuss Rajamouli's ideas like "Magadheera," a fantastic movie like "Eega," and a narrative like "Bahubali." His films combine emotion with a compelling plot to increase the audience's enjoyment. (Sama and Krishna) This article is very helpful because it talks about how S.S. Rajamouli films are put together.

Also, another article talks about 11 films from 1950 to 2018 that were based on real events in Indian history. The researcher explains the success of Bahubali as a story. He examines the growth and collapse, marketing techniques, budget, awards, critic reviews, and audiences' reactions in India and worldwide. Not every movie lives up to what audiences and critics want, but his survey finds that most historical stories turned into movies are liked by audiences and called "blockbusters." He says that an unexpected rise in curiosity about the past has allowed the film industry to study historical stories and present them with inventiveness. He also claims that this has led to producers committing massive sums in the hope of a large return. (Sahu) This article includes the visual representation of historical films and audience response.

Hence, the above studies reveal that the Visual Effects (VFX) industry in India has a bright future as more and more top filmmakers will soon be looking at high-end fantasies.

3. Objectives: There are two objectives for this paper:

1. To identify the most commonly used software for 3D animation and VFX, as well as the most recent technological approaches, in the film series "Bahubali" (The Beginning and The Conclusion).

2. To identify the VFX techniques used to create the key sequences by professional VFX studios in the film series 'Bahubali' (The Beginning and The Conclusion).

4. Methodology: This paper provides a basic explanation of the kind of study and its components. A qualitative method was used in this paper. This paper gives an overview of the production process and the VFX techniques used. The majority of the paper talks about the Bahubali film

franchise and all the facts about the films, such as how the films were shot and executed. Film analyses of the following give a close look at how cinematic sequences were put together in Bahubali: The Beginning and Bahubali: The Conclusion.

Table I : Theatrical Release of "Bahubali" Film Series Posters

Fig I: Bahubali – The Beginning

Fig II: Bahubali – The Conclusion

Data Collection: The secondary data was collected from various online entertainment websites (IMDb, boxofficeindia.com, etc.) in order to gather the information for the case study of the films. This process of gathering secondary information was based on the different studies, research, and investigations that have been conducted on the VFX used in the film series so far. This paper's goal is to use the information gathered to look at how film sequences in the "Bahubali" film series were made, such as the use of green or blue screens, CGI, etc. It is a very personal kind of research that lets the subjective perceptions and biases of both participants and researchers into the research frame. Therefore, a qualitative research paper is to be presented in a closed way with enough detail so that someone who has not seen the film can understand and appreciate it.

Proposed Analysis: The paper analyzed and captured key sequences of what goes on behind the scenes, which were looked at in relation to each other. The analysis of this film review also produced tables that show a list of the software and latest technologies used in the VFX and CGI industries; illustrations to show the percentage of VFX done by each professional studio; and tables to show the VFX techniques utilized for key sequences by professional studios that worked on this film series.

This paper observes a lot of movies with VFX in Indian cinema, like Ra.One, the Krrish film series, the Dhoom series, Eega, Enthiran (Robot), I, Magadheera, and 2.0, among others. But when it comes to extraordinary visual effects, the Bahubali film series is among the very greatest in the history of the Indian film industry. The paper shows that there were more than 5000 VFX shots completed in the first segment, and another 2500 VFX shots completed in the second. Rotoscoping, matte painting, chroma removal, paint, set extension, rig and wire removal, 2D and 3D tracking and matchmoving, FX, camera projections, and many more VFX techniques were all used in these films.

Fig III. Bisleri bottle chroma with baby Bahubali

Fig IV. 100% CGI in the 10-minute-long avalanche sequence

Fig V. 3D Mahishmati City

Fig VI. Mahishmati City, featuring Forest Pack distribution maps

The paper finds that the modeling, texturing, shading, and lighting parts of set extension in 3D and post-production software brought to life a beautiful Mahishmati Kingdom. The Forest Pack Distribution map was used to create the Mahishmati city, with 400 distinct building structures and more than 50 different plant species.

