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Internet of Things in Journalism

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Abstract
In an era of rapid technological change, journalism is being reshaped by emerging digital systems and data-driven practices. Among these developments, the Internet of Things (IoT) has introduced new possibilities for news gathering, production, and distribution. IoT refers to a network of physical objects equipped with sensors, software, and connectivity that enable them to collect and exchange data. By enabling interconnected devices, smart sensors, and automated data collection, IoT expands newsrooms' capacity to gather information in real time and at scale. This paper examines the impact of IoT on modern journalism, with particular attention to its role in news gathering, production, and distribution.

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Keywords: Internet of things, IoT, industrial Internet of things, IIoT, journalism, journalists, news, news media, ubiquitous journalism

1. Introduction

The practice of journalism has consistently evolved in tandem with technological advancements. It is undergoing a fast transformation as a result of technological advancements such as new media, digital media, and artificial intelligence, all of which are redefining the method in which news is collected, evaluated, and disseminated. From the printing press to broadcast media, and subsequently to the Internet and mobile technologies, each wave has fundamentally altered how news is produced and consumed. In recent years, the Internet of Things (IoT) has emerged as a powerful catalyst in this ongoing evolution. The integration of IoT into journalistic practices has given rise to a new paradigm often referred to as the "Journalism of Things" (JoT) or "Sensor Journalism." This interconnected ecosystem enables an unprecedented volume of real-time data, giving rise to "ubiquitous journalism," in which news production and consumption are seamlessly integrated into daily life [1].

2. Theoretical Framework

In this paper, we adopted structured literature review based on two complementary theories. The Technology Acceptance Model (TAM) and the Diffusion of Innovation Theory (DOI). Together, they help explain both how IoT technologies are adopted in journalism and how they spread across media organizations. TAM explains how journalists and media organizations decide whether to adopt IoT technologies based on two main factors: perceived usefulness and perceived ease of use. Davis argues that these factors strongly influence users' acceptance of information systems and emerging technologies [2]. In journalism, IoT tools such as smart sensors, wearable devices, connected cameras, and environmental monitoring systems can support news gathering, real-time reporting, and data-driven storytelling when users view them as both valuable and easy to operate [2]. Rogers' Diffusion of Innovation Theory provides a framework for understanding how IoT technologies spread throughout media organizations and the journalism profession. According to this theory, adoption is shaped by several factors, including relative advantage, compatibility, complexity, trialability, and observability [3]. In this context, IoT-enabled journalism can be seen as a technological innovation that reshapes traditional news production through automated data collection, real-time monitoring, and stronger audience engagement [3].

Together, TAM and DOI provide a strong theoretical foundation for examining the role of IoT in journalism. While TAM explains the factors that influence adoption at the user level, DOI helps explain how these technologies spread across organizations. TAM and DOI, combined, support an analysis of IoT's impact on news gathering, reporting efficiency, content creation, and audience interaction.

3. Overview of Internet of Things

Earlier literature on the Internet of Things (IoT) dates back in the late 1990s, but it gained momentum in the 2000s with the rise of Internet-connected devices. The Internet began with a network of military computers at the Pentagon called ARPANET in 1969. It expanded throughout the 1980s as a set of four parallel military networks, each at a different security level. The evolution of IoT is shown in Figure 1 [4].

