

News Reporting in Drone Internet of Things Digital Journalism: Drones Technology for Intelligence Gathering in Journalism

Andrew Chinonso Nwanakwaugwu, University of Salford, UK

 <https://orcid.org/0000-0002-2929-9638>

Ugochukwu O. Matthew, Hussaini Adamu Federal Polytechnic, Nigeria*

 <https://orcid.org/0000-0003-0828-9710>

Ogobuchi Daniel Okey, Michael Okpara University of Agriculture, Nigeria

 <https://orcid.org/0000-0003-0686-2763>

Jazuli Sanusi Kazaure, Hussaini Adamu Federal Polytechnic, Nigeria

 <https://orcid.org/0000-0001-7681-2177>

Ubochi Chibueze Nwamouh, Kampala International University, Uganda

 <https://orcid.org/0000-0002-0320-3773>

ABSTRACT

The current study investigated several innovations for drone technology adoption in journalistic expeditions for intelligence and news gathering purposes. The necessity to leverage technologies to improve the direct involvement of eyewitnesses especially in violence-prone areas where physical and direct human involvement would be impossible or with high risk of survivability expectations is the motivating factor that directed the current research. The paper surveys the adoption of autonomous sensing drone systems in internet of things journalism and amalgamated the theoretic ingredients from the academic standpoint with realistic technological advancements from the global perspective and eventually expanded the propositions for conceivable adoption in the credible societal applications. The paper envisioned the future journalism and mass media practices and how drone innovation can revolutionize the journalism profession for the purpose of news and intelligence gathering with practical and technical realism with reduction of journalistic casualties.

KEYWORDS

Artificial Intelligence, Cloud Computing, Digital Journalism, Drone Remote Sensing, Interactive Media Technology, Internet of Things, Mass Communication, Mass Media, Objectivism

1. INTRODUCTION

The digital and mobile technologies implementation across platforms had pushed the news media and journalism profession to recently experience the waves of the fourth industrial automation involving

DOI: 10.4018/ijicst.320181

*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

unmanned aerial vehicles (UAVs) or Drones technology Internet of Things (DIoT) integration which characterised the regime of extreme digital automation in its existential process modernism (Salaverría & de-Lima-Santos, 2020). Those disruptive technologies have already been implemented across society layers, taking effects through new devices based on artificial intelligence (AI), machine learning, Internet of Things (IoT), mobile cloud computing technology, block chain technology and unmanned aircrafts systems (UAS) (Gill et al., 2019). The digital revolution had intercepted journalistic information management, intelligence and news gathering through implementation of the disruptive technology paradigm. The robotic systems, digital platforms and IoT devices are transporting innovative modes of news production, distribution and consumption of the journalistic ingredients, transforming the mass media to a novel ubiquitous dispensation (Susskind & Susskind, 2015). The twenty first journalists can now create data sets and develop insights more quickly and simply than ever before, through the use of IoT sensors that remotely control objects and collect data through cloud technology infrastructures (Onyebuchi et al., 2022). Journalists, for example, can track the sounds and vibrations from any public event, such as political rallies and concerts, and determine which speech or quote most affected the audience or which song was the most well-liked in real time through IoT Drone surveillance.

The current research focussed on the interactive connotation of DIoT implementation within the framework of technological innovations, assimilating the twenty first century journalism in its central discussion (Wojciechowska, Frey, Sass, Shafir, & Cauchard, 2019). The research described the DIoT devices application systems that the mass media journalism can incorporate into the production and consumption of news ingredients, furnishing a general idea of the prospects and challenges that DIoT poses to journalism and mass media profession (Ilan, 2021). The paper focussed on the newest technologies for journalistic profession, combining the experiences from academic background, journalistic excursions and technological innovations in a quest to chart a brand new digital model for journalistic news gathering and intelligence formations. There exist an academic correspondences on how to blend the modern technology, specifically the autonomous sensing Drones in IoT as essential tools for safeguarding news correspondents and the journalistic professionals when applied pragmatically (Anderson, Bell, & Shirky, 2015). The current paper surveys the adoption of autonomous sensing Drones system in IoT journalism and combined the theoretic ingredients from the academic perspective with realistic technological advancements on the move and eventually expanded the propositions for conceivable adoption in the credible societal applications to grantee the scope of industry 4.0 extreme digital automation for journalism and mass media practice (Aydin, 2019). While the researchers discussed the imperativeness of the autonomous sensing Drones system for intelligence gathering in IoT journalistic expeditions, that will guarantee the indispensability for the storylines to lives on even when the journalists covering the events are murdered while on active duty and also to enable the law enforcement agencies prosecuting the killings to have immense evidential facts for execution of judgement. In journalism, intelligence and news gathering had got to the point in which direct eyewitness and personal contact in reportages, particularly in the occasion of war scenarios, ethnic conflicts, environmental disasters, predatory observances, security and surveillances, remote sensing and many dramatic news events, might involve unquantifiable journalistic risk factors (Doku, 2020).

The current research investigated several innovations for Drones use for journalistic requirement in intelligence and news gathering purposes to safeguard the news correspondent from unquantifiable journalistic risks. The necessity to improve the direct involvement, eyewitnesses, especially in the violence prone areas and fields where physical and direct human involvement would be impossible or with high risk of survivability demand the adoption of autonomous remote sensing Drones for event monitoring and reportages. The current research went further to investigate the interrelationships existing with the modern technologies for journalistic innovation, with the spectator's expectations for uncompromising chromatic implementations, representation, dissemination philosophy and collective constructivist simulations for process modernism. It established that the up-coming

categories of Drones reportages will epitomise a disruptive synchronism, an improvement that will occur inadvertently but dislocates prevailing formations of chromatic commentaries and successively provides for the establishment of innovative consumers that valued the linkages. The UAVs universally recognized as Drones are the military equipment that are currently modified technologically for non-combatant and commercial utilization in the global world for adaptable societal uses(Kvasňovský, 2020). With recent developments in Nigeria in which journalist are adopted, brutalized, killed in the course of official assignments are not good precedence. Often times, events are perpetuated without the documentation of evidence for public views or events are reported with fictitious narratives with several concealment and suppression of material facts just to favour the interest of the government and other interested parties. The technologists, researchers and broadcasting organizations are contemplating deploying the services of Drone technology for broadcasting and intelligence gathering in objective journalism(Cho, 2013). The Drones technology offers an economical approaches to situate cameras and sensors in the air to capture images and telemetry data through the use of remote sensing adaptation(Sudhakar et al., 2020). In the event of natural disasters, large protests, riots, traffic monitoring and all outdoor events, Drones could produce virtual reality (VR) content either through 360p video or a self-sufficient 3D VR environment that resemble 3D video games(Chamberlain, 2017). This approach likewise caused considerable concerns about well-being, confidentiality, privacy, conflict of interest, viewpoint, and trustworthiness.

This research surveys the immediate moral contemplations amid Drones journalism contractors and digital evidence campaigners to validly establish the economic importance of the use of Drone system to improve the timeliness of information arrival, dependability and accuracy in objective journalism. It places those deliberations touching the background of functional upright philosophy employed in journalism to imply supplementary stratum of interpretation that should be validly interfaced with Drones technology for intelligence gathering and reportages. Without doubt, the evolutions and development in information communication technologies (ICTs) have transformed the manner in which journalism and mass communication essential services are managed through revamping the modernistic configurations of digital journalism(Agostino, Arnaboldi, & Lema, 2021). The current paper envisioned the future journalism and mass media practices and how Drone innovation can revolutionize journalism profession with practical and technical realism with reduction of journalistic casualties(Adams, 2019). The research article is structured thematically based on explanations and journalistic assessments of IoT Drone adoption in journalistic expeditions. The innovative model is introduced with purpose to increase engagements due to collaboratively pervasive digital society extreme automation with respect to journalistic and mass media explorations. While the paper focussed on the upcoming societal expectation, digital consciousness, the challenges were assessed within the perspective of the twenty first century business automation and investment ecosystem that facilitate economy of scale in its process modernism.

2. RESEARCH OBJECTIVES

The major goal of this study is to investigate the adoption of IoT Drones in journalism in relation to interactive news creation, journalistic career modernism and digital media innovative activation. Finding and analysing its disruptive technology connotation within Nigerian news space and global journalistic practice were subject of consideration. Based on the research findings, it is suggested that IoT Drones be implemented in journalism and mass media on the account of its technical realism in video and telemetry data transmission through cloud infrastructure. In particular, when the subject is expanded, journalists viewed IoT Drone technology as a safer and more cost-effective means to get video. Using IoT Drones in journalism, News events like volcanic eruptions, war-torn communities, and natural disasters can all be captured on camera using IoT Drone technology where direct human engagement may not be negotiable.