Fig VII. Chroma in the Epic War Sequence between Mahishmati and Kalakeya Soldiers

Fig VIII. Chroma in the Epic War Sequence between Mahishmati and Kalakeya Soldiers

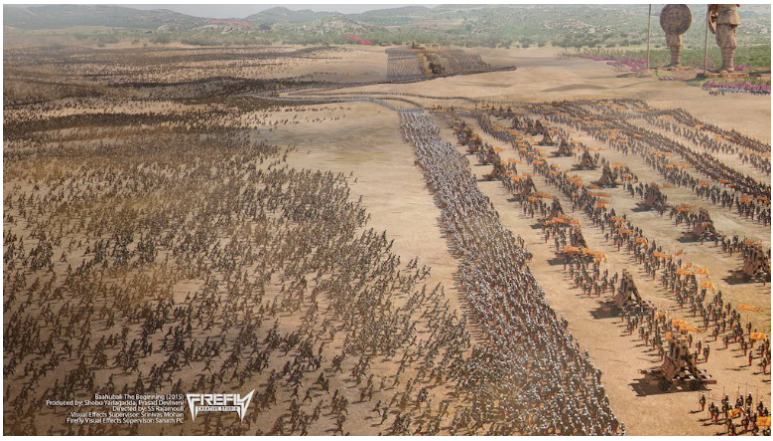


Fig IX. Use of Crowd Multiplication for War Sequence

The paper observes the battle sequences between 25,000 Mahishmati soldiers and one lakh Kalakeyan soldiers, which was hard to prepare for in a live-action film, yet was achieved successfully via crowd multiplication. Accordingly, a green screen chroma about 1200 feet in length was utilized. The production designer used a live-action set and VFX programme to make the period look accurate. Therefore, the Indian film industry has never shot an epic war scene of this scale before.

Fig X. Chroma Green Screen and 3D Bull in the Bull Fight Sequence.

The paper further identifies a VFX company that collaborated with actor Rana Daggubati to create the combat scene with 3D Bull.

Fig XI. 3D Body Scan of Lead actor 'Bahabuli', a solider of Mahishmati and head of 'Bhadra'

Also, 3D scans of the actors were used to make digital body doubles, which were then animated to show some of the more complicated battle scenes.

Fig XII. Chroma Green Screen for Waterfall Scenes

The paper also finds a pre-production and pre-visualization task done for a 2500-foot 3D waterfall animation. It was made possible with the use of 3D camera projection and blocking from a variety of camera angles.

Fig XIII. Chroma green and blue screen used 'Dhivara song' in Bahubali – The Beginning

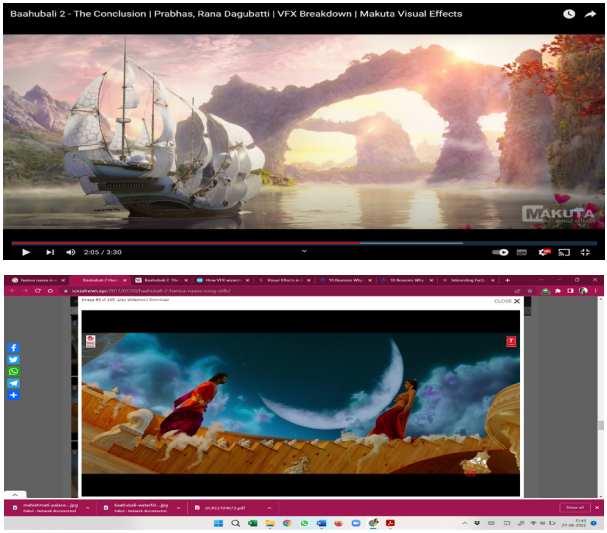


Fig XIV. Larger than Life Visuals shown throughout 'Hamsa Naava' in Bahubali – The Conclusion

The paper also adds two love songs, "Dhivara" and "Hamsa Naava". In both parts, they used a lot of green screens, and most waterfall scenes were made with CGI and 3D animations of water falls with a lot of fluid dynamics.