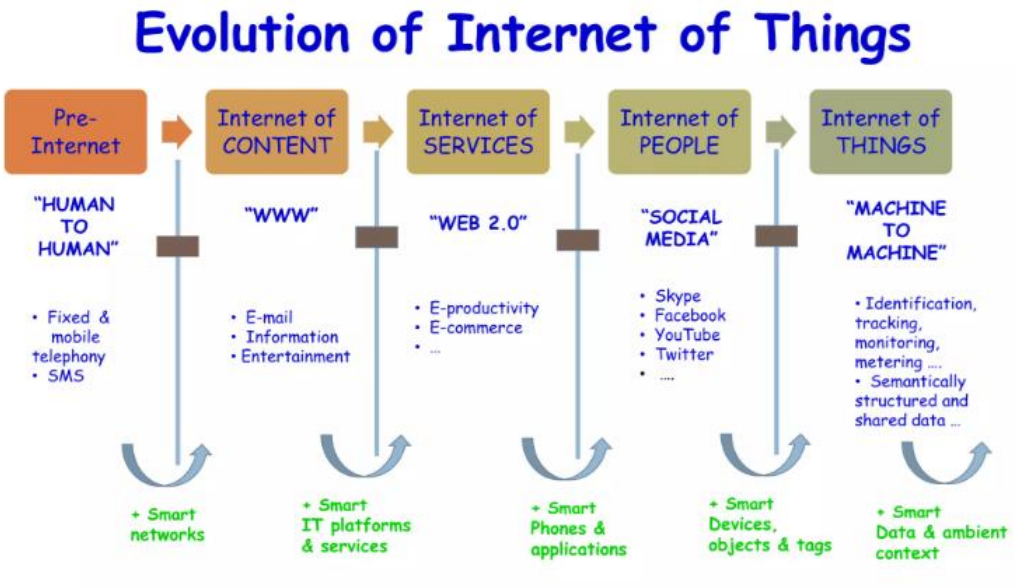

Fig 1: The evolution of IoT [4].

The core technology that gives the Internet its particular characteristics is called Transmission Control Protocol/Internet Protocol (TCP/IP), which is essentially a set of rules for communication [5].

The Internet of Things (IoT) is a worldwide network that connects devices to the Internet and to each other via wireless technology. These devices contain hardware, such as sensors and electronics, that enable them to interact with other objects and be monitored and controlled from afar. The idea is that the physical devices with sensors or the ability to capture data share that data with websites. The information is then used or analyzed in real time or at a later time to create efficiencies. IoT is expanding rapidly, and estimates suggest that 50 billion devices will be connected to the Internet by 2020. These include smartphones, tablets, desktop computers, autonomous vehicles, refrigerators, toasters, thermostats, cameras, alarm systems, home appliances, insulin pumps, industrial machines, intelligent wheelchairs, wireless sensors, mobile robots, etc. Figure 2 illustrates the Internet of Things [6]. while Figure 3 shows its various applications [7].

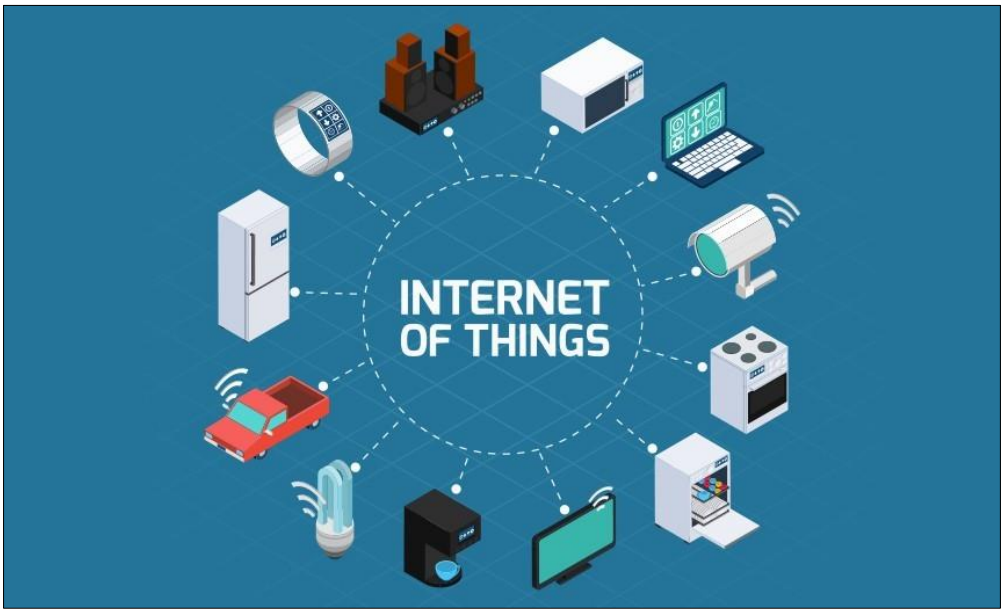

Fig 2: The Internet of things [6]

