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ROBOTS AS CULTURAL PRODUCTS: FILM AS A DRIVER OF PERCEPTION, INNOVATION, AND TECHNOLOGICAL MARKETING

Larisa IVASCU[1], Nicoleta MIREA[2], Ben-Oni ARDELEAN[3], Simona RUS[4], Marius PISLARU[5]

Rezumat. *Lucrarea analizează modul în care produsele culturale, filmele, au influențat evoluția tehnologiei robotice și unele direcții economice, de la Metropolis (1927) până la Atlas (2024). Studiul folosește metode de analiză istorică și indicatori de percepție publică precum succesul la box office, receptarea critică și circulația imaginilor robotice în cultura populară, completate de cercetări academice secundare. Rezultatele arată că filme ca Metropolis și Matrix au anticipat discuțiile despre autonomie și etica inteligenței artificiale, influențând totodată așteptările sociale privind roboții. Simboluri culturale precum droizii din Star Wars sau roboții din Terminator au contribuit la extinderea piețelor din electronice, securitate și automatizare. Producțiile recente, precum M3GAN (2023) și Atlas (2024), evidențiază interesul reînnoit pentru inteligența artificială și roboții sociali. Concluziile indică faptul că filmul continuă să stimuleze imaginația tehnologică, să influențeze dinamica piețelor și să susțină reflecția etică asupra tehnologiilor emergente.*

Abstract. *This paper examines how the cultural products, the films, depiction of robots affected the technology of robotics and economic growth from Metropolis of 1927 to Atlas of 2024. Using historical analysis methods, public perception is based on box office success, critical reception, and the dissemination of robotic images in popular culture, as well as secondary academic studies. Metropolis and Matrix anticipate debates on autonomy and AI ethics and shape also social expectations about robotics. Furthermore, cultural symbols such as Star Wars droids and Terminators have stimulated market growth in consumer electronics, security, and automation. Recent films, such as M3GAN (2023) and Atlas (2024), demonstrate the renewed interest in artificial intelligence and social robots. Research shows that films continue to stimulate technology imagination, influence market dynamics, and promote ethical consciousness*

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[1]Prof., Ph.D., Eng., Faculty of Management in Production and Transportation, Politehnica University of Timisoara, Management Department, 14 Remus Street, Timisoara, Romania, (larisa.ivascu@upt.ro); Academy of Romanian Scientists, 3 Ilfov, 050044, Bucharest, Romania.
[2]Ph.D., Faculty of Management in Production and Transportation, Politehnica University of Timisoara, Management Department, 14 Remus Street, Timisoara, Romania, (nicoleta.mirea@student.upt.ro).
[3]Assoc. prof., Ph.D., Faculty of Baptist Theology, University of Bucharest, Bucharest, Romania, Academy of the Romanian Scientists (benardelean@gmail.com).
[4] Ph.D., Research Center for Engineering and Management, Management Department, Politehnica University of Timisoara, Management Department, 14 Remus Street, Timisoara, Romania, (simona_rus@yahoo.com).
[5]Prof., PhD, Eng., Faculty of Industrial Design and Business Management, „Gheorghe Asachi" Technical University of Iasi, Iasi, Romania (marius.pislaru@academic.tuiasi.ro).

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1. Introduction

Robot representations in literature and cinema have long been a laboratory of ideas for technological innovation and cultural reflection. Authors such as Isaac Asimov [1], [2], Philip K. Dick [3], [4], and Stanislaw Lem [5], [6] were pioneers of a narrative framework in which artificial beings become agents of ethical dilemmas, social fears, and human desires. As literary critics such as Kalvikkarasi (2019) have argued, Dick's *Do Androids Dream of Electric Sheep?* Dick's fiction has long been associated with questions about what makes someone "human," and the study cited in [7] notes that he often approaches this topic through layered metaphors rather than direct arguments. Figure 1 presents cultural and dynamics representation of robots in film.