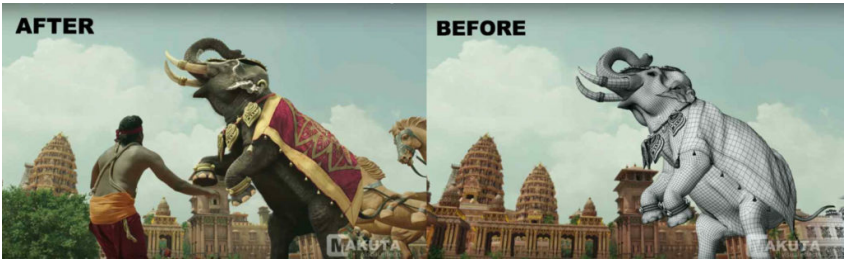


Fig XV. Animatronics of Elephant for close up shots

Further, the paper finds that in order to achieve realistic close-ups, the production designer built animatronic versions of a horse and an elephant. Much of the key animation in Bahubali makes use of this technique, especially when human and animal characters interact.

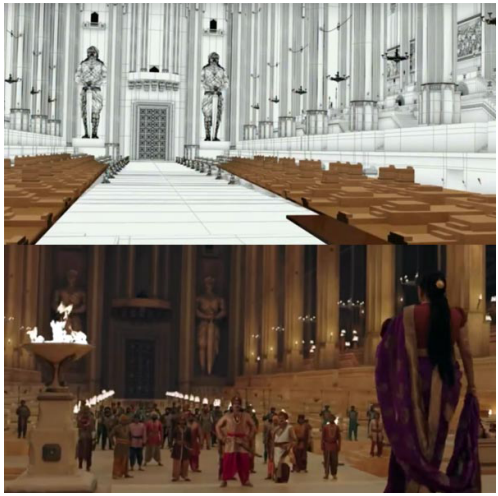


Fig XVI. 3D set of Mahishmati Court

Fig XVII. LiDAR Scanning of the Entire City

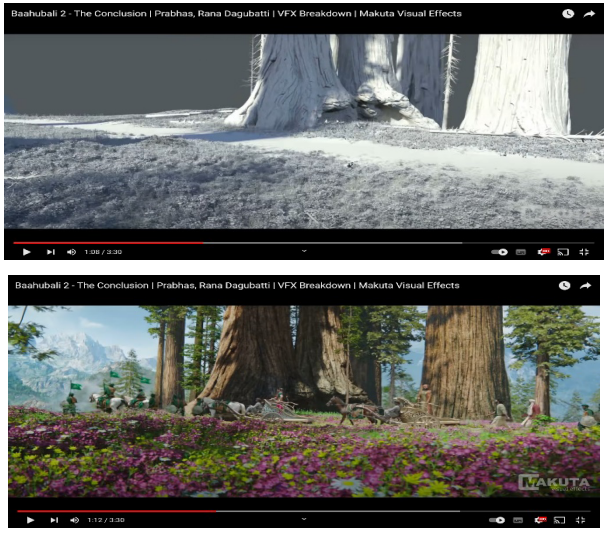


Fig XVIII. LiDAR Scanning of Kunthala Rajya scene

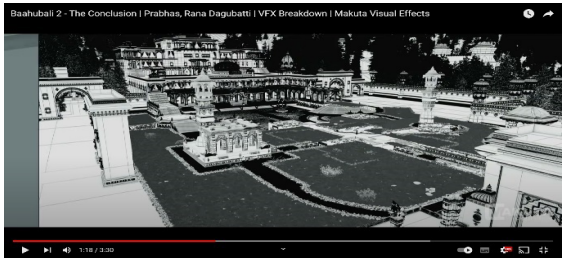


Fig XIX. LiDAR Scanning of Kunthala Rajya scene

The paper also finds that Light Detection and Ranging (LIDAR) Scanning was used to turn the whole city of Mahishmati, the inside and outside of the palace, Kunthala Rajya, and the attack of Pindari into 3D.