3. THE BACKGROUND OF STUDY

The airborne reporting of news from the early day of automation by journalistic helicopter has been an essential aspect of media events coverage and news gathering, though very capital intensive to maintain (Pavlik, 2019). The most important aspect of every career is human life, safety and security should be principal focus but the initial helicopters adoptions were intrinsically hazardous. While in February 2014, a photo correspondent and a pilot were eliminated in a destructive crash in Seattle, while in 2007 two journalist helicopters reporting a police follow-up crashed with consequential deaths of four personalities (Allan, 2013). The Drones adoption in news correspondence is considerably economical with less risk factors in the twenty first century journalistic expedition (Wasser et al., 2021). The Drones technology use in news gathering and reportages are on increase with the recent development in IoT, empowering individuals to be part of journalistic storylines and to straightforwardly communicate astonishing stories on a very deep concentration beyond correspondent line of sight (Costera Meijer, 2020). The IoT connected technologies had assisted the journalists to explore dangerous war zones, together with restricted areas using drones in no-fly zones. The Drones have attracted the public attention over the years with focus on its military adoption and utility in news gathering in the recent time (Holton, Lawson, & Love, 2015). The media houses, journalists, commercial organization and corporate institutions have engaged the services of UAVs to obtain, process, transform and report most current news to establish occurrences of natural devastations which invariably would be too dangerous for human journalistic coverages, therefore Drone use could offer unique leverages that enrich news storytelling from the global perspective (Ugochukwu O Matthew, Kazaure, Onyebuchi, et al., 2021).

However, the media scholars have highlighted the need to better fathom the privacy and moral concerns surrounding UAVs adoption in news reportages (Abeyratne, 2019). The legal limitations and propositions of their applicability have been comparatively uncharted. Basically, the evolving rules and regulations that are put in place by the Federal Aviation Administration (FAA) may ground UAVs for journalistic purposes, it is important to understand what those legal barriers are and what they mean for the future of UAVs as tools for journalism (Ahmad, Chaturvedi, & Masum, 2021). The recent Drones configuration offers a variety of adaptation and hardware specifications to meet various news gathering purposes and journalistic requirements. High definition video (HDV) and photography are able to wirelessly transmit footages for immediate airing and editing as that is becoming wide spread during night-time incidence. The high-tech devices such as Forward Looking Infrared (FLIR) allows the reporters to track incidence in the low light situations where standard cameras would be insignificantly useful (Guterman & Rulffes, 2018). The Drone use in journalism is also very flexible allowing multiple mobile news crews to collaborate, participate and digitally deploy computing moments to the logistics station and newsroom interactively. The Drone journalism involves capturing multimedia information (images, audio, digital signals and videos) by remotely controlled autonomous UAVs and recording events for reportages to the news agencies and citizen media (Barrero, 2018).

The UAVs journalism, generally permits the assemblage of news regarding events and people of interest from a distance or altitude and in most cases beyond visually line of sight (Chamberlain, 2017). The UAVs' miniaturized size, ability to hover and their capacities to adapt severe environments mean that they can survey subjects and events and places that people cannot easily engage such as a volcanic areas and war zone. The UAVs journalism is often used for news, intelligence and information gathering otherwise could have gone unreported due to high risk factor to the human reporter (Zhu, Pasch, & Bergstrom, 2020). The Drones furnished with switchable payloads are the next step in technological progression that could help law enforcement agencies to obtain evidences and journalists in some ways that were previously impossible. The current research modelled a future IoT journalism, adopting Drones for realistic interactive technology computing paradigm for process modernism and consolidated findings based on the technology negotiated approaches from the global perspectives.

The paper articulated five structured questions in the perspective of Drone IoT journalism adoption. The research discovered that IoT Drones can manoeuvre, take photographs, shoot video and open a novel opportunities for storytelling(Adams, 2019). The current research is structured into introduction, research objectives, background of study, literature review, IoT in journalism, research questions, research design/methodology, research implementation, civilian drone use, research limitations, research findings/discussions, conclusion, recommendation, acknowledgment and references.

4. LITERATURE REVIEW: INTERACTIVE MEDIA TECHNOLOGIES AND JOURNALISM

From the beginning of time, digital media have been experiencing revolutions from one phase to another from its inception up till the current twenty first century interactive internet of things digital era(Allam & Jones, 2021). While the digital electronic societies have consistently evolved over several decades, the digital natives have been able to penetrate and manipulate the media in several other ways like the television, the newspaper, digital catalogues and internet repositories due to technological innovation, that necessitated development and ever progressive technology advancement(Westlund, 2013). The consistent progressions of digital technologies have continued to drive the development of the mass media and twenty first century digital journalism(Napoli, 2011). Media have existed before humanities have attempted to design, fashioned and develop approaches to communication and outspreading the bounds of the voice expressions within the global world,(McNair, 2017). The progression in the mass media development are categorized into six periods commencing from the primitive printed book era, newspapers era, telegraph and telephone era, radio and television era and more lately the IoT digital society and smart phones dispensation, (Chun & Keenan, 2006). The book era came to effect from the development of printing media technology in Europe when Johannes Gutenberg, a German goldsmith, conceived the adjustable lithographic typing press in 1400 A.D., with the foremost book printed in 1453 A.D. The newspaper production came into effect around the late 1690 when Benjamin Harris published the foremost colonial newspaper in Boston,(Parcell, 2011), and towards 1900 the printing media had taken the nature of book publications, pamphlets, magazines and newspapers that had provided all the essential information that the world and its people can access to the remotest locations. The newspaper media era was instantaneously matched with the development of the early electronic media such as telegraph in 1858 and telephones in 1876 by Samuel Morse and Graham Bell respectively,(Bray, 2013). The sudden modernism in the field of electronic media communication helped people connect, communicate and share views with the rest of people across the globe. According to Okwudili & Kazaure (2020), the digital approaches in the twentieth century and the emergence of the electronic media permutated into the print media declining popularity with rise in the adoption of digital and interactive media technologies(Okwudili & Kazaure, 2020).

The electronic transmitting radio grew into popularity as the channel for information, news and entertainment for the populace having been developed by Guglielmo Marconi in 1894, television was conceived and developed in 1925 by John Logie Baird for broadcasting and journalistic realization,(Hart, 2004). The mass media, broadcasting and journalism, progressed with improvement in technology as the internet emerged as the chief resource aggregator in the current twenty first century digital internet generation. The internet technologies, world wide web, e-mail services, and online communication protocols have since its evolution been instrumental in providing information gateways and connectivity protocols for several digital transactions. The media also referred to as multimedia are the multiple forms of information sources and communication channels that enable easy flow of idea, information, signals and transmission among the authorized participants having been described to have evolved in the perspective of history and originating with the newspapers at the onset of the 17th century through film in the mid 1800 and radio in 1922, television in 1929 to the newest IoT media in the 20th and 21st century(Ugochukwu O Matthew & Kazaure, 2020). Justifiably,

the media have developed progressively along history, metamorphosing through the print media era (newspaper, magazine, books, editorials) to the common electronic media (radio, television, telephone) and comprehensively emerged into the most current and newest media era characterized with IoT and multimedia technologies (Ugochukwu O Matthew, Kazaure, & Haruna, 2020). The introduction of information communication technologies (ICTs) in the scheme of the new media technologies is transforming the profession of mass media, mass communication and journalism, (Kaul, 2012). Globally, attention had been shifted to online medium and real-time news reportages to validate events and occurrences as they synchronously arrive, (Smith, 2018).

The current digital societal trend will affect the conventional journalism on the account that it is very impossible for the mass media practice to be transforming technologically leaving behind the journalism. Journalism therefore should adapt to the digital activation and transform along the innovative and disruptive technologies of the IoT era (Burton, 2021). The twenty first century digital age had rewritten the role of journalism to have provided digital adjustment in which journalists operate along various media platforms such as print media, electronic radio, digital television, smart portable digital devices and online platforms, (Lian, Liu, & Dong, 2020). The current digital characterization of the twenty first century multimedia environment had began to transform responses to innovation and technology availability to increasingly, competitively and fragmentally shifting the markets for readerships, audiences, government media policy makers and transformation of audience requirements for news and information presentation and delivery, (Hipp & Grupp, 2005). The present day high-techno innovation and supersonic digital e-society have extensively transformed the way the public obtain news and information and that had affected the prevalence of the traditional mass media significance, (Hanna, 2010). The integration of the twenty first century digital media technologies in journalism practice will essentially enhance and improve the profession of mass media and journalism among other benefits (Ugochukwu Okwudili Matthew, Kazaure, Kazaure, Nwamouh, & Chinonso, 2022).

5. THE CONCEPT OF IOT DRONE JOURNALISM

The IoT journalism is the key interesting aspect of journalism which required substantial impression within the examination and cross examination of journalistic competence in its modernistic approaches (Bjerknes, 2020). The IoT describes a network of interconnected physical devices that are multi-layered and now online with the intention of gathering and exchanging data via cloud infrastructure. IoT has improved journalistic practices by changing how news is created and how frequently viewers receive it. Journalists can now create data sets and develop insights more quickly and simply than ever before thanks to the use of IoT sensors to remotely control objects and collect data. Journalists, for example, can track the sounds and vibrations from any public event, such as political rallies and concerts, and determine which speech or quote most affected the audience or which song was the most well-liked in real time. These sensors also track the consequences of the climate emergency and compare the pollution and air quality in other cities throughout the world. Many of these devices are everyday interactive technological apparatuses such as smartphones and wearable devices, smart home devices such as smart meters as well as industrial devices such as smart machines. These connected smart devices can collect, share and analyse information and create actionable moments according to the predefined modalities. IoT devices are especially susceptible to assaults since the majority of them lack adequate built-in security measures, allowing threat actors to readily scale crimes (Kumari & Jain, 2023). However, the IoT ecosystem, which has been present for more than a decade, still lacks critical regulatory measures, such as those pertaining to security requirements. Journalists should therefore be aware of potential cyberattacks coming their way via IoT devices, aggressively follow security best practices, and put new routines around safeguarding oneself into place.

