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Emerging Technologies in Media and Entertainment

Matthew N. O. Sadiku[1], Paul A. Adekunte[2], Janet O. Sadiku[3]

[1]Roy G. Perry College of Engineering, Prairie View A&M University, Prairie View, TX, USA
[2]International Institute of Professional Security, Lagos, Nigeria
[3]Juliana King University, Houston, TX, USA

ABSTRACT

Technology has been the main driving factor for the media and entertainment (M&E) industry and it is modernizing the industry. The M&E industry continues to rapidly evolve and transform. New media technologies are changing the game and shaping content creation, distribution, and consumption. The M&E industry is undergoing significant transformations that will impact the future of television. Social media applications like YouTube, TikTok, and Instagram have become primary distribution channels that allow content creators to get to millions of people at first. This democratization is not devoid of its problems for the same reason – namely, the rapidly growing number of media products, it becomes practically impossible for each media product to be noticeable. This paper looks at the top emerging technologies in the media industry.

KEYWORDS: *technology, emerging technologies, media and entertainment (M&E) industry, advertising*

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INTRODUCTION

Earlier, people used to spend their quality time with their friends and family sitting around the campfire. Today, with rapid advancement in technology, the television had become a main base of entertainment. The media and entertainment industry is undergoing a significant transformation, driven by emerging technologies that are redefining how content is created, delivered, and consumed. Media technology like artificial intelligence (AI)-powered automation in content creation are improving efficiency and audience engagement. The emerging technologies continue to reshape the way we live, work, and interact. By harnessing emerging technologies, media companies can deliver tailored content and craft interactive environments that cater to individual preferences.

The media and entertainment industry is driven by technology. Technology innovations are transforming the media and entertainment (M&E) industry, affecting every aspect from content creation to distribution and consumption. It is evident that technology has a central role to play in the business of entertainment media and technologies in determining the kind of content that is produced. The role of media and entertainment distributors in this transformation cannot be overstated, as they connect creators with their audiences and adapt to the ever-evolving technological landscape [1]. Figure 1 shows a representation of entertainment [2].

WHAT ARE EMERGING TECHNOLOGIES?

Technology may be regarded as a collection of systems designed to perform some function. It can help alleviate some of the challenges facing business today. Emerging technology is a term generally used to describe new technology. The term often refers to technologies currently developing or expected to be available within the next five to ten years. Any imminent, but not fully realized, technological innovations will have some impact on the status quo.

Emerging technologies are shaping our societies. They continue to affect the way we live, work, and interact with one another. Emerging technology (ET) lacks a consensus on what classifies them as "emergent." It is a relative term because one may see a technology as emerging and others may not see it the same way. It is a term that is often used to

describe a new technology. A technology is still emerging if it is not yet a "must-have" [3]. An emerging technology is the one that holds the promise of creating a new economic engine and is trans-industrial. ET is used in different areas such as media, healthcare, business, science, education, or defense.

The characteristics of emerging technologies include the following [4]:

- *Novelty:* Emerging technologies are typically new or novel, meaning they have yet to be widely adopted or used. They often represent a significant departure from existing technologies or processes.
- *Potential for Disruption:* Emerging technologies have the potential to disrupt existing markets, industries, or ways of doing things. They may also displace existing businesses or industries.
- *Uncertainty:* Because emerging technologies are still in the early stages of development, there is often a high uncertainty surrounding their future potential and impact. It can be challenging to predict how they will evolve.
- *Rapid Change:* Emerging technologies often evolve rapidly, with new developments and innovations emerging frequently. It can make keeping up with the latest trends and advancements challenging.
- *Interdisciplinary*: Emerging technologies often involve multiple disciplines or fields of study, such as computer science, engineering, and biology. They may require collaboration across different fields and industries to develop their potential fully.

Emerging technologies are worth investigating. They are responsible for developing new products or devices. As emerging technologies continue to evolve, engineering is poised for a transformative future. Emerging technologies have driven innovation and progress in today's rapidly evolving digital landscape. The collective impact of emerging technologies such as artificial intelligence, machine learning, big data, and the Internet of things is undeniably transformative. Some emerging technologies are shown in Figure 2 [5].