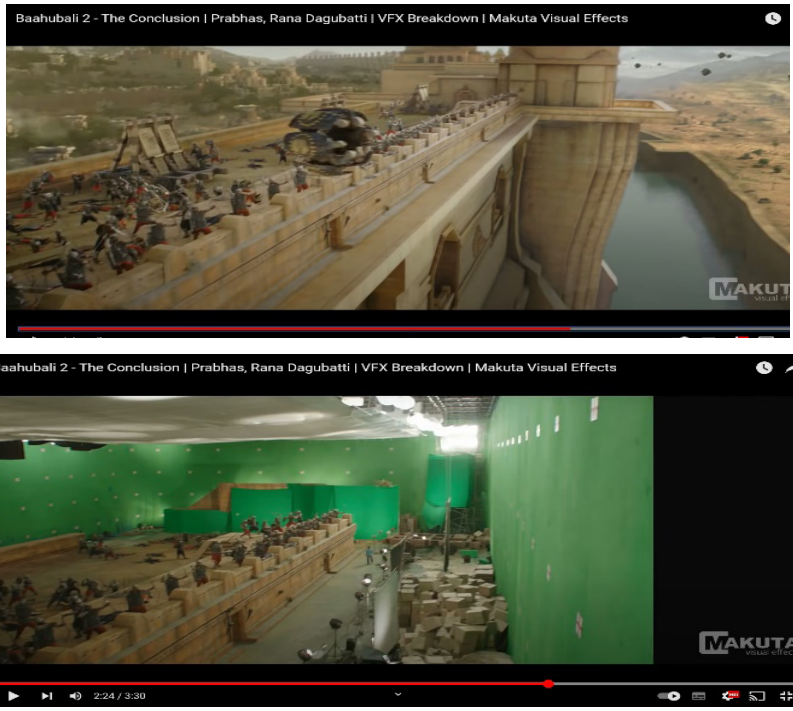


Fig XX. CGI and Chroma for Climax war sequence in 'Bahubali – The Conclusion'

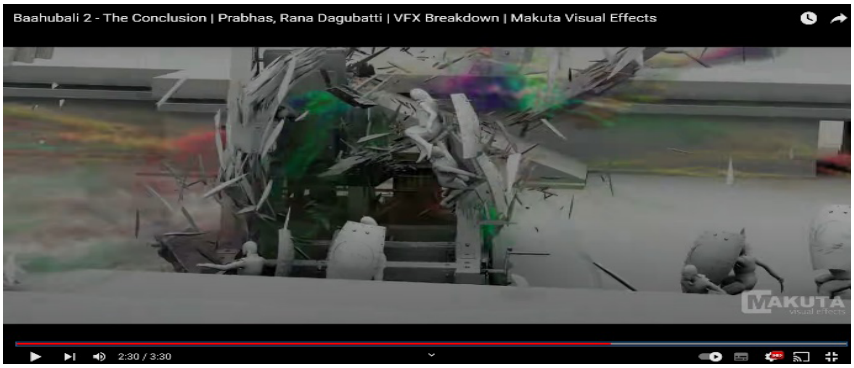
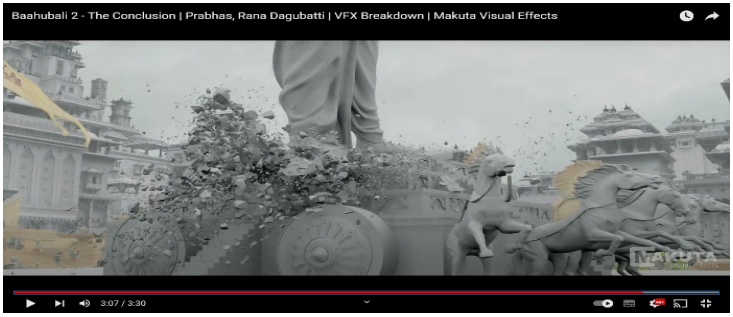


Fig XXI. 3D Printing for Climax war sequence in 'Bahubali – The Conclusion'



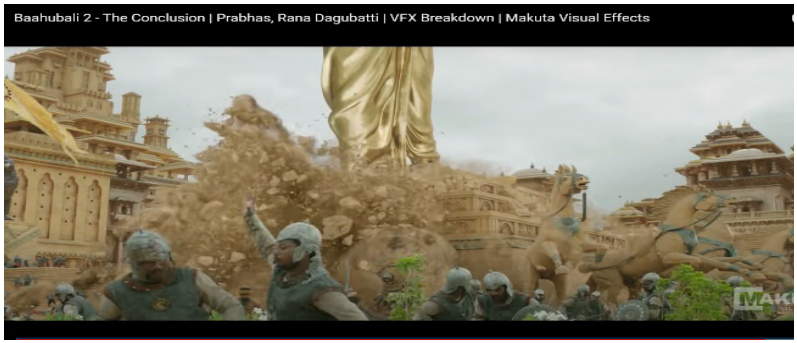


Fig XXII. 3D Printing for Bhallaldeva Status destruction in 'Bahubali – The Conclusion'

In addition, this paper finds that previsualization attempts were also made for significant sequences such as "the avalanche sequence," "the bull fight," and "the epic battle sequence" in order to comprehend the scope and envision the grandeur.