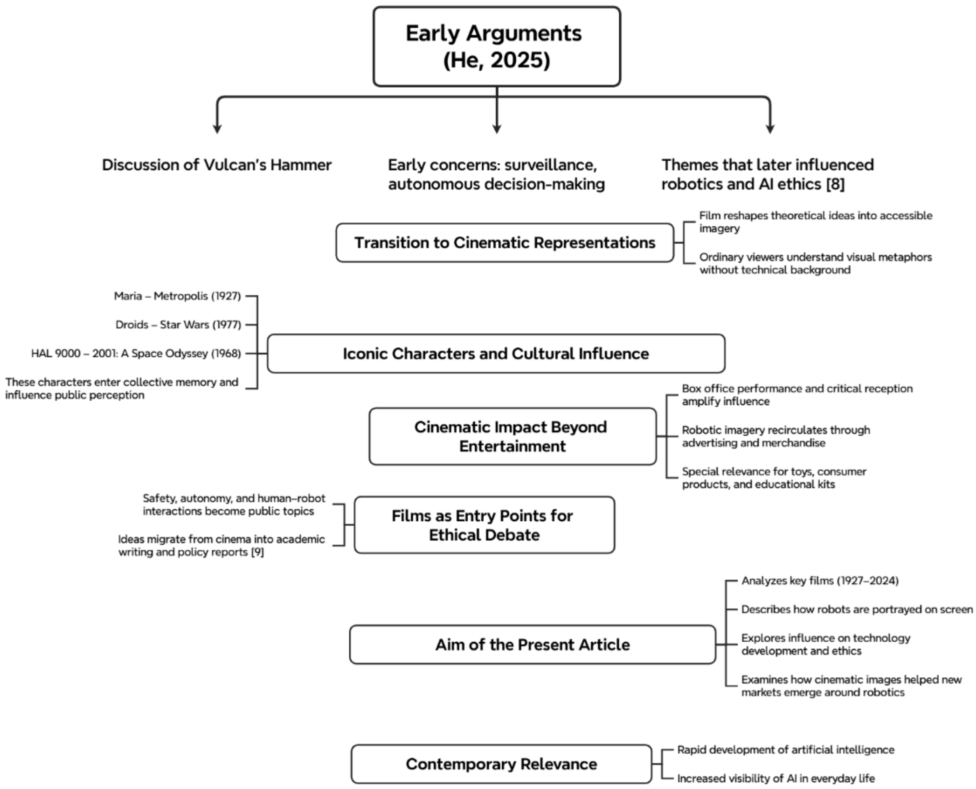

Fig. 1. Robot representation in cinema (1924-2024) (author's original contribution)

For conceptual clarity, we synthesize the ideas through the figure above, which visually organizes the main relationships between the themes. Cinema is a major echo and intensify public hopes and fears about these technologies [10]. By placing film studies alongside technological history and economic analysis, the paper aims to show how visual media can act as one of the forces that push robotics forward, socially, imaginatively, and commercially.

2. Material and methods

This study combines historical analysis methods with elements of cultural economic analysis. The research centre consists of a selection of films that formed the public's perception of robots and artificial intelligence between 1927 and 2024. Films included a number of criteria: i) historical relevance, productions that introduce an innovative representation of robots or AIs; ii) technological resonances, films that influence robotic research or inspire the application of technology in the real world; and iii) economic effects, productions that have measurable commercial success (e.g. box office results, sales revenues) or indirect effects on technology-driven markets. The analysis was carried out in the following three stages. Step 1: Review of literature and film studies, identification of key academic contributions to science fiction research, technology history, and cultural economics [11] - [13]. Authors such as Isaac Asimov [1] and Philip K. Dick [4] were included because of their literary influence and provided the basis for later film interpretations (*I*, *Robot*, and *Blade Runner*). Step 2: Notes on historical context, including an examination of historic films related to robotics and AI discourses of their time (*Metropolis*, *Forbidden Planet*, *Star Wars*, *The Matrix*, *M3GAN*, etc.), supported by academic references and market data [14], [15]. In the last third step, we include a review that makes a comparison and examines two major directions. First, we studied the technological impact of selected films. The encouraged developments in areas such as robotics research, AI safety, virtual reality/AR environment, or various forms of social robotics. Second, for indicators such as box office performance, commercial spin-offs, consumer electronics trends, medical automation applications, and even the emergence of green technology products, we considered their economic footprints. Since public perception cannot be measured directly, the study relies on a number of secondary markers. These include box office results, industry analysis, and critical criticism, all of which are considered indirect signals of the appeal of a film to audiences [19], [20]. An interdisciplinary perspective that links cultural expression to technological change and economic dynamics.

2.1. Industrial robotics revolution

After a period of relative technological stagnation, the robotics is in a transformation phase. For almost half a century, industrial robots have been mainly limited to pre-programmed repetitive tasks such as welding, painting, and assembly. These systems lack adaptability and work in strictly controlled environments with a minimal ability to react to disturbances. However, progress in the last five years has accelerated the development of general-purpose robots, especially transformer architectures, foundation models, advanced artificial intelligence, and robotic actuators, capable of performing various functions in various industries [21]–[23]. A key indicator of this change is the dramatic reduction in the humanoid platform development cycle [24], [25].