By 2025 as already forecasted there will be more than 75 billion IoT connected devices in use (Statista, 2019). This would represent an increase of almost three times those that were installed in 2019. Interactive technologies and IoT evolved to redefine journalism and mass media practice into its existential objectivism (Okwudili & Kazaure, 2020). Journalistic objectivity often points to impartiality, nonalignment, non-involvement, and non-partisanship in building narratives but most consistently involves all of these characteristics. According to (Akbar, Panda, Kukreti, Meena, & Pal, 2021), journalism from the very broad perspective is the field of human endeavour that deals with the fabrication, processing, manufacturing and circulation of occurrences of events within local or national and to the global environment. The concept of journalism relates to employment, career and profession in addition to citizenship correspondences which involves assemblage and circulation of information,(Carlson & Lewis, 2015). However, the journalistic media may involve a single media element but in most cases it involves multimedia components for interactivity and easy assimilation including print media, television media, radio frequency and amplitude transmission, internet and social media, while in the past it included newsreels. Usually, the concepts of applicable journalism varies among nations and geographic divides. In some countries of the world, the news and broadcasting media are managed by government involvement and are not fundamentally self-governing and autonomous,(King, Schneer, & White, 2017).

In some cases, the news media are independent of the government but instead operate as private industry motivated by profit orientation with government providing framework and modalities for broadcasting and publishing regulations, (Leckner, Tenor, & Nygren, 2019). In addition to the variable environmental factors of how broadcasting organizations are handled and managed, nations usually have divergent accomplishments and establishment of rules, conventions and laws legislating the freedom of speech, freedom of press, libel cases and defamation complications (Chama, 2020). In the recent time, the multiplicity in IoT uses, information communication technologies (ICTs), mobile communication and computing infrastructures, global information system (GIS), world wide web (W3), multimedia technology and creative designs, artificial intelligence, (AI), machine learning (ML), and smartphones have produced substantial improvements in the media view since the evolution of the 21st century millennium age (Abdalla, 2016). The digital natives have systematically shifted from the consumption of print media channels, as the society have progressively consumed news amidst e-readerships, smartphones, and other individualized electronic devices, as opposed to the more traditional formats of newspapers, magazines, or television news channels(Kaye & Quinn, 2010). The news media organizations are faced with the option of monetizing their digital component, as well as consolidate on the circumstances in which they publicize on the print media. The newspapers have witnessed print profits drop at a quicker measure than the rate of expansion for digital returns on the investment. However, the journalistic conventions which had contrasted across national and global perspectives had put pressure on the digital demand of the current societies . In the United States of America, the job of journalism is managed by the media organizations or by individuals,(Weaver, Beam, Brownlee, Voakes, & Wilhoit, 2009), providing bloggers who are usually but not continually journalists to contribute to journalistic adventures.

Indeed, it is the critical aspect of journalism for blog owners, Twitter and social media networks users to build audience for self-expression and essentially contributing to demand of the 21st century journalism(Craig & Cunningham, 2019). In the United States of America, reasonable news organizations are amalgamated with other entities with an editorial executive board and demonstrated independent editorial and broadcasting departments(Ala-Fossi, Grönvall, Karppinen, & Nieminen, 2021). Several trustworthy news organizations and their workforces often subscribe to the ethics of certified organizations in the likes of American Society of News Editors, the Society of Professional Journalists, Investigative Reporters & Editors or the Online News Association. Several news organizations have their individual codes of ethics and conducts that guide journalistic professionalism and publications (Pons & Hallin, 2021). In objective journalism, drafting news sections notwithstanding the media, impartiality, objectivity, fair-mindedness and preconception,

predisposition, favouritism are issues that demand considerations by a journalists (Duncan & Culver, 2020). Basically, in online news medium, many of these distinctions were clearly broken down. The news readers should give adequate attention to the news headings and other design elements to ensure that they understand the journalist's intention. According to Robert McChesney, vigorous journalism in a democratic system must anchor on the opinion of individuals in authority and who wish to be in power, must comprise the choice of opinions and must regard the information needs of the people, (McChesney, 2013). Often time, the discussions on whether journalists should be hypothetical, objective or neutral on arguments include the fact that journalists produce news out of and as part of a particular social context, and that they are guided by professional codes of ethics and do their best to represent all legitimate points of view. Additionally, the ability to render a subject's complex and fluid narrative with sufficient accuracy is sometimes tested when the time available to spend with subjects matter or the constraints of the medium used to analyse the event and the circumstantial disposition of the public opinions(Thomson, 2018).

The IoT for journalism are related to numerous activities and fields of human endeavour that are technology consolidated to provide leverage in the 21st century journalistic space (Lanzolla, Pesce, & Tucci, 2021). Attention must be given to all the fundamental concepts and structures of IoT and associated connections to IoT devices, the ubiquitous enterprise network of things, machine to machine (M2M) interactions, cloud computing infrastructures, big data science, wireless sensors technologies, autonomous & artificial intelligence and cyber physical system (Montori, Bedogni, Di Felice, & Bononi, 2018). The introduction of ubiquitous sensor network architecture premeditated by the International Telecommunication Union (ITU) provided set of dynamics in the most current journalism (Arum, Grace, & Mitchell, 2020). The technologies of IoT proposed some model and standardizations and development that has increased penetration of new coverages through the transmission of satellite images and the use of remote sensing autonomous device such as Drone system to intelligence gathering (Aasen, Honkavaara, Lucieer, & Zarco-Tejada, 2018).

6. RESEARCH QUESTIONS

The following questions have been formulated to guide the discussions and outcome of this current research paper.

- i. Could the death of journalists around the world be reduced through the use of IoT Drone technology in journalism?
- ii. What impression does IoT Drone technology storytelling portend in the digital age journalism?
- iii. What significance does IoT Drone technology portray in investigative journalism?
- iv. Does IoT Drone technology virtual reality (VR) content improve image telemetry and image realism?
- v. Could there be substitute for IoT Drones photographs in a very specific way, essentially in 3D content image resolution and VR content formulation?
- vi. Could there be future for IoT Drones technology in the objective and investigative journalism adoption?

7. RESEARCH DESIGN/METHODOLOGY

The current research was conducted to determine the latest development in the use of IoT Drones technology in the 21st century modern journalism requiring image and video computing in specific operational assignment in journalistic explorations. In doing so, attention was given to the advancement in the Drone technology to include Line of Sight (LOS) and Beyond Visible Line of Sight (BVLOS) championed by IoT and advancement in the 5G mobile network communication technology. The

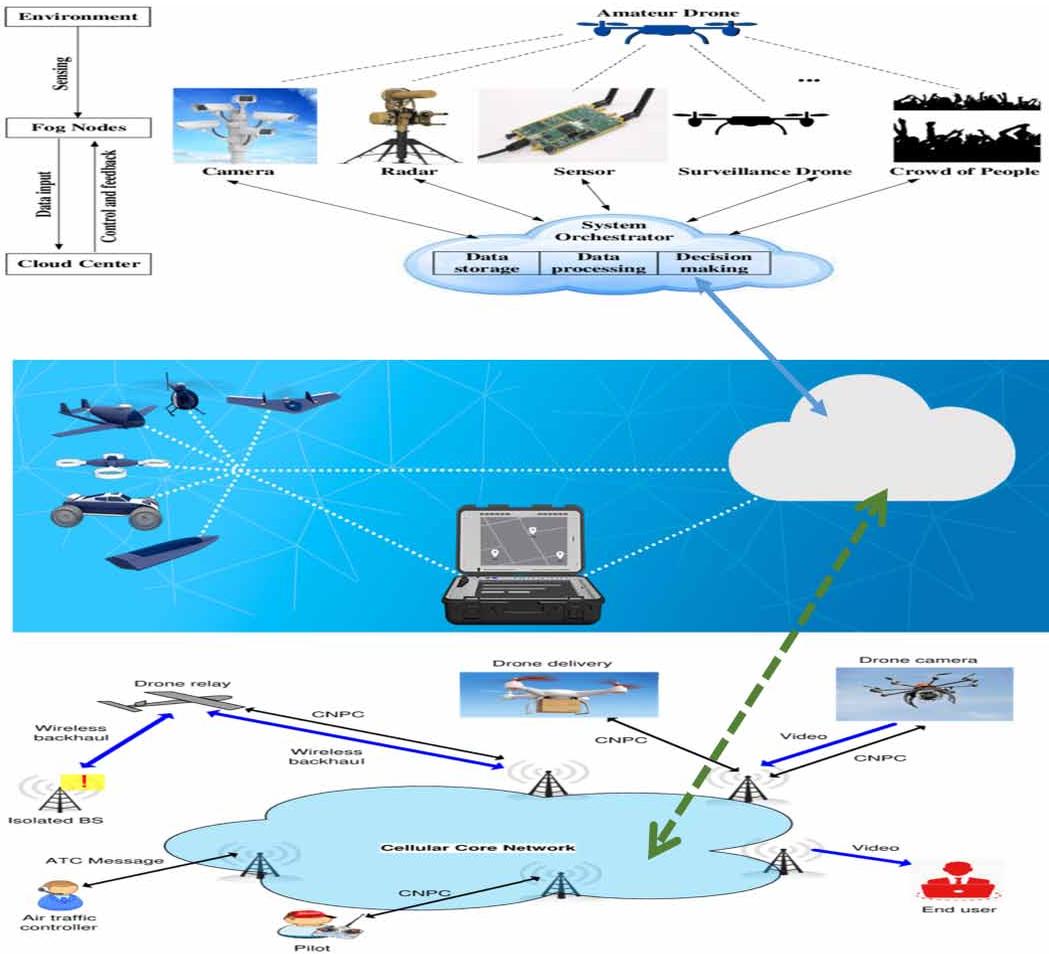
veronte autopilot, a miniaturized highly reliable avionics system for advanced control of UAVs and Unmanned Aircraft System (UAS) embedded with a suite of state-of-the-arts sensors and processors as well as a LOS and BLOS machine to machine datalink cloud connectivity through veronte cloud services for the integration of Drones in the Internet networking were adapted. The initial design was focused on the use of satellite communications but in the current research, Veronte Autopilot infrastructure was used to switch the Internet connectivity for the Drones with increased efficiency. The Veronte cloud services enabled synchronization of Drones flight data with the cloud server in real time synchronous flight and surveillance schedules. The Internet connection on the control station PC were installed in the Drone device to provide veronte cloud connectivity for increased versatility for machine to machine (M2M) operations. The Veronte autopilot defines the path for the integration of M2M philosophy in Drones pushed by the evolution of consumer technology. With the boost in the Microsoft Azure cloud computing and Google cloud technology, many companies will join the space Drone technologies with different specifications and definition of operations (Fosch-Villaronga & Millard, 2019). The global world will witness another computing paradigm characterized by IoT enabled framework for journalistic expedition.