EMERGING TECHNOLOGIES IN MEDIA & ENTERTAINMENT

Technology plays an incredible role in the media and entertainment. Several key technologies are set to have a major impact on the media and entertainment industry. These include the following [6-8]:

1. *Artificial Intelligence:* Within the M&E industry, AI's three most important functions will be recommendation, voice recognition, and media automation. AI enables media companies to deliver hyper-personalized content and adapt to shifting experiences to individual viewer preferences. AI is being used to personalize content recommendations, generate media, and improve the user experience. It is poised to revolutionize content production and consumption. By automating tasks, analyzing viewer preferences, and generating curated recommendations, AI and machine learning will empower media companies to deliver bespoke experiences that truly resonate with viewers. As demand for content localization increases, AI automates the translation and adaptation of media for global audiences. Companies will double-down on GenAI to accelerate content production, facilitate more efficient content distribution, scale personalized marketing efforts, and bolster monetization. Figure 3 shows a representation of AI [6]. As shown in Figure 4, Disney has formed business unit to utilize AI and AR [9].
2. *Robotics:* Robotics drives a shift toward precision, efficiency, and enhanced creativity in media industry. It gives opportunities for automation in complex, large-scale media environments that require huge reliance on human labor. Robotics boosts operational efficiency, reduces costs, and ensures reliable media production. Robotic camera arms and drone automation are used in filming, particularly in complex or dangerous environments.
3. *Drones:* With the emergence of drone technology, impressive photography and aerial filming has become possible. Drones help you to capture breath-taking scenes from different angles. They enable you to acquire the details of inaccessible locations and make detailed documentation. They have become an indispensable unit in the entertainment industry and benefits with great cost savings.
4. *Cloud Computing:* The use of cloud-native technologies has become ubiquitous in the video industry. Media companies leverage cloud computing to handle data-heavy workflows like AI-driven content creation and predictive analytics. Cloud computing offers computational power to process large datasets. It also enables real-time analytics for ad campaigns to allow advertisers to track performance metrics such as viewer engagement and click-through rate.
5. *Big Data:* Big data and analytics significantly improve customer satisfaction to ensure longer viewing sessions and higher retention rates.

Advanced data analytics allows media businesses to predict shows or movies in demand. Big data and analytics thus empower media companies to understand audience engagement and advertising effectiveness at a much deeper level. They measure ad campaign effectiveness across platforms using attribution modeling and data segmentation. Big data will remain the primary tool for creating highly personalized experiences that go beyond simple content recommendations as media consumption becomes more dispersed.

6. *Blockchain:* Blockchain solves long-standing concerns about piracy, sharing revenue, and content ownership. It verifies ad impressions and engagement to combat ad fraud. It provides transparency and trust in ad spending to ensure real viewers see ads. Blockchain secures intellectual property and tracks content ownership through smart contracts and distributed ledgers. The technology has the potential to secure digital content and protect intellectual property. For example, blockchain could be used to create secure and transparent platforms for content distribution, or to ensure that authors and artists receive proper compensation for their work. Blockchain technology has introduced a new era in handling digital ownership through the introduction of non-fungible tokens (NFTs). Unlike traditional tickets, NFTs can be programmed to include additional perks such as VIP experiences, exclusive content access, or the ability to resell tickets on secondary markets. Blockchain and NFTs are poised to reshape digital asset ownership and fan engagement. Nigerian startup Dramebase develops a blockchain-based decentralized media streaming platform, while Belgian startup PlayTreks develops a blockchain-based music distribution marketplace.

7. *Internet of Things:* IoT devices assist media companies in understanding consumer behavior, enhancing real-time personalization, and improving operational efficiency by enabling real-time data collection and, in turn, analysis. IoT enhances audience interaction and enables more innovative and responsive media services.