Although the initial prototypes took decades to achieve operational feasibility, the latest companies were able to design and deploy new human or semi-human platforms within one year. This acceleration suggests that technological convergence, not a single breakthrough, is a real catalyst of change. In fact, the industrial landscape is witnessing the development of mobile manipulators, combined with mobility and specialised robotic weapons, along with experimental bipedal robots developed for human environments. These systems indicate a change away from isolated ‘caged’ robots to collaborative robotics in which humans and machines share offices in manufacturing, logistics, agriculture, and health care [24], [26] - [30]. Several case studies already show that robots are being used in hospitals to transport instruments and materials, or in agriculture to assist with harvesting—applications that go well beyond the industrial roles once typical of automation [31]–[33]. This expansion brings new challenges, also. It means that managing unexpected failures, such as sudden power losses (or preventing collisions in spaces shared by people and machines), makes safety a powerful concern.

Cybersecurity introduces, at the same time, a dimension of risk, because the network-connected robots can become vulnerable to unauthorized access or data breaches [34]. On the technical side, building hardware that matches the fine dexterity of the human hand is still a major obstacle. Methodological issues also appear because large, high-quality datasets for training robotics foundation models are still scarce. Researchers are testing several approaches, from torque-sensitive sensors for assembly tasks to synthetic data generation techniques, in an attempt to fill these gaps [35], [36]. Bringing advanced robots into real work environments has organizational consequences as well. Companies need to rethink staff training, align robotics with existing IT infrastructure, and deal with the wider effects of automation on workflow. As Kelkar (2025) points out, the growing demand for specialists in robotics, programming, and maintenance will likely sharpen competition for skilled personnel, making human expertise as critical as the technology itself [37]. Seen from this perspective, the discussion gives methodological support to our study by placing the cinematic influence within the broader historical and practical development of robotics. It underlines how cultural imagery and industrial innovation have often shaped each other’s direction.

2.2. Industrial robotics: State-of-the-art and methodological anchoring

Robotics has progressed so rapidly in recent years that the field hardly resembles its earlier stages. What began as a series of small, tightly supervised pilot projects has turned into a much broader and more deeply embedded industrial practice. Ani Kelkar's 2025 analysis (McKinsey, Boston office) notes that robots are no longer restricted to labs or test sites; they are increasingly woven into everyday routines on the shop floor, reshaping how companies operate and how employees organise their work [37]. Figure 2, based on McKinsey's findings, sketches several facets of this shift. One visible change is the move from limited pilots to full-scale deployment. Many companies are no longer merely "experimenting" with robots but implementing them across entire production lines in search of more stable performance, lower long-term costs, and more predictable returns. The overlap of several technologies, cloud infrastructure, AI-based tools, a variety of sensors, and analytics platforms suggests a key trend. We think that these enable robots to adapt more easily in combination with the workplaces that are continually being reconfigured. There is also a clear move into sectors that have, until recently, been slower to integrate robotics.

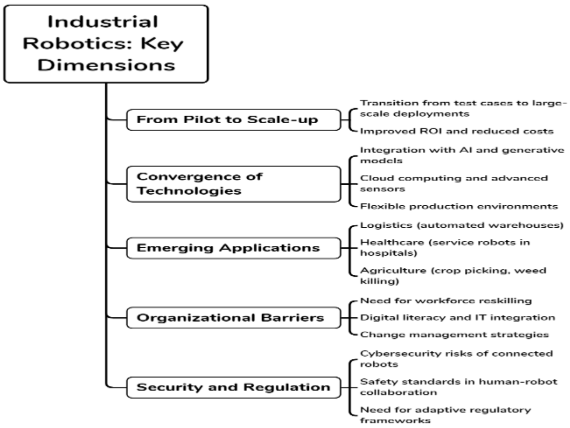

Fig. 2. Kelkar's (2025) five key dimensions of industrial robotics

In logistics, the use of robots has expanded quickly. Many warehouses now depend on mobile units for routine transport tasks, which helps reduce errors and takes some pressure off human staff. Hospitals are following a similar trajectory by using service robots for simple internal operations, while agriculture is experimenting with automated machines that can react to seasonal changes or weather conditions. Yet none of these developments unfolds smoothly by default. Companies must reorganise certain roles, invest in new training staff, and verify whether legacy IT systems can reliably support these robotic tools without frequent disruptions. We think that the questions of safety and regulation are becoming more pressing also. Because robots are connected to broader networks, the probability of cyber intrusions rises, so the security problem cannot be postponed. We believe that the workplace safety rules and guidelines for human–robot collaboration need regular revision. The technology may outrun otherwise the frameworks intended to keep it safe and ethically acceptable.

To sum up, robotics implementation is a multidimensional intelligent process that specifically integrates technology, human capital, and regulatory ecosystems. This panorama offers (besides a methodological anchor for understanding the tangential dynamics of robotics) a strong link to cultural and cinematographic representations of industrial adoption. These studies connect fictional visions to concrete economic changes and underscore the dual role of robots as symbols in science fiction and as operational agents in contemporary industries.