This innovation will further be enhanced by cloud technologies for data synchronization that will eventually link to big data phenomenon which will be of a greater challenges if measures were not taken preemptively. The Drones acting as sensor devices will certainly open up a large number of IoT applications in mass communication, journalism, healthcare computing, agriculture, mining operations, and security surveillance and industrial inspection services (Rozlosnik, Infrarroja, & de Bustamante, 2018). The ongoing IoT revolution in Drones industry have experienced accelerated transformation shifting from mere hobbyist play toy to become a system of complex IoT devices essentially for process modernism. The advancement in the telecommunication world that had ushered in 5G technology in an unexpected way to enhance the ability for IoT Drones to respond to commands in real time and effecting instant feedback. The innovated IoT Drones will assist the digital natives to perform some classified operations which will include but not limited to image and video computing through remote sensing, refer **to fig 1**.

In this implementation, cloud data warehouse was used to stablish individual and simultaneous bidirectional communications between the control station and one or more UAVs. The UAV network was managed simultaneously to operate over large areas on hybrid IoT cloud infrastructure allowing data synchronization through the cloud storage-data warehouse. It increases the productivity and coverage of services delivered by the provider. The system and its infrastructure allowed multiple UAVs to install veronte autopilot in order to synchronize information sharing. With effective compliance to the standard requirements, the system have the capabilities to record telemetry data, transmit and keep log record with data recorded on every operational assignment. Among several improvement recorded with Veronte Cloud infrastructure is the increased collision avoidance, safety in UAV flights management and smart multimedia data acquisition by veronte autopilot. These autopilots Drone systems are empowered to join communication among themselves and efficiently exchange multimedia data ubiquitously and autonomously. The system and its infrastructure improved the algorithms for collaborative sense avoid repulsion as well as the flight control.

This technology infrastructure allowed for analyzation and coordination that enabled information from transponders in the real synchronize able time frame. The system allowed for synchronous configuration of events taking place in the UAVs environment managed with veronte cloud performing automatic actions in unison, which include reporting the track of their current location and activities, analyzing all environmental data, sending of multimedia information (images, photos and video) through the cloud infrastructure(Ugochukwu O Matthew, Kazaure, & Okafor, 2021). The configuration of the Drone based on the current research was implemented on veronte autopilot nomenclature for data capturing and transmission to the newsroom in the real time event occurrences.

Figure 1.
 Remote autonomous sensing IoT Drone for surveillance (Ugochukwu O Matthew, Kazaure, Onyebuchi, et al., 2021)



8. RESEARCH IMPLEMENTATION

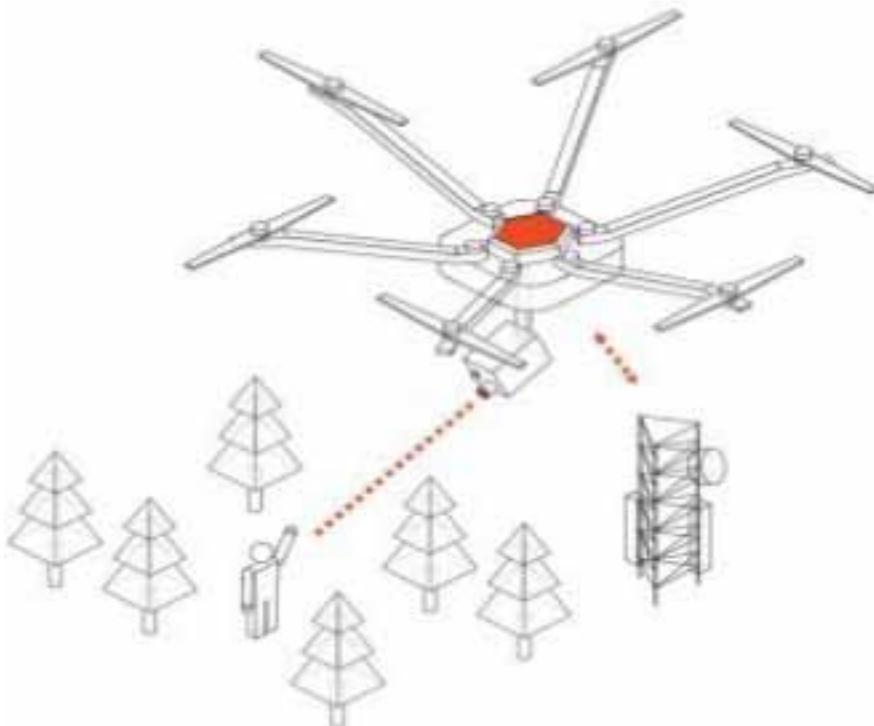
In journalism and mass media communication, emergency responses and on spot mobilization and spotlight event coverages often times happened in some locations that are inaccessible both with limited lines of visibility such as expansive forests or locations where it's difficult for news service equipment to gain access or extremely expensive. In such scenario, a Drone equipped with an infrared camera and trained with artificial intelligence convolution neural network (CNN) to recognize human images and objects can be of great help and support(Ugochukwu O Matthew, Kazaure, Onyebuchi, et al., 2021). Drones have gained extensive popularity across a variety of industries, including healthcare, journalism & mass media, transportation & logistics, agriculture, construction, oil and gas sector, mining and for ecological management(Chamberlain, 2017). Several business organizations have used IoT Drones to survey land, assess crop health, and perform complex inspections. Presently, Drones have added many more attributes to its already extensive features. Drones are being utilized not only to improve safety, emergency and prevention of future disasters but on several situations, they have been instrumental in emergency responses for live streaming. Most Drones with intelligent system for object recognition was implemented with Latvian authorities in defense and public safety

reconnaissance outfit, in which the Drones were used to find individuals in the forest region, refer to **Fig 2**. The Drones were designed with embedment of sound sensors in order to define the distance and direction of any occurrence. The comprehensive testing and implementation of the Drone started around 2018, where some numbers of Latvian National Guard had since conducted the test including the events that occurred in the night, where the drones was able to clearly identified individuals in the remote location, including events that occurred at night(Duo, Trembanis, Dohner, Grotoli, & Ciavola, 2018).

9. CIVILIAN DRONES USE IN A SPECIFIC IDENTIFIABLE OPERATIONS

- i. Drones enables the identification and rescuers, journalists to find missing people(person), deliver supplies such as food and life vests and significantly lowers the search and response times from hours to minutes in all the cases where it was tested and used in the real life scenario.
- ii. In one scenario, public safety departments recorded three separate search and rescue operations, which saved the life of four human persons. Indeed, that present the first time scenario in history when three simultaneous Drone operations were used to rescue peoples in a single day(Gotovac, Zelenika, Marušić, & Božić-Štulić, 2020). This is also good for journalistic documentation.
- iii. The Police Department in UK used some Drones(McKelvey, Diver, & Curran, 2019), with thermal imaging to identify semiconscious man around the edge of a steep cliff.
- iv. With the help of Drone, the Wayne Township Fire Service in Indiana dropped a life vest to a criminal suspect who had jumped into a pond and was suffocating to survive.