Four key technologies commonly support IoT systems [8]. (1) Radio-frequency identification (RFID) and near-field communication (NFC), (2) Optical tags and quick response codes: This is used for low-cost tagging, (3) Bluetooth low energy (BLE), (4) Wireless sensor network: They are usually connected as wireless sensor networks to monitor physical properties in specific environments. Communications technologies in Internet of Things are portrayed in Figure 4 [9]

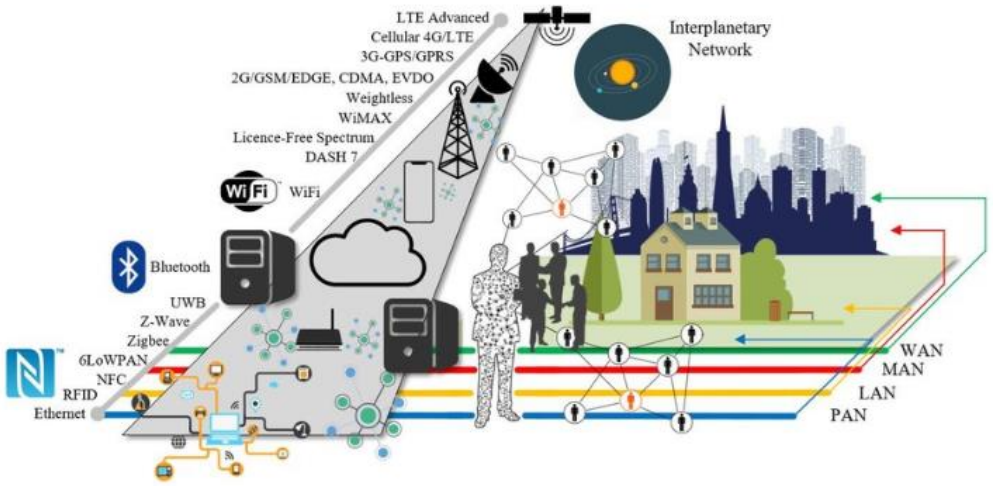

Fig 3: Communications technologies in Internet of things [9].

IoT technology enables people and objects to interact with each other. It is employed in many areas, including smart transportation, smart cities, smart energy, emergency services, healthcare, data security, industrial control, logistics, retail, structural health monitoring, traffic congestion, manufacturing, and waste management. The Internet of Things is widely developed worldwide, with a focus on civilian applications such as electric power distribution, intelligent transportation, healthcare, industrial control, precision agriculture, and environmental monitoring. The growth of the Internet of Things (IoT) is having a drastic impact on homes and industries. While the IoT affects, among others, transportation, healthcare, and smart homes, the Industrial Internet of Things (IIoT) refers specifically to industrial environments. IIoT is a new industrial ecosystem that combines intelligent, autonomous machines, advanced predictive analytics, and human-machine collaboration to improve productivity, efficiency, and reliability. It is bringing about a world where smart, connected embedded systems and products operate as part of larger systems [10]

The industrial Internet of Things (IIoT) refers to the application of the Internet of Things (IoT) across several industries such as manufacturing, logistics, oil and gas, transportation, energy/utilities, chemical, aviation, and other industrial sectors. A typical industrial Internet of Things is shown in Figure 5 [11]