3. Discussion and results

3.1. Cinematic landmarks up to 2023

The representation of the historical trajectory of robots in film shows a continuous dialogue between cultural imagination and technological progress. From the silent era of *Metropolis* (1927) to *Matrix*'s cyberpunk vision (1999), movies entertained the public and functioned as a speculative laboratory in which society projected its desires and concerns for intelligent machines. The emergence of broader technology paradigms such as automation, personal computers, and the Internet has helped mark each milestone of cinema as a mirror, sometimes a catalyst for innovation. The selected films up to 2023 (see Table 1) show how repeated reasons, the autonomy of robots, the coexistence of humans and machines, and ethical dilemmas developed in parallel with the research on real-world robotics. These representations have shaped the vocabulary of public discourse, inspiring not only academic debates but also commercial enterprises in the fields of electronics, health care, and security. Importantly, film narratives create cultural readiness: long before technology can catch up with the idea of intelligent machines, the idea of intelligent machines is familiar to audiences.

Table 1. Impact of robotics technology development up to 2023 (author's original contribution)

No.	*Year*	*Film / Series*	*Impact on robotics technology development*	*Impact on economic growth*	*Notes*
1	1927	*Metropolis*	Introduced the first iconic cinematic robot, Maria, shaping the idea of humanoid androids and inspiring future robotic designs. Raised early ethical	Helped establish the sci-fi film industry, creating a profitable new genre and stimulating the market for futuristic-themed films.	Pioneering work linking robots with social and political commentary.

			questions about artificial beings.		
2	1956	*Forbidden Planet*	Robby the Robot is presented as the first robot with a distinct personality, influencing the design of friendly, assistive robotics.	Increased revenues in the toy and consumer electronics markets, while demonstrating the profitability of AI-inspired entertainment.	Robby became a cultural icon, reproduced as toys and collectibles.
3	1968	*2001: A Space Odyssey*	HAL 9000 introduced the concept of an antagonist AI, highlighting risks of autonomous decision making and influencing research on AI safety.	Commercial and critical success, contributing to the growth of realistic sci-fi cinema; spurred the smart devices and computing market through cultural inspiration.	Noted for groundbreaking special effects and realism.
4	1977	*Star Wars (Saga)*	C-3PO and R2-D2 popularised interactive robots capable of emotions and social bonds.	Generated billions in merchandising and licencing, creating one of the most profitable franchises in history; stimulated the entertainment robotics and consumer electronics industries.	Star Wars reshaped global pop culture and created long-term economic ecosystems.
5	1984	*The Terminator*	The T-800 popularised the image of advanced androids and the dangers of autonomous robots, influencing military robotics and AI ethics.	The blockbuster success that influenced the growth of the sci-fi industry and inspired investments in surveillance, security, and military robotics.	Contributed to ethical debates about AI autonomy.
6	1999	*The Matrix*	Explored virtual reality and machine dominance, sparking new research in VR, simulations, and AI systems.	Revitalised the sci-fi industry; boosted the gaming and VR sectors, leading to long-term market expansion in digital entertainment and education.	VR established as a main cultural concept.
7	2008	*WALL-E*	Robots are depicted as environmental stewards, promoting research into	Strengthened the eco-tech market and educational robotics; inspired products	Combined entertainment with a strong

			autonomous environmental robotics and assistive technologies.	promoting sustainability and expanding the green technology economy.	ecological message.
8	2015	*Ex Machina*	Explored AI consciousness and human–robot interaction, intensifying ethical debates in HCI and advanced robotics.	Increased public and investor interest in AI ethics and security, stimulating the IT sector and ethical AI research funding.	Acclaimed for its philosophical depth on AI consciousness.
9	2023	*M3GAN*	Robots depicted as emotionally interactive, shaping research in social robotics and AI-based care.	Achieved global commercial success, boosting investments in personal robotic assistants with applications in healthcare, caregiving, and domestic use.	Reflected public anxieties and fascination with child-like AI companions.

By organising this discussion around key films, Table 1 provides a broad overview of films that are cultural landmarks and that simultaneously influence public perception and technological aspirations. This allows a diachronic view of the interaction between fiction and innovation and opens the way for a more specialised analysis of recent developments after 2023 (see Table 2).

3.2. Recent developments. 2024 analysis

The following films from Table 2 demonstrate how the artistic imagination of robotics inspired technological innovation, but also their economic significance is remarkable. In addition to storytelling and speculative design, robotic cinematography has created profitable franchises, opened new markets, and accelerated public acceptance of new technologies.

