

Robot Journalism

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ABSTRACT

The rapid evolution of digital media has ushered in a transformative era in newsrooms: the integration of robotics and automation into journalism. This integration, often known as “robot journalism” or “automated journalism,” or “algorithmic journalism,” demonstrates that robotics serves as a powerful augmentative force. The applications of robotics in journalism represent a fundamental paradigm shift rather than a temporary technological trend. This technological revolution does not replace human journalists but rather liberates them to focus on the deeply human aspects of storytelling. While a robotic algorithm can compile sports statistics, synthesize financial reports, it cannot experience empathy, build trust with a vulnerable whistleblower, or make complex ethical judgments. This paper explores the integration of robotics in the field of journalism.

KEYWORDS: robots, robotics, journalism, journalists, news, news media, robot journalism, automated journalism, algorithmic journalism.

INTRODUCTION

Throughout history, journalism, like other professions, has evolved with technology.

The journalism industry has historically evolved in tandem with technological breakthroughs, from the printing press to the Internet and real-time digital newsrooms. In the contemporary media landscape, the industry is undergoing another profound transformation driven by the integration of robotics. This integration is reshaping how news is gathered, produced, and disseminated. In journalism, “robotics” encompasses both physical robotics-such as drones and automated camera systems-and virtual or software robotics. Robotics is not replacing the human journalist; rather, it is establishing a collaborative, hybrid model of journalism where repetitive, hazardous, and highly computational tasks are offloaded to machines, thereby freeing human reporters to focus on high-value, empathetic, and investigative storytelling. In robot journalism news articles are generated by computer programs rather than human reporters.

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WHAT IS A ROBOT?

The word “robot” was coined by Czechriter Karel Čapek in his play in 1920. Isaac Asimov coined the term “robotics” in 1942 and came up with three rules to guide the behavior of robots and later added the zeroth law [1]:

- Law 0: A robot may not injure humanity or through inaction, allow humanity to come to harm.
- Law 1: Robots must never harm human beings,
- Law 2: Robots must follow instructions from humans without violating rule 1,
- Law3: Robots must protect themselves without violating the other rules.

Robots are becoming increasingly prevalent in almost every industry, from healthcare to manufacturing.

Although there are many types of robots designed for different environments and for different purposes/applications, they all share four basic similarities [2]:

1. All robots have some form of mechanical construction designed to achieve a particular task;

2. They have electrical components which power and control the machinery;
3. All robots must be able to sense its surroundings; a robot may have light sensors (eyes), touch and pressure sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), etc.
4. All robots contain some level of computer programming code.

Programs are the core essence of a robot since they provide intelligence. There are three different types of robotic programs: remote control, artificial intelligence, and hybrid. Some robots are programmed to faithfully carry out specific actions over and over again (repetitive actions) without variation and with a high degree of accuracy.

Robotics is an interdisciplinary field that involves the design, construction, operation, and use of robots. It is a branch of engineering and computer sciences that includes the design and use of machines that are capable of performing programmed tasks without human involvement. The field develops machines that can efficiently carry out various tasks, can automate tasks, and do various jobs that a human might not be able to do. Robots could someday be our drivers, companions, collaborators, teachers, specialists, and exploration pioneers [3]. Figure 1 shows a cloud word for robots [4].

ROBOT JOURNALISM

The history of journalism is an ongoing narrative of technological adaptation. It demonstrates how robotics and other technologies have continually transformed storytelling. The integration of robotics into journalism represents a classic mediamorphic transition. The process began in the mid-to-late twentieth century with the digitization of newsrooms, transitioning from typewriters to word processors, and eventually to database-driven journalism. In the twenty-first century, a new technological frontier has emerged: the integration of robotics and artificial intelligence (AI) directly into the journalistic workflow. Often labeled robot journalism or automated journalism, this phenomenon refers to the algorithmic generation of news content and the deployment of autonomous systems to gather, analyze, and distribute information without direct human intervention [5].