8. *Immersive Technology:* Emerging technologies in media and entertainment include virtual reality (VR), augmented reality (AR), mixed reality (MR), and the metaverse, which are transforming how we experience content and interact with digital worlds. These technologies offer 3D environments and virtual space to enable immersive storytelling and interactive content capabilities. They provide immersive experiences, redefine viewer engagement, and create new opportunities for content creation and distribution. They will continue to redefine how we experience media and entertainment. VR can be used for virtual concerts, gaming, and movie-going experiences, while AR allows for overlaid digital content onto the real world, and MR blends both. The metaverse is being explored for entertainment, social interaction, and even e-commerce. Figure 5 is an example of immersive experience [6].

9. *5G Network:* Connectivity is moving outside of the tethered cell phone to direct connected 5G-enabled high end IoT devices, the still camera, video camera, televisions, over the top playout devices, health wearables, real-time coaching, and many more that will come to market. Connectivity technologies solve long-standing issues like latency, bandwidth constraints, and fragmented distribution. 5G's incredible speeds and low latency will usher in a new era of individualized experiences. From real-time interactions and personalized content to extended reality (XR) applications that blend the physical and digital worlds, 5G will reshape audience engagement with content. It is expected to fuel innovations in autonomous vehicles, smart cities, and the Internet of things (IoT) with near-instantaneous data transmission, paving the way for real-time communication between devices. China Unicom & Huawei launched the world's first large-scale integrated 5G-Advanced intelligent network. Figure 6 shows a representation of 5G [6].

10. *Biometrics:* Biometrics improves content verification and personalized user interaction in the media sector. These technologies allow media companies to secure the integrity of their content by verifying the source and authorship of media like videos and images. Biometrics also safeguard digital media assets from piracy as well as find applications in content protection, targeted advertising, and subscription management.

Other emerging technologies include metaverse, clean tech, web 3, 3D printing, edge computing, and quantum computing.

BENEFITS

Emerging technologies can deliver tailored content and craft interactive environments that cater to individual preferences. The shifts in consumer behavior are not only redefining the media and entertainment industry; they are setting the stage for a new era of digital consumption, where

personalization, interactivity, and multi-platform accessibility are key. Success lies in technical proficiency and understanding the pulse of consumer expectations. Other benefits of emerging technologies in media and entertainment include the following [2,10]:

- *Personalization:* There is a growing preference for personalized, on-demand content driven by advancements in AI and machine learning. Consumers now expect media that caters to their tastes and schedules moving away from traditional, scheduled programming. Integrating AI in content personalization is not just a trend; it is a revolution reshaping the media and entertainment landscape. Globally, AI is reshaping how content is curated and consumed, offering viewers a more immersive, personalized experience. Gen AI will play a crucial role in personalized content suggestions, handling shopping queries, productizing content recommendations, facilitating interactive advertising, and addressing cybersecurity threats. Figure 7 shows a representation of personalization [11].
- *Interactive Experiences:* The demand for interactive content, such as virtual reality and augmented reality experiences, is on the rise. Interactive and immersive experiences are driving a profound transformation in the media and entertainment industry. Consumers increasingly seek more engaging and participatory content in a shifting media landscape. They seek more than passive viewing; they want engaging, immersive experiences that blur the lines between viewer and content. Interactive shopping will find its place on the TV, blurring the boundary between content consumption and e-commerce.
- *Automation:* AI is already being used to automate many aspects of media production, from content creation and distribution to analysis and recommendation. Language models are propelling AI into realms beyond our initial expectations, automating tasks like extensive dataset analysis and amplifying productivity for providers of video services. AI-powered voice assistants like Siri and Alexa are becoming increasingly popular, allowing users to interact with media content using voice commands. Figure 8 shows an example of automation [12].
- *Social Media*: Social media has evolved into a massive, unified distribution platform, making immediate global reach highly feasible for both brands and creators. Short-form videos on TikTok and Instagram Reels are becoming a medium of choice to reach younger demographics, while YouTube remains strong for longer-form and educational content. People still want the TV and movie experience offered by traditional studios, but social platforms are becoming competitive for their entertainment time. Social platforms can also make it easy for advertisers to buy ads and target specific cohorts with clear results. Figure 9 shows a representation of social media [13].
- *Gamification:* Interactive content and gamification are revolutionizing brand interaction with audiences. Gamification incorporates game-like elements that reward users with points, badges, and leaderboards. Such elements encourage users to get more involved and stay for longer stretches. When applied well, gamified experiences build community. Experts predict that the gaming industry will follow a similar trajectory to other digital technologies such as social media, mobile apps, and e-commerce. Figure 10 shows an example of gamification [13].
- *Advertising:* Today's advertisers have figured out that context is king. This has paved the way for a contextual media gold rush where advertisements are selected and served by automated systems based on the context of what a user is looking at. Apart from encouraging user engagement, contextual media also has the advantage of not disrupting the viewing experience significantly. Pre-rolls, in-stream, and post-roll ads have already proven their effectiveness in increasing the monetization for distributors. The deep insights available through a modern video ad server enable advertisers to serve customized ads to different consumers during the same stream. AI will also help advertisers in narrowing down on ads that will capture the viewer's attention and will not interfere with the visual experience. Figure 11 shows a representation of advertising [11].