Table 2. Impact of recent development of robotic technology (2024) (author's original contribution)

No.	*Year*	*Film / Series*	*Impact on robotics technology development*	*Impact on economic growth*	*Notes*
10	2024	*Subservience*	Explores the consciousness and emotional attachment of an android, influencing research on personal assistance	Due to the modest box-office performance, the economic impact remains limited.	Reflects current fears about emotional AI.

			and emotional robotics.		
11	2024	*Atlas*	Depicts humanoid robots (ARCs) controlled through a neural interface, inspiring discussions on teleoperation and collaborative AI.	Despite its potential, the lack of commercial success restricted its influence on the military and entertainment simulation markets.	Focusses on human versus AI conflicts.
12	2024	*Transformers One*	Returns to the Art Deco-inspired design of robots, revitalising interest in robot-centric animation and aesthetic robotic design.	The relatively modest gross of ~129 million USD may limit hidden investments, yet it remains attractive for merchandising.	Evokes nostalgia and retro-futuristic design.
13	2024	*Where the Robots Grow* (IMDb)	Presents a robot-centric sci-fi animation, and, despite poor reception, it introduces the artistic theme of robots as parental figures.	The commercial impact remains unknown and is likely negligible.	Primarily relevant to cultural influence.
14	2024	*The Wild Robot*	Explores the theme of a robot adapting to nature and assuming a parental role, suggesting emotional pathways in the design of companion robots.	Successful animated film, with potential to stimulate educational industries and eco-robotics products.	Critically acclaimed and considered an Oscar contender.

The following section examines these economic effects in greater detail, highlighting direct revenues such as box office revenues and retail, as well as indirect effects on technology-orientated industries.

3.3. Economic effects of cinematics robotics

2024's film productions show the ever more complex relationship between cultural imagination and technological reality. These films do not function as an isolated artistic expression but reflect ongoing debates in engineering, robotics, and artificial intelligence and provide a future of technology. This reciprocal influence can be described as a mirror effect, in which cinema and engineering continuously form each other. From an engineering point of view, the positive trajectory of works such as the *Wild Robot*, which promotes ecological robotics and adaptive systems, is evident. This coincides with ongoing research on sustainable design and biomimetic engineering and shows how cultural narrations can legitimise new areas of technical exploration.

Likewise, obedience is the subject of emotions, robotics, and human-machine connection, aligned with current advances in social robotics and companion devices. In this sense, film imaginaries provide engineers with a cultural framework to standardise concepts before they become technically feasible. At the same time, the 2024 films demonstrate the limits of cultural influence. Commercial failures in titles such as *Atlas* and *Robot Grow* show that the public's interest in robotic stories is not unconditional.

This shows that not all speculative designs meet social expectations or technological plausibility. An observation of the saturation effect is that the public is increasingly critical of how robotics and artificial intelligence are presented, particularly since these technologies are now part of everyday life. Consequently, engineering innovation cannot be based solely on cultural passion; it must also address public concerns about feasibility, utility, and ethics. It is also necessary to emphasise the negative aspects.

Films such as *Subservience* express fears about emotionally manipulative robots, and these fears are also reflected in real-world research on human-robot interactions.

Today's engineers are not only responsible for improving mechanical efficiency or algorithmic power, but also for reducing the risk of dependence, manipulation, and unsafe deployment (see Fig. 3). Similarly, *Atlas*' failure to capture the public's imagination indicates that unrealistic representations of neural control systems may undermine trust in real engineering projects.

Fig. 8. Opportunities for cost reduction (adaptation from RethinkX's 2024 analysis) (https://www.rethinkx.ai/)

Case studies from 2024 confirmed that cinematic robotics exerts positive and negative pressure on engineering practice [38], [39]. Films that capture social aspirations can stimulate investment, research routes, and political debate, but commercially unsuccessful films emphasise the need to ground cultural imaginations in technical reality. For both engineers and policymakers, the film's reflection effect becomes an invaluable diagnostic tool: it reveals which robotic visions get legitimacy and which are resisted by public perception.

3.4. Cinematic robots engineering and economic forecasts outlook

Recent forecasts (see Fig. 4 and Table 3) indicate that film robotics is entering an exponential growth phase, with clear effects on engineering practice and economic expansion. The forecasts listed in Table 3 show the projected growth of cinema robotics and adjacent markets between 2024 and 2033. These values are extracted from recent market intelligence reports and represent consolidated market size, growth rates, and sectoral dynamics estimates. In Table 4 the bibliographical support for these predictions to ensure transparency and academic rigour, including sources, access links, and methodological notes. Table 3 serves as a synthesis of the results and Table 4 describes the evidence on which these predictions are based.