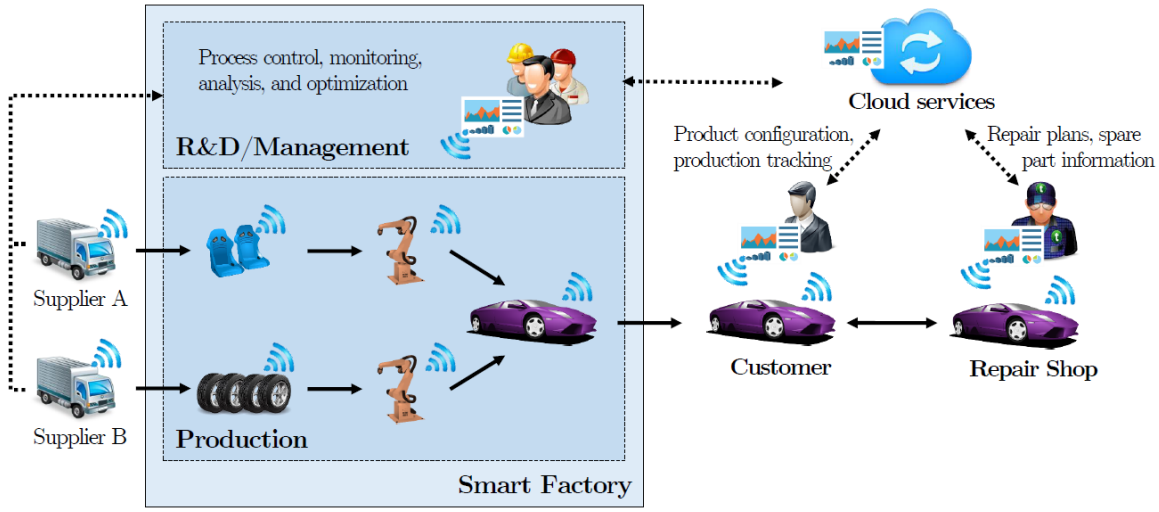

Fig 4: A typical industrial Internet of things [11].

4. IoT Technology in Journalism

The Internet of Things (IoT) has rapidly evolved from a niche technological concept to an omnipresent reality, embedding sensors, processing capabilities, and software into everyday physical objects. From smart home devices and wearable health trackers to urban infrastructure sensors and connected vehicles, IoT networks continuously collect and exchange vast amounts of data. For journalism, this proliferation of connected devices presents a profound paradigm shift. It offers unprecedented opportunities for data-driven reporting,

enabling journalists to monitor environmental changes, track public infrastructure, and uncover stories hidden within massive datasets.

The advent of the Internet of Things (IoT) has precipitated a profound shift in the media landscape, ushering in a new paradigm often referred to as "ubiquitous journalism." Through sensor and drone journalism, reporters can access objective, real-time data to uncover hidden truths and report safely from hazardous environments [1].

5. Application of IoT in Journalism

Through sensor networks, drones, wearable tech, and smart production environments, journalists can uncover new stories, report with greater immediacy, and connect with audiences in personalized ways. Common applications of IoT in journalism include the following [1, 12,13].

In Journalism of Things is not just a variation of data journalism. It is at the intersection of IoT and journalism. We live in a world of connected devices and things. The Internet of Things has vast potential to change and influence the way we live our lives. The number of connected objects around us is constantly increasing. The interconnectedness of things takes their records to the global net, to those who analyze their data and base business models on it. This is how the "Internet of Things" is created. It is rapidly and inexorably conquering our everyday lives. Journalism of things also takes place with readers' hands on them. It needs its own formats that treat stories as living and involve citizens to build trust between journalists and their readers.

Also in Sensor *Journalism, one* of the most prominent applications of IoT in journalism is the use of sensors to collect primary data, a practice known as sensor journalism. Sensor journalism utilizes connected devices to collect continuous, real-time data about the physical environment. These sensors can monitor variables such as air and water quality, traffic patterns, seismic activity, and noise levels. For example, the New York Times used IoT air-quality sensors for its "Breathing Fire" series, deploying devices across communities to reveal pollution levels from local industries. This approach allows journalists to transcend reliance on official reports, providing objective, verifiable data to substantiate their narratives. It enables reporters to track ecological changes and identify trends that might otherwise remain undetected. One of the most prominent applications of sensor journalism is in environmental reporting. By deploying low-cost sensors, journalists can measure air quality, water contamination, and noise pollution in real-time.