CHALLENGES

There are potential challenges and ethical considerations associated with emerging technologies. These must be addressed in order for widespread adoption to take place.

For example, there are concerns about the potential impact of VR on mental health, as well as issues related to data privacy and security in the use of AI. There are also concerns about the potential for these technologies to reinforce existing biases or perpetuate harmful stereotypes. Service cancellations are problematic for streaming video on-demand companies that have been dependent on subscription revenues to support their costs. Other challenges of

emerging technologies in media and entertainment include the following [14]:

- *Risk:* As AI adoption gains momentum across the industry and companies seek to maximize their AI advantage, they will also need to establish proper risk governance and controls, including fair use, safety, copyright norms, and talent compensation. For example, there is the risk of AI-generated content being used to spread misinformation or propaganda, or of AI algorithms being used to manipulate public opinion.
- *Costs:* Costs and risk have narrowed cinema to very expensive and safe franchises. The rising service costs and widespread price sensitivities may be contributing to persistent and high churn rates among consumers. The costs of producing and distributing TV and films continue to go up, while the revenue they generate has gone down.
- *Sustainability:* Sustainability is becoming a priority in media production. There is an increasing trend in adopting sustainable production methods within the media and entertainment industry. It is driven by the growing consumer demand for greener working methods and climate change. The media and entertainment industry will see a heightened focus on sustainability. As digital consumption increases, some platforms are also considering their environmental impact, looking at ways to reduce digital carbon footprints and promote sustainable viewing habits.
- *Interoperability:* Media and entertainment companies are increasingly pushing for an interoperable digital space where users can socialize, attend virtual concerts, and participate in interactive storytelling experiences.
- *Cybersecurity:* Cybersecurity threats are on the rise. As technology evolves, so do cybersecurity threats. Ransomware attacks, in particular, have surged, with cybercriminals targeting hospitals, schools, and government institutions. Aside from cybersecurity threats, the M&E industry will also need to consider the potential harm of deepfakes, and the impact that pirates could have on a studio's business.

CONCLUSION

The media and entertainment industry is currently transforming, primarily fueled by the advent of groundbreaking technologies. AI, generative AI, and augmented reality (AR) are at the forefront of this revolution. For example, AI and Gen AI are revolutionizing content personalization and creation. AR offers immersive experiences that blend digital elements with the real world. TV streaming services such as Netflix, Hulu, and Disney plus are among the leading service providers of movies, TV shows, and documentaries to consumers. This change from cable television to streaming has upended conventional business models as well as creating new opportunities for companies that are willing to take the risks. Leaders such as IBM, Nvidia, Google, Microsoft, and OpenAI drive emerging technologies across the world whilst tackling ethical concerns and regulations.

Emerging technologies are undoubtedly transforming the media landscape and offering new opportunities for creativity and innovation. These technologies are opening up new possibilities for storytelling, entertainment, education, and even social engagement. The future of media and entertainment is being shaped by rapid technological advancements.