Robot journalism refers to the process of using computer programs, artificial intelligence, and autonomous systems to gather, produce, and distribute news content with minimal or no human intervention. The integration of robotics into journalism is not a harbinger of the profession's demise, but rather a structural and intellectual

liberation. Modern journalism is entering a new era where drones and other forms of robotics play a part. Reporting was once limited by geography, physical risk, and time. Now, technology helps deliver the news with speed, precision, and a new perspective. Drones and robotics have opened a new era in journalism-an era characterized by improved efficiency, increased safety, and better storytelling [6]. Figure 2 is a representation of robot journalism [7].

APPLICATIONS OF ROBOT JOURNALISM

The deployment of robotics in journalism is not monolithic; rather, it exists along a multi-dimensional spectrum that can be categorized into three primary domains: software-based automation, physical field robotics, and virtual/humanoid presenters. There are many fields of application for automated journalism, including automated content production, data mining, news dissemination, and content optimization. Common applications of robot journalism include the following [5,8,9]:

- *Automated Journalism*: The most pervasive and commercially mature form of robot journalism occurs behind the scenes through software-based automation. The application of virtual robotics-often referred to as automated journalism or algorithmic journalism-is most prevalent in the production of high-volume, data-driven news stories. The automated news production process generally follows a standardized pipeline: data acquisition, data filtering and structuring, semantic analysis, sentence planning, and linguistic realization. Automated systems are already deeply embedded in global newsrooms. These software “robots” analyze structured data feeds and automatically write news articles within seconds, completely bypassing human intervention. Automated journalism is sometimes seen as an opportunity to free journalists from routine reporting, providing them with more time for complex tasks. For example, in 2014, the Associated Press (AP) partnered with technology provider Automated Insights to automate its corporate quarterly earnings reports using the Wordsmith platform. Prior to automation, AP journalists spent significant time manually digesting spreadsheets and writing repetitive earnings stories-a task that reporters widely dreaded. Figure 3 shows a team of journalists at a press conference [10].
- *Software Robotics*: The most pervasive form of robotics in journalism is non-physical: software robots or algorithms driven by natural language generation (NLG). These programs ingest

structured data, identify key patterns, select pre-programmed or dynamically generated narrative templates, and output human-readable prose in a matter of milliseconds. In the 2020s, the advent of generative AI and large language models (LLMs) has shifted software robotics from rigid, template-bound NLG to dynamic, context-aware content generation.

- *Drone Journalism:* While software robots dominate text production, physical robotics are transforming newsgathering in the field. The most prominent physical robots in modern journalism are uncrewed aerial vehicles (UAVs), commonly known as drones, which have birthed the subfield of drone journalism. Drone journalism has revolutionized field reporting by overcoming geographical limitations, physical hazards, and the prohibitive costs associated with traditional helicopter-based aerial photography. Drones function as “robot witnesses” in environments that are too dangerous, costly, or physically inaccessible for human journalists. In urban protests or active conflict zones, drones provide stable, high-altitude perspectives that are impossible to capture from the ground. Deploying a commercial drone costs a fraction of chartering a news helicopter, democratizing aerial journalism for local and independent news outlets that were historically priced out of high-angle reporting. Figure 4 shows a drone used for journalism [6].
- *Robotic Cameras:* While drones dominate outdoor news gathering, robotic systems are quietly transforming the interior of the modern newsroom. Facing shrinking budgets and expanding demands for multi-platform content, television broadcasters are increasingly turning to robotic camera systems and automated pedestals to optimize studio workflows. Traditional studio environments required multiple camera operators to manually pan, tilt, and zoom. Today, robotic camera systems handle routine camera movements with extreme precision and repeatability. By eliminating the physical footprint of human camera operators, broadcasters can design smaller, highly optimized studios in premium real estate areas.
- *Investigative Reporting:* The rapid adoption of robotics is rewriting the very architecture of the newsroom. In the domain of investigative reporting, AI serves as an indispensable analytical microscope, unearthing systemic corruption and corporate malfeasance buried deep within mountains of data.