Fig 3: Applications of IoT [7].

Furthermore, D*rone Journalism:* Drones in journalism have signaled a digital revolution that has altered news reporting, intelligence gathering, and the management of journalistic information processing. Drones, integrated with IoT capabilities, have revolutionized reporting in hazardous or inaccessible areas. Drone journalism has proven invaluable in covering natural disasters, large-scale protests, and conflict zones. The aerial perspective provides a cinematic and comprehensive view of events, such as the spatial extent of a flood or the size of a demonstration. Drones equipped with cameras and environmental sensors can safely navigate conflict zones, disaster areas, or exclusion zones, capturing high-resolution imagery and vital data. For example, following the 2011 Fukushima nuclear disaster, drones were employed to report from within the exclusion zone, providing aerial views and radiation readings that would have been perilous for human reporters. This application not only ensures journalists' safety but also provides audiences with immersive, comprehensive coverage of critical events. Figure 6 shows a typical drone use case [12]

Wearable Technology shows where the proliferation of wearable IoT devices, such as smart glasses and action cameras, has introduced new dimensions to mobile journalism. Wearable technology enables journalists to record video, capture images, and access information hands-free, facilitating first-person, immersive storytelling. During fast-paced or volatile events such as riots or natural disasters, wearables enable reporters to stream live footage without the physical burden of traditional camera equipment, providing audiences with a visceral, "on-the-ground" perspective. The result enables efficient News Gathering. The primary impact of IoT on journalism is most evident in the news-gathering phase. Traditionally reliant on human observation, interviews, and document analysis, journalists now have access to a vast array of automated sensors. However, IoT devices, such as environmental sensors, wearables, and drones, provide journalists with unprecedented access to real-time, objective data from remote or hazardous locations. As connected devices and sensors become ubiquitous, newsrooms are transitioning from traditional data collection methods to real-time, automated, and hyper-localized reporting.

With the advancement of such technologies, Investigative journalism has also leveraged existing IoT infrastructure. For example, the South Florida Sun Sentinel won a Pulitzer Prize for its "Speeding Cops" series, which utilized data from SunPass electronic toll transponders to prove that off-duty police officers were frequently driving at excessive speeds. This investigation highlights how journalists can hold institutions accountable by analyzing the digital exhaust generated by everyday connected devices used in *Smart Newsroom.* Beyond newsgathering, IoT is transforming the operational dynamics of media production and the newsroom environment. "Smart studios" utilize interconnected devices to automate and optimize broadcasting workflows. For example, IoT sensors can automatically adjust lighting, audio levels, and camera angles during live broadcasts based on real-time environmental conditions, reducing manual errors and enhancing production quality. Various studio asset *management* solutions are now possible. For example, in media production studios, IoT sensors can monitor equipment performance and usage, enable predictive maintenance and reduce costly downtime. Smart studio environments can automatically adjust lighting, temperature, and audio levels in response to real-time conditions, minimizing the need for manual intervention and allowing creative teams to focus on content creation.

6. Benefits and Challenges of Drones in Journalism

6.1. Benefits of Drones in Journalism

The Internet of Things is fundamentally reshaping journalism, offering innovative tools for data collection, visual storytelling, and audience engagement. Other benefits of IoT in journalism include the following [1]:

Automated processes streamline production, allowing newsrooms to operate more efficiently. Automated journalism, also known as robot journalism, involves algorithms generating news articles from structured data. By interpreting and organizing data sets, these programs can produce hundreds of articles in the time it takes a human reporter to write one. The Associated Press, for example, utilizes automation to cover minor league baseball games and corporate earnings, significantly increasing its output volume. This automation frees human journalists from routine reporting, allowing them to focus on complex, investigative tasks. Further, for p*ersonalization*, IoT devices, including smart speakers and smart TVs, can deliver personalized news feeds and audio briefings tailored to individual user preferences. Media organizations can leverage data collected from these IoT devices to analyze user behavior, preferences, and consumption patterns. This data-driven approach enables the delivery of highly personalized content recommendations and targeted advertising. However, this hyper-personalization, driven by algorithmic profiling, raises concerns about the creation of "filter bubbles," where users are predominantly exposed to information that aligns with their existing views.