Furthermore, the paper also finds that the climactic battle was polished off with fundamental skills across all of the key disciplines to deliver a finished product in less time. Computer-generated effects for the Bahubali film series were largely produced in India and have become the standard for Indian films. The paper also finds that the BBC show celebrated 100 years of Indian movies by showing the making of Bahubali before the movie came out.

Hence, the paper analyzes that VFX has contributed greatly to making this film series more entertaining, appealing, and interesting and highly successful at the box office.

5. Results and Discussion

Objective 1

Table II: The software utilized to create VFX, animations, and 3D-based content, as well as the most recent technology, contributed to the success of the film series.

Supervising film production and VFX	Software used for 3D Animation and VFX	Latest Technology Used
Bahubali – The Beginning (2015) by Srinivas Mohan	3Ds Max, Mental Ray, Houdini, Zbrush, Mudbox, Bonjou, Mocha, Radeon Loom software, Cinema 4D, Blender	• Forest Pack distribution Map • Lidar Scanning • Academy Color Encoding System • Infinitely Scalable Information Storage • Animatronics • AMD processors • 3D Printing Technology • 4K Movie Print for 4K projection • Arri Alexa XT camera with Master Prime lens • BB360 camera • Digital Intermediate
Bahubali – The Conclusion (2017) by R C Kamalakannan	Maya, Arnold, Yeti, Nuke, Fusion, Deep EXR, Miniature Practical FX, Golaem, Miarmy, Houdini, Zbrush, Mudbox, Bonjou, Mocha	

Table II informs us about the visual effects supervisors involved in the production of both films, respectively. Secondly, it also lists the various software used for 3D animation and VFX. For example, with the help of

AMD's state-of-the-art CPUs and GPUs, they were able to produce larger-than-life visuals with ease and, in large part, thanks to the use of graphics cards from the Radeon Pro WX series. Bahubali's editing was done in real time with the help of Radeon Loom software, which was employed by Rajamouli. The film's creators upgraded the image quality by using cutting-edge 4K resolution technology. The Digital Intermediate partner was used to create the high-quality digital feed needed for post-production. Considering the scope of the film's digitally enhanced shots, the filmmakers used Infinite Scalable Information Storage and the Academy Color Encoding System for the first time in an Indian film. Finally, Bahubali filmmakers used 24 'bb360' cameras and AMD Radeon software to capture 360-degree footage of the massive sets and render the picture in 3D.

According to timeofindia.com, the paper finds that about 90% of "Baahubali: The Beginning" and "Bahubali: The Conclusion" were made up of computer-generated imagery (CGI) and animations. There were about 5,000 and 2,550 visual effects (VFX) shots in the respective films. In this paper, the figures below demonstrate how much VFX each of the following studios made approximately.

Fig XXIII. The distribution of the 90% percentage of the VFX was created by these visual effects studios in 'Bahubali – The Beginning'.

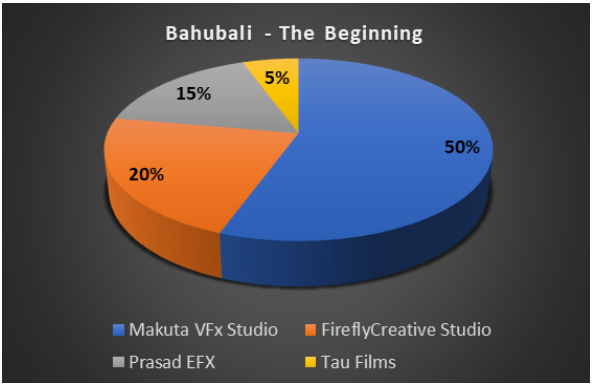
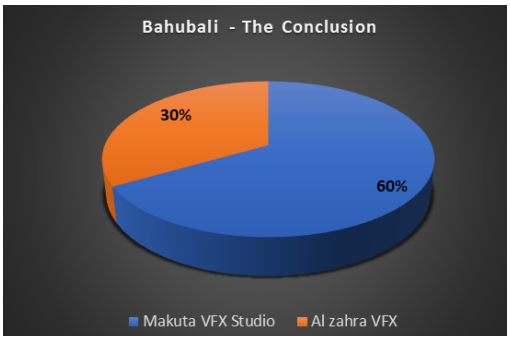