- *Humanoid Presenters:* The most visible frontier of robotics in journalism is the rise of virtual and humanoid news presenters. These systems combine synthetic voice generation, facial mapping, and deep learning to simulate human anchors. These virtual anchors can operate twenty-four hours a day, translating text into broadcast-ready video instantly, significantly reducing production overhead for digital-first news operations. Jia Jia is a Chinese humanoid robot journalist created by developers from the University of Science and Technology in China’s Anhui province. She made a splash when she “reported” for the country’s news agency Xinhua and conducted a live interview with an editor of WIRED Magazine.

BENEFITS

AI has prospects for improved efficiency, personalization, and analytical capabilities. Empirical audience research reveals that a segment of the public perceives automated or robotic journalism as inherently more objective, neutral, and trustworthy than human-written news. Other benefits of robot journalism include the following [5,9]:

- *Automation:* Due to the development of artificial intelligence and language-based software, automatic machines, which can generate news contents from data, are starting to be used in the editorial practice. By automating routine stories and tasks, journalists can free up time for more challenging jobs such as covering events and investigative reporting. It also paves the way for greater efficiency and cost-cutting measures for news organizations struggling to survive. By automating routine stories and tasks, journalists are promised more time for complex jobs such as investigative reporting and in-depth analysis of events. Human journalists can use the automatically generated stories as initial leads, which can help them in exploring a particular case in more detail.
- *Cost:* Automated journalism is cheaper because more content can be produced within less time. It also lowers labor costs for news organizations. Reduced human input means less expenses on wages or salaries, paid leaves, vacations, and employment insurance. Automation serves as a cost-cutting tool for news outlets struggling with tight budgets but still wish to maintain the scope and quality of their coverage.
- *Operational Efficiency:* One of the most immediate and quantifiable benefits of software-based robotics in journalism is the dramatic increase in operational speed and volume. In the

digital news economy, being the first to report breaking news is a primary driver of audience engagement and subscription revenue. Human journalists, bound by cognitive and physical limits, require time to read data, cross-reference facts, draft prose, and edit copy. Algorithms, conversely, can execute these steps in milliseconds. With automation, the Associated Press increased its output tenfold.

- *Speed:* Robot reporters are built to produce large quantities of information at quicker speeds. The Associated Press announced that their use of automation has increased the volume of earnings reports from customers by more than ten times. With software from Automated Insights and data from other companies, they can produce 150 to 300-word articles in the same time it takes journalists to crunch numbers and prepare information.
- *Precision:* In an era plagued by the rapid spread of misinformation and “fake news,” the accuracy of journalistic output is paramount. While human journalists are susceptible to cognitive biases, fatigue, mathematical errors, and typos, automated writing systems operate with high mathematical precision. When fed clean, structured data, algorithms do not make transposition errors, or misspell corporate names. Drones and other autonomous systems can improve reporting accuracy while keeping people out of harm's way. This precision is particularly valuable in highly polarized beats, such as local political races or financial markets.
- *Human Safety:* While software-based robots transform the digital backend of newsrooms, hardware-based robotics—specifically drones—have revolutionized physical news gathering. Drones can be deployed instantly by a single operator on the ground, capturing high-definition, three-dimensional perspectives that ground-level cameras cannot replicate. More importantly, they keep human journalists out of harm's way during critical crises. Drones can go to places where humans cannot. They can cover areas that are flooded, the borders of the fires, and the places polluted with chemicals.
- *News Democratization:* Over the past two decades, local journalism has faced a severe economic crisis. Declining advertising revenues have forced metropolitan and regional newspapers to slash editorial budgets, resulting in the emergence of “news deserts”—entire counties and communities with no local newspaper coverage. This lack of coverage erodes civic

engagement and reduces local government accountability. Robotics and automation offer a scalable, economically viable solution to revive local reporting. Automated systems can bridge the gap by generating hyper-local content from public datasets. Drone journalism has democratized aerial reporting, offering a safe, cost-effective, and highly agile alternative.