Figure 2.
IoT Drone trained with artificial intelligence to identify human in the thickest forest used for Journalistic Coverages in Disaster Management (Ugochukwu O Matthew, Kazaure, Onyebuchi, et al., 2021)



- v. In Hill Country Texas, the public safety agencies had dropped a life vest to a mother and her fifteen years old daughter who were trapped in a rising flood.
- vi. Drones have been used in locating survivors during natural disasters after the hurricanes struck in Texas, Florida, and Puerto Rico, Drones with thermal imaging was used to pinpoint the locations of people in the dare need of rescue attention(Barnawi, Chhikara, Tekchandani, Kumar, & Alzahrani, 2021).
- vii. Firefighting responses at some point in the previous year, fires raged through California, making it the deadliest and most destructive fire outbreak on record. The fire scorched more than 150,000 acres in less than two weeks. In response to that, sixteen teams of public safety officials completed over 500 Drone flights spanning 26.5 square miles averagely. The Drones were then used to aid search and rescue operations, assisting in planning and responding to potential mudslides, pinpoint fire paths and more efficiently responded to all scenarios.

10. THE RESEARCH LIMITATIONS

The current research had captured some limitations in the implementation of the disruptive technology paradigm requiring journalism automation using autonomous sensing Drone system in IoT.

Job Loss: The traditional journalist who are not innovated are bound to be displaced with the newest journalistic paradigm. A single surveillance UAV (Drone) is enough to handle the journalistic responsibilities of 10-20 manual journalist in terms of intelligence, news gathering and evidential illustration without casualties and obstruction.

Cost Intensive: The IoT Drone infrastructure and configuration is essentially cost intensive with considerable returns on the investment. Regardless of the capital expenditure requirement for IoT Drone installation, the benefits are unquantifiable especially when news gathering could mean life or death of a journalist, the Drone technology could be deployed in such journalistic adventures.

Technical Requirement: The technical requirements for the IoT Drone Installation and configuration required that experts are needed for such configuration and to man the critical infrastructure require essential technical details.

Government Legislation: The government legislation regarding the use of civilian IoT Drones are not usually flexible. The government laws, rules and legislative consideration of the civilian IoT Drones for journalistic assignment are varied across nations. In America, the law guiding the use of the civilian Drones for use in the day and in the night contained several reservations and so much sceptics.

Privacy Issues: In era of IoT Drone journalism, privacy is usually breached. The infrared cameras of the Drones enable it to pick every image and picture of whatever is brought to its focus. The high risk of exploiting the telemetry transmission of the Drone by enemies for security, spying and espionage is sort of worry when deploying IoT Drone system for journalistic mission. America banning the use of Chinese civilian Drones was based on the fear of spying, espionage and privacy breaches which may be possible.

Security Breaches: The security breaches may be prevalent in the use of IoT Drone system in journalistic assignment(Valente & Cardenas, 2017). For the fact that Drones comes in different specifications will make it difficult to be identified as civilians or military intelligence hardware for dangerous purpose.

11. RESEARCH FINDINGS & DISCUSSION

The most updated journalistic applications for IoT Drone remote sensing are still at infant and elementary stage but they are expected to expand rapidly as digital society keep evolving. To effectively guide and manage the development of IoT Drone remote sensing for sustainable journalism in respect to political coverages, remote occurrences, disaster prone area and forest area search and rescue

mission, it is important to systematically and continuously conduct comparative studies to determine the appropriate IoT Drone remote sensing technologies for various remote conditions, engagement and forestry applications,(Tang & Shao, 2015). While the IoT Drones equipped with an infrared camera can quickly provide critical information to the first responders in disaster management, similar system has been tested in various missions with first responders and has yielded positive results in the assigned mission. In the district of Latvia, where such system was used to collect and analyzed data in real-time and identified areas with the highest risk of fire outbreak, this pointed to forestry and environmental management. The result that enabled the first responders to prepare for scenarios in the prone area to minimize any possible eventuality and escalation.

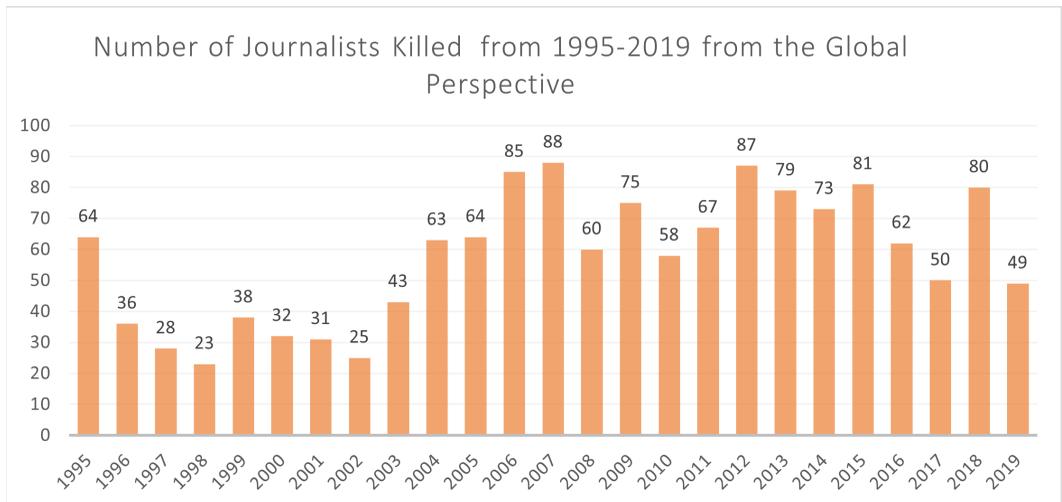
Such development will ensure the following benefits: (i.) immediate information collection and analysis from the video, signals, audio and images retrieved from the Drones

(ii.) intelligence gathering to necessitate appropriate responses for security alertness and ecological surveillance (iii.) instrument for objective journalism and investigative reportages (iv.) safer access points identification (v.) increased success rate of forest fire suppression and quick recovery (vi.) justification of claims in the event where insurance cover is required for payment of indemnity (vii.) sustainable Balance in the environmental ecosystem.

From all indication, journalism as a profession might not be contemplated as the most distant hazardous and precarious profession in the twenty first century occupational environment, however the figure of journalists exterminated from the global perspective in 2012 amounted to 157 deaths(Urbanik & Roks, 2021). Unpredictable assumptions exist for individuals contemplating to venture into the profession of journalism(Goens, 2021). (fig. 3) From the research data, 64 journalists were murdered in 1995 and fortunately the figure reduced considerably lower than 50 until 2004 when the figure increased to 63. However, the death cases again increased to the zenith of 88 cases after 4 years later. Prevalence of journalist assassinations persisted beyond 50 for a number of years until 2019 when the least possible figure of journalists extermination were noticed ever since 2003. The current research observed that journalists were murdered in 2019 more in Syria and Mexico with at least 10 journalists extermination in the respective countries(Seelke, 2019).

From the current research, 251 journalists were incarcerated from the global perspective in 2018(Ghazoul & Kleinschroth, 2018), the figure of the arrested journalists totaled 350 while 60

Figure 3.
Number of journalists killed worldwide 1995-2019 Published by Amy Watson, Feb 24, 2020, source: <https://www.statista.com/statistics/266229/number-of-journalists-killed-since-1995/>

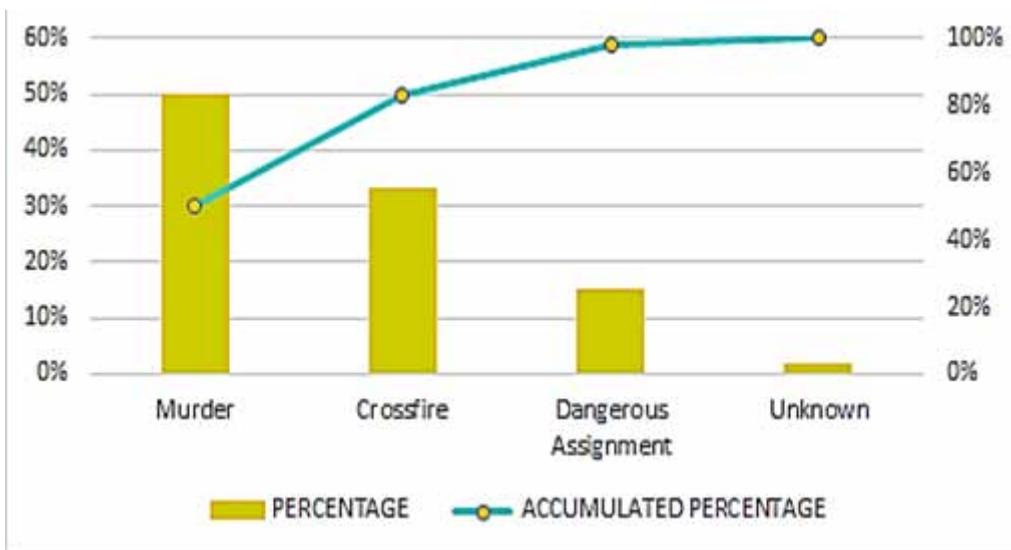


journalists were abducted(Torsner, 2019). Several media workers and journalists have been kidnapped, confined and imprisoned as retribution for reportages construed to be condemning, critiquing, evaluating or passing judgment on the political government and religious dogma. Journalist are often maltreated for discourteous representation of positions of powers, frightened for imageries they broadcasted and murdered ingenuously for being in a wrong location at inappropriate time. Among the hazardous countries for journalistic practice is supposedly Mexico, accustomed for nine journalists murder in 2018,(Ward, 2017),(Veit, 2019). From the global evaluation, journalism professionals in Mexico are regularly disposed to surveillance, intimidated, endangered, frightened and hopelessly chastised for efforts that tend to uncover or broadcast governmental degeneracy. Notwithstanding the fact that the country is not experiencing war, Mexico persisted in implacable country for journalistic practice,(Veit, 2019). The Fig4 illustrated the distribution of the journalists and their causes of death in the context of the ongoing analysis.