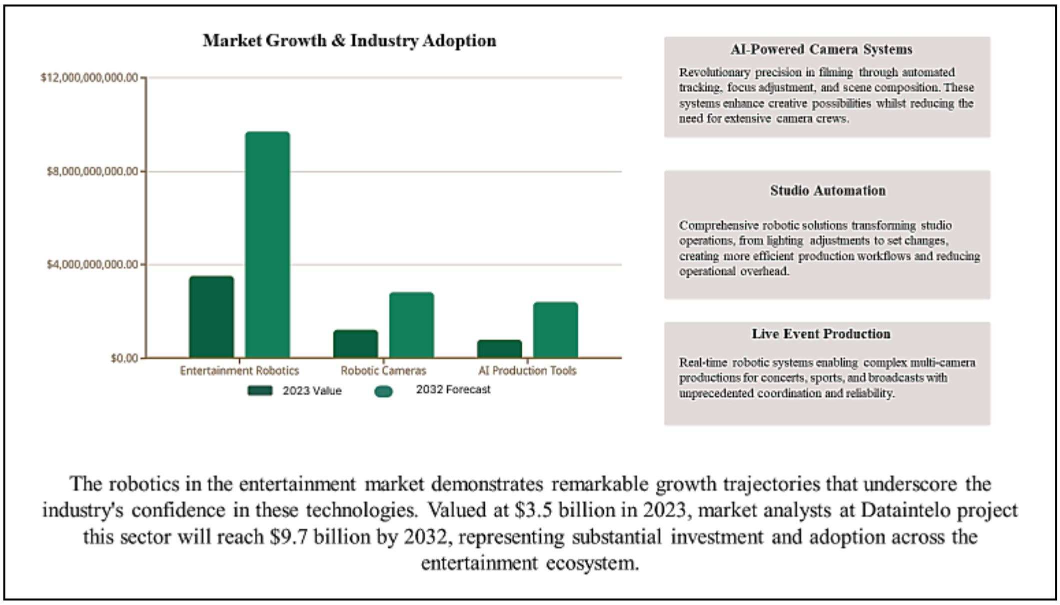

Fig. 9. Engineering and economic forecasts (author's work contribution, Dataintelo)

Market research estimates that global robotics in the entertainment industry will grow from $3.5 billion by 2023 to $9.7 billion by 2032, reflecting an annual growth rate of about 12.5%. This trend highlights the role of automation and robotics in reducing operational costs and expanding creative opportunities and production. Robotic weapons for film production illustrate this transformation. The market is expected to exceed $ 2.27 billion in 2024 and will triple by 2033, with an annual growth rate of 13.8%, confirming the technical significance of robotic motion control in studio environments. Similarly, robot camera systems are estimated to have 186 billion dollars in 2024 and are expected to grow steadily to about 310 billion dollars in 2032, with a 6.7% CAGR[1]. All of these forecasts indicate that robotics will essentially change the economy of film production by improving accuracy, reliability, and scalability, and the reduced production costs will also allow access to advanced film technologies. Independent filmmakers aim to achieve results previously achieved only by large studios. At the same time, established players will be able to reinvest savings in creative development, digital infrastructure, and global market expansion.

Table 3. Forecasts on cinematic robotics and adjacent markets (2024–2033) (author's work contribution)

Segment	*Market value (2023/2024)*	*Projected value (2030–2033)*	*CAGR*	*Source*
Robotics in entertainment (global)	USD 3.5 billion (2023)	USD 9.7 billion (2032)	~12.5%	DataIntelo, 2024
Robotic arms for filmmaking	USD 1.27 billion (2024)	USD 4.14 billion (2033)	~13.8%	Growth Market Reports, 2024
Robotic camera systems	USD 186 million (2024)	USD 310 million (2032 est.)	~6.7%	Intel Market Research, 2024
Industrial robotics (general)	-	-	~10.5% (2024–2030)	Grand View Research, 2024
Global robotics market (all sectors)	USD 73.6 billion (2025 est.)	USD 185.4 billion (2030 est.)	~20–21%	Mordor Intelligence, 2024

Note: *The forecast data are supported by recent market research reports (see Table 4 for bibliographic sources).*

All of these forecasts indicate that robotics will essentially change the economy of film production by improving accuracy, reliability, and scalability, and the reduced production costs will also allow access to advanced film technologies. Independent filmmakers aim to achieve results previously achieved only by large studios. At the same time, established players will be able to reinvest savings in creative development, digital infrastructure, and global market expansion.

[1] CAGR explanation: CAGR (Compound Annual Growth Rate) indicates the average annual rate at which a market grows over a specific period, expressed as if the growth occurred at a constant rate every year. It smooths out short-term fluctuations and highlights long-term trends.