CHALLENGES

As newsrooms delegate editorial and gathering tasks to machines, they confront profound ethical, legal, and professional challenges. These concerns include algorithmic bias, the erosion of editorial transparency, intellectual property ambiguities, algorithmic bias, privacy, black-box opacity, the degradation of local news quality, skill erosion, authorship, misinformation, editorial integrity, and the precarious future of human labor in the newsroom. Other challenges of robot journalism include the following [5,9]:

- *Privacy Concerns:* Drone journalism faces severe regulatory and privacy constraints. High-resolution drone cameras can easily peer into private properties, raising concerns about surveillance and civil liberties. News organizations must navigate a patchwork of national and local aviation laws, such as the Federal Aviation Administration (FAA) Part 107 regulations in the United States, which restrict flights over people or beyond visual line of sight. Balancing the public's right to know with individual privacy rights remains a delicate ethical tightrope for drone operators. Newsrooms must establish impermeable data-privacy barriers to protect their sources.
- *Ethical Concerns:* The ethical landscape of robot journalism is fraught with risks, chief among which is the propagation of algorithmic bias. Another critical ethical hazard is the phenomenon of hallucinations in generative AI systems. To safeguard the integrity of news production, news organizations must establish strict, non-negotiable ethical guidelines for AI and robotic integration. The primary technical limitation of robot journalism lies in its absolute dependency on structured data, which leads directly to the “garbage in, garbage out” dilemma. If the input data is incomplete, biased, or corrupted, the algorithm will flawlessly synthesize those errors into a polished, authoritative-sounding narrative.
- *Algorithmic Bias:* A persistent myth of automated journalism is that algorithms are inherently objective, fair, and free from human bias. Algorithms are not neutral; they reflect the biases

of their human programmers and the historical biases embedded within their training datasets. They are trained on historical data, which often reflects societal prejudices and systemic biases. If an AI model is trained on historical crime reports that disproportionately target specific demographics, the automated news summaries it generates may perpetuate those biases.

- *Accuracy:* A fundamental ethical pillar of journalism is accuracy. “Accurate” information has become a rare commodity with the proliferation of plagiarized contents and fake news. While algorithms are highly consistent, they are entirely dependent on the quality of the data they ingest. The classic computer science adage “garbage in, garbage out” is highly applicable to robot journalism. If an official data feed contains errors, the automated writing software will instantly and flawlessly propagate those errors at scale.
- *Transparency:* Transparency must be paramount: audiences have a right to know when a story or image was generated or assisted by a machine. In traditional journalism, a reporter's byline establishes accountability. If an error is made, the reader knows who wrote the piece and can demand a correction. In automated journalism, authorship is obscured. Complex deep-learning models operate as “black boxes”-even their creators cannot fully trace the cognitive pathway the machine took to arrive at a specific output or synthesis. This lack of transparency threatens the foundational journalistic principle of verification and public trust, especially when AI-generated articles are published without clear labels indicating machine assistance.
- *Authorship:* In an automated story, there is often confusion about who should be credited as the author. Several participants of a study on algorithmic authorship attributed the credit to the programmer; others perceived the news organization as the author, emphasizing the collaborative nature of the work. There is also no way for the reader to verify whether an article was written by a robot or human, which raises issues of transparency. When an algorithm autonomously generates an article, who owns the intellectual property? Is it the software developer who wrote the code, the news organization that deployed the system, or does the content immediately enter the public domain?
- *Accountability:* A fundamental ethical dilemma of robot journalism is the question of accountability. From a legal perspective, robot journalism introduces unprecedented ambiguities, particularly regarding authorship and copyright. Under traditional legal frameworks, copyright protection is strictly reserved for original works of human authorship. Generative AI models are trained by scraping millions of copyrighted articles written by human journalists, often without compensation or consent. This has sparked major legal battles. Since algorithms cannot be held legally or morally accountable for their outputs, liability for automated content must ultimately rest with a natural person who deploy the code. This requirement of human accountability is central to maintaining journalistic integrity, yet it is difficult to enforce.
- *Job Displacement:* The fear of technological unemployment is a central concern in the discourse surrounding robot journalism. In 2020, Microsoft made headlines by replacing dozens of MSN contract journalists with automated AI systems, a move that directly resulted in human job losses. Automation eliminates expenses associated with salaries, health insurance, paid leave, and unions. Despite fears of a “robotic takeover,” the consensus among media scholars and industry leaders is that robotics will not replace human journalists, but will instead redefine their roles.
- *Skill Erosion:* There remains a critical risk: skill erosion. If entry-level journalists are no longer required to write basic sports recaps or local police blotters-which historically served as the training ground for developing fundamental reporting skills-the industry may face a long-term deficit in seasoned investigative talent.
- *Public Skepticism:* In an era characterized by intense political polarization and widespread public skepticism toward traditional media outlets, some citizens view human journalists as inherently biased, emotionally driven, or beholden to partisan, political, and corporate interests. For these readers, a machine-generated article represents the ultimate realization of the journalistic ideal of detachment and scientific objectivity. However, this perception of robotic neutrality is deeply contested. There is a growing concern that automated news feeds can quietly perpetuate systemic social, cultural, and political biases under the guise of mathematical neutrality.