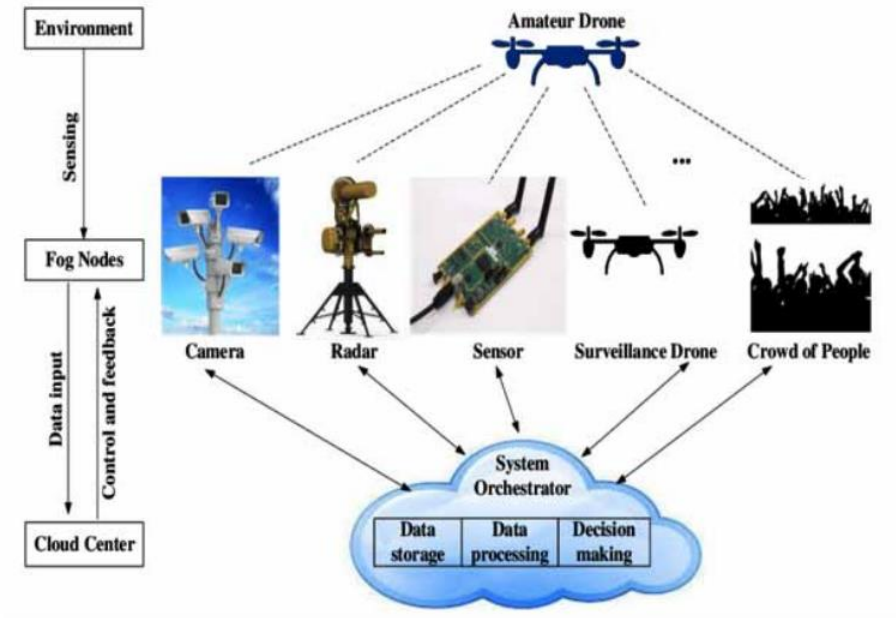

Fig 6: A typical use of drone [14].

Furthermore, it's prominent in *Audience Engagement.* For example, IoT devices offer unprecedented opportunities for audience engagement. The proliferation of smart speakers (e.g., Amazon Alexa, Google Assistant), smart TVs, and connected wearables has expanded the touchpoints through which consumers access news. By integrating news delivery into the ambient environment of the connected home, publishers can foster deeper and more habitual engagement with their audiences. Additionally, for collaborative work, IoT enables real-time sharing of footage and project updates among dispersed teams. Cloud-connected cameras and editing platforms enable geographically dispersed teams to share footage and synchronize workflows in real time. This interconnected infrastructure not only improves operational efficiency but also enables media organizations to manage their physical assets more effectively through predictive maintenance of broadcasting equipment.

6.2. Challenges of Drones in Journalism

Realizing the full potential of journalism of things requires navigating complex challenges related to cybersecurity, privacy, and ethical data use**.** Newsrooms must navigate complex ethical considerations regarding data privacy, surveillance, and the verification of crowdsourced information. Other challenges of IoT in journalism include the following [1]:

There are numerous *Ethical Concerns. Such issues include privacy* and ethical concerns arising from the deployment of sensors and drones. Ubiquitous connectivity introduces significant cybersecurity, data privacy, and journalistic ethics vulnerabilities. As the industry continues to adapt to this liquid environment of continuous information, news organizations must develop robust security protocols and ethical frameworks.

Security is seen as an additional area of paramount concern. Perhaps the most immediate and severe challenge posed by the IoT to journalism relates to the security of reporters and the confidentiality of their sources. IoT devices are often manufactured with minimal security protocols, making them vulnerable to hacking. IoT devices are notoriously vulnerable to cyberattacks. Many lack robust security protocols, making them susceptible to hacking. For journalists, compromised devices can lead to severe consequences. Malicious actors could hijack smart home devices or wearables, track a reporter's location, or uncover passwords. The lack of standardized security protocols in consumer IoT devices poses direct physical and digital threats to journalists.