12. FUTURE RESEARCH FOCUS

The sudden outburst in the adoption of IoT Drones technology for all numerous space operations may leave the providers vulnerable to new set of risks arising from third-party damages, injuries and liabilities of all kinds. Specific attention should be given to the Drone industry to enable understanding of complexities in the line of flight and what steps are still needed to verify that all participants can securely guarantee the safety of a large number of Drones flight that would be conducted simultaneously in wide ranges with no actual real time synchronization. Special agencies should steer up and engage governments and decision makers on the state of IoT Drones flying BVLOS as well as their connectivity options either via cloud infrastructure, terrestrial or satellite networks control system. The detect and avoid system test, performance collision avoidance and traffic avoidance using data fusion for various combinations should be given adequate attention in the massive adoption of IoT Drones technology for journalism.

Figure 4.
Causes of Journalist Death around the World(Charles, 2020)



13. CONCLUSION

The current research assimilated six questions in guiding discussion of its findings. The research discovered that IoT Drone can be use to cover events that are inaccessible to human journalist including hazardous events like war zone reportages. This approach had helped in reducing the number of journalist who died in the cross fire. Regarding the impressions of IoT Drone technology storytelling in the digital age journalism, the current paper observed that audiences who are open to disruptive technology use will distinguish news media using IoT Drones as more ethical which is the extension of diffusion of innovative modernism. On the significances of IoT Drone technology in investigative journalism, the current paper observed that IoT Drones journalism incorporates digital forensics methodology, providing a framework for techniques and developments that should be surveyed when approaching matters in a digital forensic founded investigations. In that perspective, IoT Drones could produce virtual reality (VR) content either through 360p video or a self-sufficient 3D VR environment that resemble 3D video games as part of evidence in investigative journalism. The IoT Drones technology virtual reality (VR) content will fundamentally improve image telemetry and image realism for journalistic information abundance (MacDermott, Baker, & Shi, 2018). The research went further to investigate the future for IoT Drones technology in the objective and investigative journalism adoption. The research discovered that utilizing disruptive technologies, in conjunction with the knowledge acquired from the current study will provide the comprehensiveness of IoT Drones in journalism and guiding the industry with more knowledge on IoT Drones technology for the twenty first century journalistic extreme automation. This paper has been able to establish the scenarios upon which image and video processing in information retrieval for classified and unclassified journalistic mission can be effected with the latest innovations in IoT Drones technology. Moreover, the use of Drones for journalistic news gathering, intelligence acquisition and emergency responses in the event of fire disaster, plane crash, security surveillance, ecological sensing, search and rescue mission has also been touched in the current paper. The research was implemented on the latest cloud infrastructure, future research should consolidate on the current paper findings and provide more evidence based computing using an autonomous IoT Drones with supper infrared cameras for visual processing and intelligence gathering.

14. RECOMMENDATION

The IoT Drones are essentially used globally for advancing mobility for journalistic and mass communication. This document analyzed the outcome in the most contemporary perspective to capture the strengths, weaknesses, opportunities and threats (SWOT analysis) of adoption of IoT Drone technology in journalism. In this paper, methods for addressing regulatory issues, feasibility, acceptability, monitoring and evaluation details are presented to guide future implementations in a more fundamental approaches towards safeguarding the environmental ecosystem. The recommendations for the governments, agencies, key stakeholders, IoT Drone technology providers, promoters and funders include but not limited to;

- (i.) Designing/Developing more reliable robust technologies for IoT Drone service .
- (ii.) Comprehensive vetting of IoT Drones providers' capacities in providing logistical services during selection process.
- (iii.) Ability to maintain in-country markets and businesses advantage for Drone operations locally.
- (iv.) Ability to coordinate efforts among all stakeholders and government as the key player.
- (v.) Implementing and identifying funding for long-term projects sustainability.
- (vi.) Comprehensive evaluation of impacts via standardized indicators by best standard practices.

The outcome of this research should be taken a broader approach to include all information linkable to events. Sharing experiences and evidence from ongoing journalistic automation. The researchers strongly recommend future exploration on the concept of beyond visually line of sight for IoT Drones required for journalistic news coverages in the most authentic context.

ACKNOWLEDGMENT

This research work is supported by U&J Digital Consult Limited, an IT and Educational Consulting Firm in Nigeria. There is conflict of interest.

REFERENCES

- Aasen, H., Honkavaara, E., Lucieer, A., & Zarco-Tejada, P. J. (2018). Quantitative remote sensing at ultra-high resolution with UAV spectroscopy: A review of sensor technology, measurement procedures, and data correction workflows. *Remote Sensing, 10*(7), 1091. doi:10.3390/rs10071091
- Abdalla, R. (2016). *Introduction to geospatial information and communication technology (GeoICT)*. Springer. doi:10.1007/978-3-319-33603-9
- Abeyratne, R. (2019). *Legal Priorities in Air Transport*. Springer. doi:10.1007/978-3-030-18391-2
- Adams, C. (2019). Tinker, tailor, soldier, thief: An investigation into the role of drones in journalism. *Digital Journalism, 7*(5), 658–677. doi:10.1080/21670811.2018.1533789
- Agostino, D., Arnaboldi, M., & Lema, M. D. (2021). New development: COVID-19 as an accelerator of digital transformation in public service delivery. *Public Money & Management, 41*(1), 69–72. doi:10.1080/09540962.2020.1764206
- Ahmad, N., Chaturvedi, S., & Masum, A. (2021). Unregulated drones and an emerging threat to right to privacy: A critical overview. *Journal of Data Protection & Privacy, 4*(2), 124–145.
- Akbar, S. Z., Panda, A., Kukreti, D., Meena, A., & Pal, J. (2021). Misinformation as a Window into Prejudice: COVID-19 and the Information Environment in India. *Proceedings of the ACM on human-computer interaction, 4*(CSCW3), 1-28. doi:10.1145/3432948
- Ala-Fossi, M., Grönvall, J., Karppinen, K., & Nieminen, H. (2021). Finland: Sustaining professional norms with fewer journalists and declining resources. *The Media for Democracy Monitor 2021: How Leading News Media Survive Digital Transformation*.
- Allam, Z., & Jones, D. S. (2021). Future (post-COVID) digital, smart and sustainable cities in the wake of 6G: Digital twins, immersive realities and new urban economies. *Land Use Policy, 101*, 105201. doi:10.1016/j.landusepol.2020.105201
- Allan, S. (2013). *Citizen witnessing: Revisioning journalism in times of crisis*. John Wiley & Sons.
- Anderson, C. W., Bell, E., & Shirky, C. (2015). Post-Industrial Journalism: adapting to the Present. *Geopolitics, History & International Relations, 7*(2).
- Arum, S. C., Grace, D., & Mitchell, P. D. (2020). A review of wireless communication using high-altitude platforms for extended coverage and capacity. *Computer Communications, 157*, 232–256. doi:10.1016/j.comcom.2020.04.020
- Aydin, B. (2019). Public acceptance of drones: Knowledge, attitudes, and practice. *Technology in Society, 59*, 101180. doi:10.1016/j.techsoc.2019.101180
- Barnawi, A., Chhikara, P., Tekchandani, R., Kumar, N., & Alzahrani, B. (2021). Artificial intelligence-enabled Internet of Things-based system for COVID-19 screening using aerial thermal imaging. *Future Generation Computer Systems, 124*, 119–132. doi:10.1016/j.future.2021.05.019 PMID:34075265
- Barrero, M. Á. F. (2018). Journalism and drones. Challenges and opportunities of the use of drones in news production. *Doxa Comunicación, 26*).
- Bjerknes, F. (2020). Inventive Factfinders: Investigative Journalism as Professional Self-representation, Marker of Identity and Boundary Work. *Journalism Practice, 1–20*.
- Bray, J. (2013). *The communications miracle: The telecommunication pioneers from Morse to the information superhighway*. Springer.
- Burton, S. L. (2021). *Technological Digital Disruption in the Age of Artificial Intelligence: A New Paradigm for Leadership. In Cultivating Entrepreneurial Changemakers Through Digital Media Education*. IGI Global. doi:10.4018/978-1-7998-5808-9.ch001
- Carlson, M., & Lewis, S. C. (2015). *Boundaries of journalism: Professionalism, practices and participation*. Routledge.