Fig XXIV. The distribution of the 90% percentage of the VFX was created by these visual effects studios in 'Bahubali – The Conclusion'.



Objective 2

Table III. The following sequences in the film 'Bahubali: The Beginning' were made using these VFX techniques by each of the VFX studios:

VFX Studio	Key Sequences Analyzed	VFX techniques
Makuta VFX Studio	• The Waterfall Sequences • Bisleri bottle replaced with Baby Bahubali • The Tarzan Sequence • The Mahishmati City • The Mahishmati central Palace	• Rotoscoping • Matte Painting • Chroma removal • Set extension • Rig and wire removals • 2D and 3D Tracking • Fluid dynamics • 3D camera projection • Camera blocking • Camera animation • Digital doubles • 3D scanning • 3D modelling and animation • Simulation and rendering • Digital multiplication • background animation • cosmetic touch ups • Face mapping • Digital double • CG character • UV mapping • Particle system
Firefly Creative Studio	• Pre-production and Pre-visualization Waterfall Animation • Avalanche • The Epic War Sequence • Underwater VFX shots • Backstories for Kalakeya characters • Bhallaldeva chariot with the rotating blades • Snake scene	
Prasad EFX	• Pre and Post battle episodes • Kattappa's 3D face • Cutting off Bhadra head scene	
Tau Film	• Bhallaldeva vs Bull Fight Sequence	

Table III shows that four Indian visual effects studios were involved in creating the visual effects for the first film in the Bahubali series. A total of sixteen different types of sequences were examined, including the establishing shots, the flashback, the animal attack or close-up, the songs, the conflicts, and the emergence of a kingdom. The VFX processes used to complete these sequences include the following: the creation of a CG character; face mapping; 3D modelling and sculpting; the removal of green and blue screen for chroma keying; the expansion of the set; the elimination of wires; matchmoving and camera tracking; the use of a digital double; the use of a particle system; etc. The paper finds that over a hundred visual effects (VFX) artists and animators collaborated on this project to make it the most successful film ever made in India.

Table IV. The following sequences in the film 'Bahubali: The Conclusion' were made using these VFX techniques by each of the VFX studios:

VFX Studio	Key Sequences Analyzed	VFX techniques
Makuta VFX Studio	• Opening Credits • Elephant attack sequence • Coronation (Exterior) • The Mahishmati City • The Mahishmati central Palace • Kunthala Rajyam • Wild Pig sequence • Hamsa Naava Song • Climax War	• Rotoscoping • Matte Painting • Chroma removal • Set extension • Rig and wire removals • 2D and 3D Tracking • Fluid dynamics • 3D camera projection • Camera blocking • Camera animation • Digital doubles • 3D scanning • 3D modelling and texturing • Simulation and rendering • Digital multiplication • background animation • Cosmetic touch ups • Face mapping • Digital double • 3D environment
Al zahra VFX	• Burning Oxen thorn sequence • The dam breach in the kunthala war'	

Table IV indicates that two Indian VFX studios were primarily responsible for generating the VFX for the conclusion. Ten distinct sorts of sequences, including the post-flashback, animal assault or close-up, music, and climax, were analyzed. The VFX processes used to complete these sequences include: the creation of a CG character; face mapping; 3D modelling and sculpting, 3D scans, cosmetic touch-ups, simulation and rendering, the removal of green and blue screens for chroma keying; the expansion of the set; the elimination of wires; matchmoving and camera tracking; the use of a digital double; the use of a particle system; and camera projection, among others. The paper also finds that the crew of artists who worked on Bahubali: The Conclusion's simulations, models, digital matte paintings, animations, and set extensions peaked at 100 people at one point.