FUTURE OF ROBOT JOURNALISM

The future of journalism lies in a symbiotic relationship-a human-in-the-loop workflow, where cognitive and physical robots act as force multipliers. In a symbiotic future, human intellect and machine

capability will coexist. Robotics will not render human journalists obsolete. Rather, it demands a symbiotic redefinition of the profession, where machines act as cognitive and physical force multipliers while humans safeguard the critical, ethical, and empathetic core of investigative storytelling. In this collaborative “man-machine” model, machines handle the routine, repetitive, and dangerous tasks, while human journalists are elevated to “editorial orchestrators” and “ethical gatekeepers” [5].

The future of robotics in journalism is not a binary choice between a fully automated, machine-driven news ecosystem and a nostalgic return to purely manual reporting. Instead, it represents a profound, ongoing process of co-evolution. From self-driving cars to personal assistants, machines are increasingly collaborating with humans in a variety of novel domains. When deployed responsibly, robotics can act as a powerful force multiplier for public-interest journalism [11]. Figure 5 shows a collaboration between a robot and a human [12].

CONCLUSION

Robotics is no longer confined to the realm of science fiction; it is an active, operational reality in newsrooms worldwide. Far from being a speculative future, this technology is already deeply integrated into the world's leading news organizations. The integration of robotics into journalism represents a pivotal mediamorphic shift. It offers unprecedented opportunities to expand the scope of news coverage, reduce operational costs, accelerate reporting speeds, and protect human lives in hazardous environments.

The future of journalism is collaborative. By outsourcing repetitive, data-entry writing and hazardous physical gathering to robotic systems, media organizations can preserve their dwindling resources for what machines cannot replicate: deep empathy, moral clarity, critical skepticism, and the relentless pursuit of truth. The essence of journalism remains a deeply human endeavor. Major global news organizations, including The Associated Press (AP), Bloomberg, Reuters, and The Washington Post, have spent years integrating automation into their daily workflows. News broadcasters in Kuwait, Greece, South Korea, India, China, and Taiwan have presented news with anchors based on generative AI models. More information on robot journalism can be found in the books in [13-17] and the following related journals:

- Robotica
- Robotics
- Robotics and Autonomous
- Robotics and Computer-Integrated Manufacturing,

- Advanced Robotics
- Autonomous Robots
- Automation in Construction
- Journal of Robotics
- Journal of Robotic Systems
- Journal of Robotic Surgery
- Journal of Robotics and Mechatronics
- Journal of Intelligent & Robotic Systems
- Journal of Mechanisms and Robotics-Transactions of the ASME
- Journal of Automation, Mobile Robotics and Intelligent Systems
- Journal of Future Robot Life
- IEEE Robotics and Automation Letters
- IEEE Transactions on Robotics
- International Journal of Robotics Research
- International Journal of Social Robotics
- International Journal of Humanoid Robotics
- International Journal of Advanced Robotic Systems
- Science Robotics
- Soft Robotics
- Journalism
- Journalism and Media

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Figure 2 A representation of robot journalism [8].



Figure 3 A team of journalists at a press conference [10].



Figure 4 A drone used for journalism [6].



Figure 5 Collaboration between a robot and a human [11].