More information about emerging technologies in the media and entertainment industry can be found in this related journal*: Journal on Emerging Technologies.*

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Figure 1 A representation of entertainment [2].

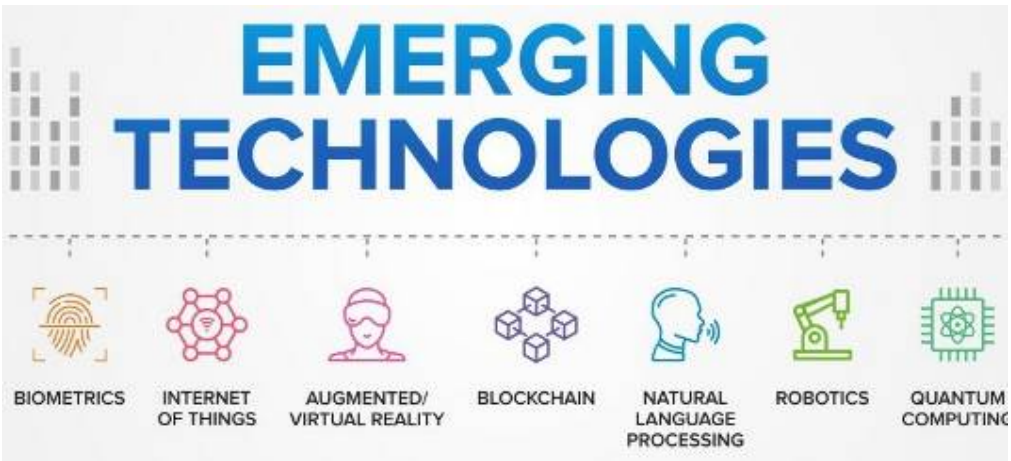

Figure 2 Some emerging technologies [5].

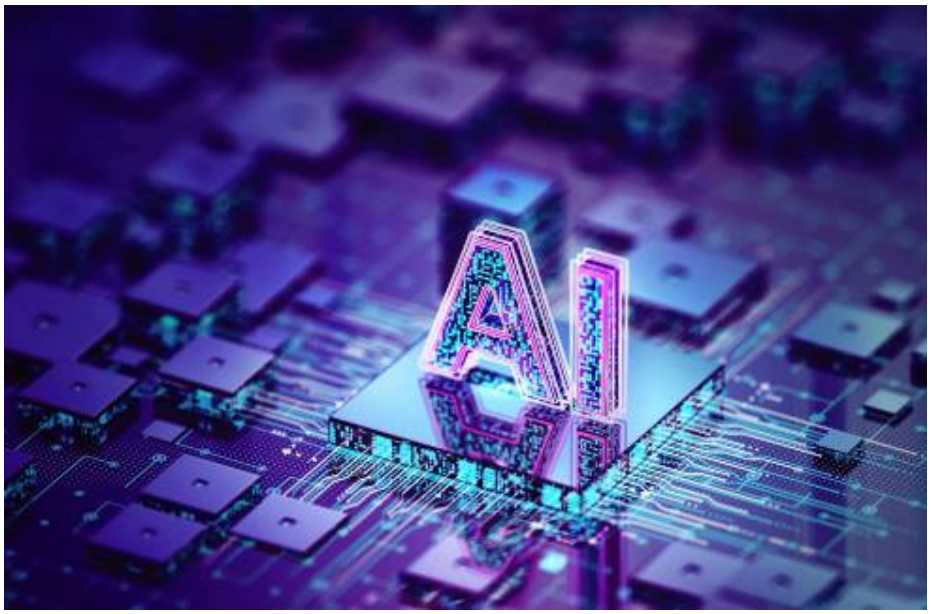

Figure 3 A representation of AI [6].

Figure 4 Disney has formed business unit to utilize AI and AR [9].

Figure 5 An example of immersive experience [6].

Figure 6 A representation of 5G [6].

Figure 7 A representation of personalization [11].

Figure 8 An example of Automation [12].

Figure 9 A representation of social media [13].

Figure 10 An example of gamification [13].

Figure 11 A representation of advertising [11].