- Chama, B. (2020). *Tabloid Journalism and Press Freedom in Africa*. Springer. doi:10.1007/978-3-030-48868-0
- Chamberlain, P. (2017). *Drones and journalism* (Vol. 4). Taylor & Francis. doi:10.4324/9781315618470
- Charles, M. (2020). Why are journalists threatened and killed? A portrait of neo-paramilitary anti-press violence in Colombia's Bajo Cauca. *Journalism*.
- Cho, G. (2013). Unmanned aerial vehicles: Emerging policy and regulatory issues. *Journal of Law, Information and Science*, 22(2), 201–236.
- Chun, W. H. K., & Keenan, T. (2006). *New media, old media: A history and theory reader*. Psychology Press.
- Costera Meijer, I. (2020). Understanding the Audience Turn in Journalism: From Quality Discourse to Innovation Discourse as Anchoring Practices 1995–2020. *Journalism Studies*, 21(16), 2326–2342. doi:10.1080/1461670X.2020.1847681
- Craig, D., & Cunningham, S. (2019). *Social media entertainment: The new intersection of Hollywood and Silicon Valley*. NYU Press.
- Doku, G. (2020). *Physical insecurity of journalists and the issue of impunity in Ghana, a case study of Multimedia Group limited*. University of Education, Winneba.
- Duncan, M., & Culver, K. B. (2020). Technologies, ethics and journalism's relationship with the public. *Media and Communication*, 8(3), 101–111. doi:10.17645/mac.v8i3.3039
- Duo, E., Trembanis, A. C., Dohner, S., Grottoli, E., & Ciavola, P. (2018). Local-scale post-event assessments with GPS and UAV-based quick-response surveys: A pilot case from the Emilia-Romagna (Italy) coast. *Natural Hazards and Earth System Sciences*, 18(11), 2969–2989. doi:10.5194/nhess-18-2969-2018
- Fosch-Villaronga, E., & Millard, C. (2019). Cloud robotics law and regulation: Challenges in the governance of complex and dynamic cyber-physical ecosystems. *Robotics and Autonomous Systems*, 119, 77–91. doi:10.1016/j.robot.2019.06.003
- Ghazoul, J., & Kleinschroth, F. (2018). A global perspective is needed to protect environmental defenders. *Nature Ecology & Evolution*, 2(9), 1340–1342. doi:10.1038/s41559-018-0640-1 PMID:30061565
- Gill, S. S., Tuli, S., Xu, M., Singh, I., Singh, K. V., Lindsay, D., & Jain, U. et al. (2019). Transformative effects of IoT, Blockchain and Artificial Intelligence on cloud computing: Evolution, vision, trends and open challenges. *Internet of Things*, 8, 100118. doi:10.1016/j.iot.2019.100118
- Goens, G. A. (2021). *Getting the Message: The Wisdom of Listening and Thinking*. Rowman & Littlefield Publishers.
- Gotovac, S., Zelenika, D., Marušić, Ž., & Božić-Štulić, D. (2020). Visual-based person detection for search-and-rescue with uas: Humans vs. machine learning algorithm. *Remote Sensing*, 12(20), 3295. doi:10.3390/rs12203295
- Gutterman, R. S., & Rulffes, A. M. (2018). The Heat is On: Thermal Sensing and Newsgathering—A Look at the Legal Implications of Modern Newsgathering. *Communication Law and Policy*, 23(1), 21–48. doi:10.1080/10811680.2018.1406768
- Hanna, N. K. (2010). *Transforming government and building the information society: Challenges and opportunities for the developing world*. Springer Science & Business Media.
- Hart, J. A. (2004). *Technology, television, and competition: The politics of digital TV*. Cambridge University Press. doi:10.1017/CBO9780511490941
- Hipp, C., & Grupp, H. (2005). Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies. *Research Policy*, 34(4), 517–535. doi:10.1016/j.respol.2005.03.002
- Holton, A. E., Lawson, S., & Love, C. (2015). Unmanned Aerial Vehicles: Opportunities, barriers, and the future of “drone journalism”. *Journalism Practice*, 9(5), 634–650. doi:10.1080/17512786.2014.980596
- Ilan, J. (2021). We Now Go Live: Digital Live-News Technologies and the “Reinvention of Live” in Professional TV News Broadcasting. *Digital Journalism*, 9(4), 481–499. doi:10.1080/21670811.2021.1886862

- Kaul, V. (2012). Changing paradigms of media landscape in the digital age. *Journal of Mass Communication and Journalism*, 2(2), 1–9. doi:10.4172/2165-7912.1000110
- Kaye, J., & Quinn, S. (2010). *Funding journalism in the digital age: Business models, strategies, issues and trends*. Peter Lang. doi:10.3726/978-1-4539-0101-4
- King, G., Schneer, B., & White, A. (2017). How the news media activate public expression and influence national agendas. *Science*, 358(6364), 776–780. doi:10.1126/science.aao1100 PMID:29123065
- Kumari, P., & Jain, A. K. (2023). A Comprehensive Study of DDoS Attacks over IoT Network and Their Countermeasures. *Computers & Security*, 127, 103096. doi:10.1016/j.cose.2023.103096
- Kvasňovský, T. (2020). *Autonomous Weapon Systems as the next revolution in warfare and implications of technology deployment for global security*. Academic Press.
- Lanzolla, G., Pesce, D., & Tucci, C. L. (2021). The digital transformation of search and recombination in the innovation function: Tensions and an integrative framework. *Journal of Product Innovation Management*, 38(1), 90–113. doi:10.1111/jpim.12546
- Leckner, S., Tenor, C., & Nygren, G. (2019). What about the hyperlocals? The drivers, organization and economy of independent news media in Sweden. *Journalism Practice*, 13(1), 68–89. doi:10.1080/17512786.2017.1392254
- Lian, Y., Liu, Y., & Dong, X. (2020). Strategies for controlling false online information during natural disasters: The case of Typhoon Mangkhut in China. *Technology in Society*, 62, 101265. doi:10.1016/j.techsoc.2020.101265
- MacDermott, A., Baker, T., & Shi, Q. (2018). *Iot forensics: Challenges for the ioa era*. Paper presented at the 2018 9th IFIP International Conference on New Technologies, Mobility and Security (NTMS). doi:10.1109/NTMS.2018.8328748
- Matthew, U. O., & Kazaure, J. S. (2020). Multimedia e-learning education in nigeria and developing countries of Africa for achieving SDG4. *International Journal of Information Communication Technologies and Human Development*, 12(1), 40–62. doi:10.4018/IJICTHD.2020010103
- Matthew, U. O., Kazaure, J. S., & Haruna, K. (2020). Multimedia Information System (MIS) for Knowledge Generation and ICT Policy Framework in Education: Innovative Sustainable Educational Investment. *International Journal of Information Communication Technologies and Human Development*, 12(3), 28–58. doi:10.4018/IJICTHD.2020070102
- Matthew, U. O., Kazaure, J. S., Kazaure, A. S., Nwamouh, U. C., & Chinonso, A. (2022). ICT Policy Implementation as Correlate for Achieving Educational Sustainability: Approaching Development in Multi ICT Dimensions. *Journal of Information Technology*, 4(4), 250–269.
- Matthew, U. O., Kazaure, J. S., & Okafor, N. U. (2021). Contemporary development in E-Learning education, cloud computing technology & internet of things. *EAI Endorsed Transactions on Cloud Systems*, 7(20), e3–e3.
- Matthew, U. O., Kazaure, J. S., Onyebuchi, A., Daniel, O. O., Muhammed, I. H., & Okafor, N. U. (2021). *Artificial Intelligence Autonomous Unmanned Aerial Vehicle (UAV) System for Remote Sensing in Security Surveillance*. Paper presented at the 2020 IEEE 2nd International Conference on Cyberspac (CYBER NIGERIA).
- McChesney, R. W. (2013). *Digital disconnect: How capitalism is turning the Internet against democracy*. New Press.
- McKelvey, N., Diver, C., & Curran, K. (2019). *Drones and Privacy. In Unmanned Aerial Vehicles: Breakthroughs in Research and Practice*. IGI Global.
- McNair, B. (2017). *An introduction to political communication*. Taylor & Francis. doi:10.4324/9781315750293
- Montori, F., Bedogni, L., Di Felice, M., & Bononi, L. (2018). Machine-to-machine wireless communication technologies for the Internet of Things: Taxonomy, comparison and open issues. *Pervasive and Mobile Computing*, 50, 56–81. doi:10.1016/j.pmcj.2018.08.002
- Napoli, P. M. (2011). *Audience evolution: New technologies and the transformation of media audiences*. Columbia University Press.