Discussion

The visual parts of a movie are very important to Indian cinema, which was built on the idea that they are valid and helpful. They have the chance to focus on the spoken parts of a story and come up with a deep and informative meaning. The 'Bahubali' film series exemplifies a new approach to story-telling in the Indian film industry.The focus of the research is on the visual effects, which are made with high-end VFX technologies that push creativity to levels that are impossible to imagine and improve the artistic quality of film. The CGI production fits naturally into the narrative. The audience is convinced to believe in the truth of a story set in a made-up environment with many pieces of computer-generated imagery. CGI makes it possible to show things that have never happened in a photorealistic way. Because of CGI, thousands of costumes, weapons, and pieces of equipment were not needed, and the amount of work done by operators and other special effects in the film was greatly reduced, all of which led to significant cost savings and the creation of an experience.

The 'Bahubali' movie series was chosen for this analysis because it is different from other movie sequels in many ways.

- One of the film's innovative tactics was the "one shot" method.
- Effects stacking allows for the generation of novel visual effects that would be impossible to capture using the standard on-set method.
- This film uses a variety of visual elements not seen in other films, including 3D shots on an Arri Alexa XT and the BB360 camera.

- S.S. Rajamouli, Sabu Cyril, and V. Srinivas Mohan, the acclaimed director, production designer, and visual effects supervisor of Magadheera, Enthiran, Eega, I, and Robot 2.0.

6. Conclusion: As we shift from verbal to visual modes of communication, VFX will become standard fare. The filmmaking process itself has undergone a dramatic evolution thanks to the efforts of filmmakers. They are beginning to grasp the immense potential VFX holds, particularly for action, fantasy, and science fiction movies. The costs associated with building elaborate sets can be mitigated by the use of VFX. According to the findings, the digital video industry is dependent on CGI, with most sequences being shot in the studio with the use of state-of-the-art technologies and techniques like green screen VFX, 3D animation, morphing, motion tracking, and composition. VFX is now integral to the production process. After the success of the Bahubali franchise, Rajamouli's another masterpiece, "RRR", which just came out, has become a pan-Indian hit. Hindi-dubbed versions of south Indian hits like the 'Baahubali' series, 'KGF' chapters, 'Pushpa' and 'Brahmastra' have shown that Indian audiences are eager for more sophisticated VFX. The field of visual effects (VFX) has been present for quite some time, but recently, it has been expanding both in scope and quality. The MNCs and studios in India are extensions of foreign studios. They are outsourcing to India due to the price disparity. A lot of employees with the right skills are now working on a lot of Indian domestic projects. This is why the quality of VFX is getting closer to what is expected around the world.

Works Cited:

Films Viewed

Bahubali: The Beginning. Dir. S. S. Rajamouli. Perf. Prabhas and Rana Daggubati. Ramoji Film Studio, 2015. Film.

Bahubali: The Conclusion. Dir. S. S. Rajamouli. Perf. Prabhas and Rana Daggubati. Ramoji Film City, 2017. Film.

Books

Barron, Craig, and Vaz, Mark Cotta. *The Invisible Art: The Legends of Movie Matte Painting.* Thames & Hudson, 2002.

Bratt, Benjamin. *Rotoscoping: Techniques and Tools for the Aspiring Artist.* Taylor & Francis Group, 2018.

Caughie, John. *Theories of Authorship.* Taylor & Francis, 2013.

Dinur, Eran. *The Complete Guide to Photorealism for Visual Effects, Visualiza-*

tion and Games. Routledge, 2021.

Dobbert, Tim. *Matchmoving: The Invisible Art of Camera Tracking.* Wiley, 2012.

Patel, Mayur. *The Digital Visual Effects Studio: The Artists and their Work Revealed.* Clock and Flame Studios, 2009.

Perisic, Zoran. *Visual Effects Cinematography.* Focal Press, 2000.

Prince, Stephen. *Digital Visual Effects in Cinema: The Seduction of Reality.* Rutgers UP, 2012.

Ph.D Thesis

Balla, Gianluca. *The Director's Method in Contemporary Visual Effects Film: The Influence of Digital Effects on Film Directing*. Diss. University of York, 2016.