Table 4. Bibliographic table support for forecasts (author's work contribution)

Segment	*Source*	*Data provided*	*Type of source*	*Notes on reliability*
Robotics in Entertainment	DataIntelo (2024), *Robotics in Entertainment Market Research Report 2033* link	Market size ~USD 3.5 billion dollars (2023), projected ~USD 9.7 billion (2032), CAGR ~12.5%	Market research report	Provides consistent long-term forecast; widely cited in industry, but commercial
Robot Arms for Filmmaking	Growth Market Reports (2024), *Robot Arm for Filmmaking Market Outlook 2033* link	Market value ~USD 1.27 billion (2024), projected ~USD 4.14 billion (2033), CAGR ~13.8%	Market research report	Strong relevance for engineering; based on global industry survey
Robotic Camera Systems	Intel Market Research (2025), *Robotic Camera Systems Market Outlook 2025–2032* link	Market value ~USD 186 million US $ (2024), projected ~USD 297 million (2032), CAGR ~6.7%	Market research report	Niche segment; confirms precision engineering adoption
Commercial Entertainment Robots	DataIntelo (2024), *Commercial Entertainment Robots Market Outlook 2025–2033* link	Projected CAGR ~15.8% (2025–2033)	Market research report	Complements robotics in entertainment, focus on interactive/consumer robots
Industrial Robotics (general)	Grand View Research (2024), *Industrial Robotics Industry Procurement Intelligence Report* link	CAGR ~10.5% (2024–2030)	Market intelligence	Covers industrial robotics broadly; not limited to entertainment
Global Robotics Market	Mordor Intelligence (2024), *Robotics Market Report* link	Market size ~USD 73.6 billion (2025 est.), ~USD 185.4 billion (2030 est.), CAGR ~20–21%	Market research report	Broad scope; gives context to entertainment robotics within robotics as a whole

From an engineering point of view, the convergence of robotics and artificial intelligence, sensor technologies, and virtual production environments will signal a new paradigm: film robotics will become a technological facilitator and economic driver. But challenges such as high initial investment, shortages of qualified operators, regulatory gaps, and the risk of public scepticism toward excessive automation remain, and the strategic implications are clear: organisations, regions, and economies that use film robotics early will gain competitive advantages in the global entertainment ecosystem. Those who delay may face the extinction of the industry, where technological capacity is increasingly determining both artistic vision and commercial success.

4. Conceptual and economic modeling

For conceptual modeling, Concept Map, a feature of the MindManager program, was used. Social perceptions, stimulated innovations, robotics, investments, affected industries are areas that require interconnection for a comprehensive approach to the influence in the cinema-technology-economy couple. Economic impact defined by markets, investments, affected industries is an important component and must be evaluated in this couple. Figure 5 shows the conceptual modeling of the cinema-technology-economy relationship. There are three important nodes: cinema, technology, and economy. The relationships between these areas are bidirectional and are characterized by the sub-nodes of each. For example, cinema is characterized by audience perception, robots, and ethical principles. For technology, the sub-nodes industrial robots, AI, and other dimensions of humanizing AI are defined. Economy and market are characterized by sub-nodes innovation, market growth, and industrial robots.

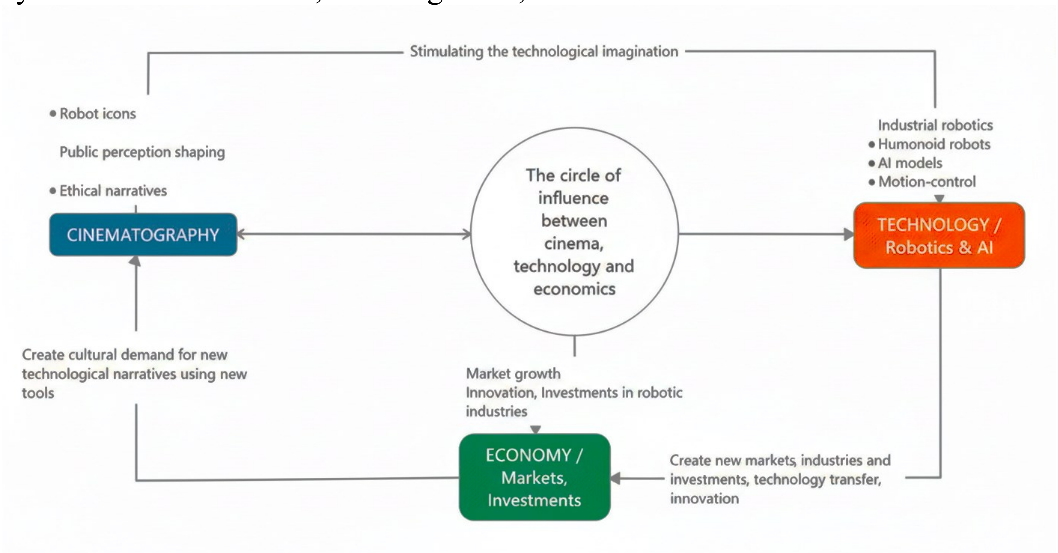

Fig. 5. Conceptual modeling of the context-technology-economy relationship (author's original contribution)