Findings show that continuous data collection by IoT devices raises significant *privacy concerns*. The "commodification of data" means that information leakage is often an intentional feature of these devices. Journalists must navigate the ethical implications of using data generated by individuals' personal devices. Ensuring consent, protecting identities, and preventing the misuse of sensitive information are paramount. The ubiquitous collection of data raises questions about surveillance and the consent of the individuals being monitored. This poses a direct threat to press freedom and source confidentiality.

Furthermore, a*uthorship* is a growing issue. The rise of automated journalism blurs the lines of authorship. Determining whether the credit belongs to the programmer, the news organization, or the algorithm itself is a complex issue. Additionally, while algorithms can process data efficiently, critics argue they lack creativity, critical thinking, and ethical judgment inherent in human reporting.

In the era of *surveillance*, the tracking capabilities of IoT devices are equally concerning. Wearable fitness trackers, smart car GPS systems, and even seemingly innocuous apps can inadvertently reveal a journalist's location, potentially compromising secret meetings with sources. This continuous surveillance can create a chilling effect, forcing journalists to alter their behavior or revert to analog methods to protect their work.

Regulatory vulnerabilities are also a paramount concern. The rapid deployment of IoT devices has outpaced the development of robust regulatory frameworks, leaving significant security gaps. Many IoT devices are manufactured with weak security protocols and are rarely updated, making them easy targets for malware and botnets. These compromised networks can be used to launch distributed denial-of-service (DDoS) attacks against news organizations, disrupting their operations and silencing their reporting.

The fundamental tenet of journalism is accuracy. However, IoT data is not inherently infallible. The reliability of sensor data depends on the quality of the hardware, environmental factors, and proper calibration. Low-cost, consumer-grade sensors, which are often used in citizen science or grassroots journalism projects, can suffer from measurement drift, poor sensitivity, and susceptibility to environmental factors such as temperature or humidity, which can affect a*ccuracy*.

The study shows that integrating IoT into journalism exacerbates existing inequalities within the news industry, creating a significant digital divide and a pressing need for new skills. There must be a concerted effort to bridge the digital divide, providing journalists with the data literacy skills necessary to navigate and report on the increasingly connected world.

7. Future of Iota in Journalism

The news media industry has historically evolved alongside technological advancements, transitioning from print to broadcast and, more recently, to digital and mobile platforms. The future of the Internet of Things (IoT) in journalism is closely linked to the deployment of 5G networks, which provide the low latency, high bandwidth, and reliability needed to process large volumes of sensor-generated data in real time. This enhanced connectivity supports advanced journalistic applications such as drone-based reporting, wearable technologies, and immersive storytelling. However, the successful adoption of these technologies requires news organizations to address ethical, privacy, and cybersecurity concerns while equipping journalists with new competencies in data literacy, hardware systems, and digital security. [1], [14-18].

8. Conclusion

The integration of the Internet of Things into journalism represents a significant development in the media landscape. By using sensors, drones, and wearable technologies, journalists can access real-time data that enhances the depth, accuracy, and immediacy of their reporting. As IoT continues to evolve, the journalism industry must adopt these technologies responsibly, ensuring that innovation remains grounded in the core principles of truth, transparency, and public service.

The Internet of Things presents both significant opportunities and serious challenges for journalism. It offers powerful tools for investigating the physical world, enabling data-driven

reporting that can influence public policy and hold institutions accountable. At the same time, the widespread use of connected devices introduces major security vulnerabilities that may endanger journalists and compromise the confidentiality of their sources. To address these risks, the profession must develop robust ethical guidelines for sensor journalism that prioritize accuracy, context, and privacy.

More information about IoT and the Internet of Things in journalism can be found in the books [19-21] and in the following related journal: *IEEE Internet of Things Journal.*

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