Journal Articles

Jain, Ankit, and Nishita Jain. "A Peek into Computer Generated Imagery Pipeline." *Bionano Frontier,* vol. 10, no. 2, 22 Dec. 2017, pp. 220–21.

Kumar, B Senthil. "A Study on Computer Graphics and Animation in Film Media." *International Research Journal of Engineering and Technology,* vol. 3, no. 11, Nov. 2016, pp. 388–91.

Kumar, B. Senthil, et al., "A Study of the Recent Changes in Technology and Storytelling Method of Tamil Cinema." *MuktShabd Journal* IX-.IX (2020): 1008-11. Web. 02 Feb. 2021.

Mahale, Jayesh Manohar, and Pratik Yuvraj Mahale. "The Recent Trends of VFX (Visual Effects) & Animation in Indian Film Industry." *International Journal of Engineering Research & Technology*, vol. 10, no. 3, 30 March 2021, pp. 380–81.81. 2278-0181. Print.

Pardeshi, Ajay Shivshankar, and Vaishnavi Balaji Karbhari. "Recent Trends in VFX (Virtual Effects) and SFX (Special Effects)"International Journal of Engineering Research & Technology, vol. 8, no. 7, ser. 2278-0181, July 2019, pp. 882–884. 2278-0181. Print.

Sahu, Ankita. "Films and Arts flipping the pages of the history." International Journal of English Literature and Social Sciences 3.3 (2018): 457-465.

Sama, D.V.S.S.N.S., and Challa Rama Krishna. "A Study of S S Rajamouli Films and Emotions."International Journal of Multidisciplinary Educational Research, vol. 11, no. 5(4), ser. 2277-7881, June 2022, pp. 33–38. 2277-7881, http://ijmer.in.doi./2022/11.05.67.

Sharma, Deepak. "Visual Effects Now and Then." International Journal of Multidisciplinary Educational Research, vol. 10, no. 1(7), ser.

2277-7881, Jan. 2021, pp. 217–220. 2277-7881.

Zhi, Jin. "An Alternative Green Screen Keying Method for Film Visual Effects." The International Journal of Multimedia & Its Applications 7.2 (2015): 1.

Journal Articles, accessed online

Kumar, Dharmendra & Vats, Aman. (2017). Game Changing Role of Animation and VFX in Indian Cinema. IMS Manthan (The Journal of Innovations). 12. 10.18701/imsmanthan.v12i01.10345.

Kumar, M Bala, and P Sri Jothi. "A Case Study on the Development Animation and Visual Effects in Indian Cinema."Journal of Xidian University, vol. 14, no. 4, ser. 1001-2400, 2020, pp. 3875–3880. 1001-2400, https://doi.org/10.37896/jxu14.4/423.

Websites Visited

https://www.moople.in/blog/the-stupendous-impact-of-the-blockbuster-of-bahubali-2-the-conclusion-over-the-film-technology-and-indian-cinema/

https://thevirtualassist.net/before-and-after-vfx-bahubali-part-1/

https://thevirtualassist.net/vfx-before-and-after-bahubali-part-2/

https://www.hindustantimes.com/regional-movies/how-vfx-wizardry-transformed-baahubali-into-a-visual-extravaganza/story-MZQoneGLSaekiHQ8LABJFN.html

https://www.deccanchronicle.com/150721/entertainment-tollywood/article/meet-baahubali%E2%80%99s-vfx-team

https://www.itoosoft.com/stories/makuta-baahubali

https://www.imdb.com/title/tt2631186/mediaviewer/rm1023504640/?ref_=tt_ov_i

https://www.imdb.com/title/tt4849438/mediaviewer/rm3324607744/?ref_=tt_ov_i

https://www.mensxp.com/entertainment/gossip/36888-these-15-before-and-after-vfx-scenes-from-baahubali-will-leave-you-stunned.html

https://communicationtoday.net/2015/06/29/visual-effects-in-bollywood-perception-of-jaipur-youth/

https://yourstory.com/2017/04/Bahubali-vfx/amp

https://cerebrohq.com/en/2017/08/08/case-study-bahubali-vfx/

https://dgzmedia.com/news/siima-2018-nominations-stunning-vfx-shots-of-baahubali-2/