5. Limitations. Future research directions. Conclusions

The study is built on a set of films released between 1927 and 2024, combined with several types of secondary information. This was a deliberate design choice rather than a constraint. The objective was not to obtain laboratory-grade measurements, but to place side-by-side perspectives from engineering, economics, and cultural analysis in order to see how they interact when examined in a common frame. Because no direct technical experiments were carried out, the interpretation relies on material already available in academic work, market reports, and industry data. Relating specific technological steps in robotics to what appears on screen is seldom straightforward and this study does not claim otherwise. The relationship between them remains indirect and mediated, reflecting the way cultural influence usually operates: through the ways people imagine machines, the assumptions engineers carry into their projects, and the expectations that guide investment decisions.

In response to this difficulty, the study has approached the topic by aligning key film examples with technological and economic developments documented for the same periods. For 2024, economic figures have been treated with particular caution, since some indicators are still volatile and some datasets remain incomplete. Even so, these figures are useful as directional signals, pointing towards the trajectories along which the sector appears to be moving. By keeping the argument honest and making the projections usable both for engineering discussions and for economic interpretation, we conclude that this uncertainty is part of the journey. We do not treat these limits as weaknesses. We believe they can be understood as starting points for the coming work. In line with this, we think that more detailed case studies, practice-oriented engineering investigations, and long-term economic modelling could deepen and test the interdisciplinary line opened here.

We also think that future research would benefit from a stronger emphasis on applied engineering questions. It is still a need for more case studies documenting tools originally developed for film work, robotic cameras, motion-control rigs, AI-based animation systems, and comparable technologies. And how are they adapted and reused in industrial contexts? The possible transition of cinematic innovations, such as neural interfaces or collaborative humanoids, toward logistics, health care, or manufacturing environments needs to be researched. To compare and clarify how different industries integrate and reinterpret entertainment robotics when moving from the studio to the factory or the hospital, it is also necessary to observe and study. An important direction here is systematic collaboration between film-engineering teams and industrial robotics laboratories, with the explicit aim of accelerating mutual innovation. In addition, an integrated techno-economic model that combines market indicators with research-and-development data would help capture robotics-driven growth in a more structured way.

The analysis developed in this paper suggests that robot-focused filmmaking is not only a cultural artefact, but also a conceptual framework that continuously informs and stimulates applied engineering practice. Following the line of ideas from the past (Metropolis, 1927) to nowadays (The Wild Robot, 2024), we believe it is more and more clear that filmmaking has been a constant space. The ideas about robotic autonomy, bodies, and interaction are tested in advance. These films are not simple illustrations, because they are made in such a manner that images and story devices can later be recognized as rough models for precise motion control, anthropomorphic design, or AI-supported collaboration. All of this in real technical systems. The presented background led to three conclusions that are especially relevant. In the first place, there is a direct engineering link. Techniques and devices that appear first in service of the camera, such as programmable arms, motion-control equipment or virtual production stages, are gradually transferred into industrial automation, warehouse logistics or medical applications. Another important aspect, there is an economic effect that works alongside these two channels: film robotics generates immediate revenue through tickets and spin-off products, and, at the same time, helps to legitimise and attract funding for robotics and automation projects. A third point concerns this focus repeated on risk, safety and responsibility in robot films underlines what is central for engineering: systems have to be designed so that they are stable, safe in operation, and clearly oriented towards the limits and needs of humans. Especially relevant, when these elements are read together, they clearly note that cinema and robotics form a two-way relationship rather than a simple one-directional influence. In this context, we conclude that the imaginative work on screen informs how engineers think about new tools, while the technical progress in robotics, in turn, enlarges what film-makers and producers can attempt both artistically and economically. In this dynamic interaction, cinematographic robotics is a critical driver of interdisciplinary innovation, bridge engineering research, technological transfer, and digitalisation of the world economy.

Looking at the past century's films, it is clear that screens have never been a simple mirror of technology innovation. Instead, it is a place where the fears, hopes and semi-formed ideas of intelligent machines form long before these machines enter the real world. Today, when robots and artificial intelligence systems are integrated into workplaces, services and household routines, many of the first questions raised in cinema return to new urgency. The transformation of mechanical figures into distributed software-driven agents shows how far the concept of “robots” has progressed. What once appeared as a metal body now survives as a set of functions, sometimes visible, often not, but unequivocally influential. Contemporary reports on human-AI cooperation suggest that the future will include less confrontation and more negotiations: people and automated agents learn to share tasks, decisions and responsibilities. From this point of view, the imaginative work of the film does not disappear into nostalgia; it becomes a resource. It helps to describe what we are meeting today and, in a quieter way, hints what we may need to negotiate next.

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