- Okwudili, U. M., & Kazaure, J. S. (2020). Digital Activism and Digital Revolution in Objective Journalism. *International Journal of Interactive Communication Systems and Technologies*, 10(2), 39–56. doi:10.4018/IJICST.2020070104
- Onyebuchi, A., Matthew, U. O., Kazaure, J. S., Okafor, N. U., Okey, O. D., Okochi, P. I., Taiwo, J. F., & Matthew, A. O. (2022). Business demand for a cloud enterprise data warehouse in electronic healthcare computing: Issues and developments in e-healthcare cloud computing. *International Journal of Cloud Applications and Computing*, 12(1), 1–22. doi:10.4018/IJCAC.297098
- Parcell, L. M. (2011). Early American newswriting style: Who, what, when, where, why, and how. *journalism. History (London)*, 37(1), 2–11.
- Pavlik, J. V. (2019). *Journalism in the age of virtual reality: How experiential media are transforming news*. Columbia University Press. doi:10.7312/pavl18448
- Pons, M. P., & Hallin, D. C. (2021). Press Freedom and Media Reform in a Populist Regime: How Ecuadorian Journalists and Policy Actors See the Correa Era. *International Journal of Communication*, 15, 18.
- Rozlosnik, A., Infrarroja, S. T., & de Bustamante, S. (2018). Potential contribution of the Infrared Industry in the future of IoT/IIoT. *Proceedings of the 14th Quantitative InfraRed Thermography Conference*. doi:10.21611/qirt.2018.p50
- Salaverría, R., & de-Lima-Santos, M.-F. (2020). *Towards Ubiquitous Journalism: Impacts of IoT on News*. In *Journalistic Metamorphosis*. Springer.
- Seelke, C. R. (2019). Violence against journalists in Mexico: In brief. *Current Politics and Economics of the United States, Canada and Mexico*, 21(2), 225–243.
- Smith, A. P. (2018). Commodification & Control: News media agenda setting during the 2015 United Kingdom General Election. Royal Holloway, University of London.
- Statista, R. (2019). *Internet of Things-Number of connected devices worldwide 2015-2025*. Statista Research Department. [statista.com/statistics/471264/iot-number-of-connected-devices-worldwide](https://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide)
- Sudhakar, S., Vijayakumar, V., Kumar, C. S., Priya, V., Ravi, L., & Subramaniaswamy, V. (2020). Unmanned Aerial Vehicle (UAV) based Forest Fire Detection and monitoring for reducing false alarms in forest-fires. *Computer Communications*, 149, 1–16. doi:10.1016/j.comcom.2019.10.007
- Susskind, R. E., & Susskind, D. (2015). *The future of the professions: How technology will transform the work of human experts*. Oxford University Press. doi:10.1093/oso/9780198713395.001.0001
- Thomson, T. (2018). The evolution of story: How time and modality affect visual and verbal narratives. *Visual Communication Quarterly*, 25(4), 199–210. doi:10.1080/15551393.2018.1498742
- Torsner, S. (2019). *Profiling the civil diminishment of journalism: A conceptual framework for understanding the causes and manifestations of risk to journalism*. University of Sheffield.
- Urbanik, M.-M., & Roks, R. A. (2021). Making Sense of Murder: The Reality versus the Realness of Gang Homicides in Two Contexts. *Social Sciences*, 10(1), 17. doi:10.3390/socsci10010017
- Valente, J., & Cardenas, A. A. (2017). Understanding security threats in consumer drones through the lens of the discovery quadcopter family. *Proceedings of the 2017 Workshop on Internet of Things Security and Privacy*. doi:10.1145/3139937.3139943
- Veit, M. (2019). *Blockchain and journalism: The intersection between blockchain-based technology and freedom of the press*. Academic Press.
- Ward, J. A. (2017). Making Reality Sensible: The Mexican Documentary Theatre Tradition, 1968-2013. *Theatre Journal*, 69(2), 197–211. doi:10.1353/tj.2017.0024
- Wasser, B., Pettyjohn, S. L., Martini, J., Evans, A. T., Mueller, K. P., Edenfield, N., . . . Zeman, J. (2021). *The Air War Against the Islamic State: The Role of Airpower in Operation Inherent Resolve*. Rand Corp.
- Weaver, D. H., Beam, R. A., Brownlee, B. J., Voakes, P. S., & Wilhoit, G. C. (2009). *The American journalist in the 21st century: US news people at the dawn of a new millennium*. Routledge. doi:10.4324/9781410614568

Westlund, O. (2013). Mobile news: A review and model of journalism in an age of mobile media. *Digital Journalism*, 1(1), 6-26.

Wojciechowska, A., Frey, J., Sass, S., Shafir, R., & Cauchard, J. R. (2019). *Collocated human-drone interaction: Methodology and approach strategy*. Paper presented at the 2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI). doi:10.1109/HRI.2019.8673127

Zhu, X., Pasch, T., & Bergstrom, A. (2020). Understanding the structure of risk belief systems concerning drone delivery: A network analysis. *Technology in Society*, 62, 101262. doi:10.1016/j.techsoc.2020.101262

Andrew Chinonso Nwanakwaugwu, MBCS, is a scholarly Data Science enthusiast with years of working experience in the Tech Industry. He is a Professional Member of British Computer Society (The chartered Institute for IT) where he served as the Pioneer President for the University of Salford Manchester UK BCS students Chapter and a current Member, BCS ICT Ethics Specialist Group. He is the Founder of an IT Company known as Nacsoft Systems (www.nacsoft.com.ng). He is currently working as a PT Operations Advisor (Tax Data Analyst) at HMRC UK, he worked as a Data Scientist at Greater Manchester AI Foundry where he used Artificial Neural Networks (ANN) in deep learning and development of customized speech synthesis system with interactive user interface, worked at Jamasoft Concept as System Analyst/Data Scientist, Media/Musical Instrumentalist at RCCG Manchester, computer science teacher at NYSC Nigeria etc. He enjoys doing volunteering jobs such as Volunteer Computer Engineer at Equal Education Chances United Kingdom, and has lots of leadership working experience (such as the recent outgoing Well-Being Officer for Nigeria Students Society at the University of Salford, NACC (National Association of Catholic Corps Members) Oron Zone President, Assistant Secretary General for NACOMES (National Association of Computer Engineering Students) etc. He studied Computer Engineering in his first degree and Data Science in his Second degree. He is open to all connections. Feel free to connect with him on LinkedIn: <https://www.linkedin.com/in/andrew-nwanakwaugwu-780391129> Twitter: https://mobile.twitter.com/nacsoftsystems_

Ugochukwu Okwudili Matthew presently is an Academic scholar with Hussaini Adamu Federal Polytechnic, P.M.B 5004 Kazaure, Jigawa State, Nigeria in the Department of Computer Science with specialty in AI, Big Data Science, Cloud Computing, Internet of Things, Data Mining, Multimedia and E-Learning Education. He is a member of Nigeria Computer Society (NCS), Nigeria Institute of Management (NIM), European Alliance for Innovation (EAI), International Association of Computer Science & Information Technology (IACSIT), International Association of Engineers of Computer Society (IAENG-CS), Association for Computing Machinery (ACM) and also a member of Teaching & Education Research Association (TERA). Ugochukwu O. Matthew hold Masters in Computer Applications from Bayero University Kano, Nigeria. In 2020, Matthew won Federal Government of Nigeria Bilateral Postgraduate Scholarship to UFV Brazil to study Computer Science. Matthew had authored and co-authored several research papers published in high impact International Journals. Matthew had reviewed several Journals and is a member of Review Board Committee of Journals Indexed by Scopus and Web of Science including IEEE Access, SN Computer Science (Springer), International Journal of Information Communication Technologies & Human Development (IJICTHD)IGI Global Journal, International Journal of Business Data Communications and Networking (JBDCN), International Journal of Cloud Applications and Computing (IJCAC) etc. with vast intellectual contributions in academics and among the Learned Societies, serving in several Technical Committee in International Conferences. Ugochukwu O. Matthew is a cofounder of U&J Digital Consult Limited, an IT and Educational Consulting Firm in Nigeria.

Daniel Ogobuchi Okey is a graduate assistant in the Department of Computer Engineering, Michael Okpara University of Agriculture, Umudike. His research directions/interests include Artificial Intelligence, Machine Learning, Deep Learning, Automation, System Engineering, IoT, Cloud Computing. A member of the International Association of Engineers (IAENG) and a graduate member of the Nigerian Society of Engineers (NSE). Daniel is currently undergoing Federal Government of Nigeria bilateral Postgraduate Scholarship Studies at the Universidade Federal De Lavras (UFLA), Brazil, Department of Systems and Automation Engineering.

Jazuli Sanusi Kazaure is an Electrical Engineer and IT Professional. He is a registered Engineer with Nigerian professional bodies. He is an expert on electrical circuit and project designs. He is a consultant who designs and supervises electrical projects in Nigeria. Jazuli is a certified Network Cabling Specialist in copper and fiber optic based systems and a certified instructor in Integrated System Voice and Messaging certified by C-Tech Inc. at Sparta, New Jersey, USA. Jazuli attended Technical School and read electrical installation as a trade; he obtained National Diploma, Higher National Diploma, Post Graduate Diploma and Master's Degree all in electrical engineering. Jazuli was awarded with a Degree of Doctor of Philosophy in Management Information Technology specialized on ICT Management Frameworks. Dr. Jazuli is an academician teaching in Polytechnic and University in Nigeria as well other Universities in West Africa. He started his teaching career from the lowest rank of Assistant Lecturer to the highest rank of Chief Lecturer in Hussaini Adamu Federal Polytechnic Kazaure. He was a visiting lecturer at Jigawa State Informatics Institute, a visiting Senior Lecturer with Sule Lamido University Jigawa State, a visiting Senior Lecturer with Maryam Abacha American University of Niger Republic, an External Examiner National Open University and Digital Bridge Institute of Nigeria. Dr. Jazuli held many academic positions in Hussaini Adamu Federal Polytechnic, among others are Head of Electrical Engineering Department, Director Center for Information Technology, Director College of Engineering, Deputy Dean Student Affairs and currently Director Academic Planning and Research Development. Dr. Jazuli published 20 journal articles, presented 20 conference papers and co-authored in 23 books. He supervised many National Diploma, Higher National Diploma and Degree projects as well Master's thesis. Dr. Jazuli is happily married with children.