

Unseen Dangers: Drone Technology and National Security Risks

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Abstract

The internet allows information to travel in a variety of ways. Since then, information has spread faster than normal. Providing a comprehensive analysis of adversaries' tactical communication warfare to ensure a country's protection against threats. Modern information warfare requires new technologies and strategies that should not be overlooked. Since early 2019, the idea has grown significantly, moving from military to civilian use. Drone misuse will put the security of the country at risk. Thus, the goal of the current study is to examine drone utilization in both military and civilian applications and to determine the rationale behind their employment. Later on, it will describe the impact that drone abuse will have on national security. Modern information warfare among users is found to involve military drones that are utilized to gather information, serve as a communication channel for higher command control, and eliminate adversaries. In the meanwhile, civilians' commercial drone use is appropriate for surveying buildings, land, and the entertainment and creative industries.

Using secondary data (literature review), a qualitative study approach is employed to meet the goals of the current investigation. Reviews of Boolean concepts that use keyword searches. Furthermore, the review's contents will include further examples and explanations of the existing drone usage by both the military and civilians, as well as the risks to our national security.

Keywords: Drone, UAV, military, commercial, communication, national security.

Introduction

Information warfare is when someone manipulates information that a target believes to be true without the target's knowledge, causing them to make decisions that are not in their best interests. Gaining information supremacy over an opponent is the primary goal of information warfare. It does indicate better information, but it may also indicate more information. This state can be attained by information analysis and the use of appropriate media to spread information to the intended audience. Denying an adversary superior information in order to gain an advantage in a circumstance is also known as information warfare. Drone technology is one example of how new technological advancements have made information gathering and dissemination more distinctive. The current study's objectives are to investigate drone use in both military and civilian contexts. Drones were employed in tactical warfare to gather intelligence from adversaries, for example, by deploying a swarm of drones to their locations. Drones are psychologically instilling feelings of insecurity, dread, and threat. This is because drones are

mostly used in military and espionage operations to obtain intelligence. Prior research, which supported the aforementioned scenario, asserted that information warfare consists of six elements: (1) information operations (IO), (2) psychological operations (PO), (3) electronic warfare military deception (EMD), (4) physical destruction (PD), and (5) security measures.

(SM), and (6) Information attacks (IA) [1]. For instance, Information operation (IO) itself can be divided into offensive (e.g., computer network attack, command and control warfare, special information operations), civil affairs, public affairs (media warfare), and defensive IO (e.g., physical security, computer network defence, and counter propaganda) [2].

This has sparked further discussion among academics and professionals about drone risks in relation to national security challenges using surveillance systems and spy gear. These days, technological advancements have made intelligence gathering in a nation more difficult, a phenomenon known as "modern warfare." Modern warfare differs significantly from earlier military concepts, methods, and technology in that it emphasizes the need for combatants to modernize in order to maintain their battle worthiness. It has advanced with the use of minuscule equipment that can gather visual images and transmit the information to the command center. Nowadays, the main application for drones is in the military. Drones have been an integral part of the military forces all over the world, used for research and development, combat missions, target decoy, and supervision [3]. In 2021 and beyond, Insider Intelligence published a research on the use of drone technology for military and commercial industrial drones [4]. Concerns about national security have been raised by the military's deployment of drones to gather information in the public sphere [5]. Considering the current situation about the civilian and military applications of drone technology. One's national security could be at stake if drone use is not strictly regulated and enforced. The same idea of transmitting visual data to the controller has been adopted by civilians for a variety of purposes, including surveying, amusement, and creativity. Data collection gathered from the data help its user to analyse and making decision at the same time. Sending drones, was easier and safer compared to sending physical human to record visual image at risk areas. Thus, due to its capability in capturing, recording visual images, misuse of this technology will risk national security if no or lack of enforcement on law relating to the use of drone. The present study guided from below research framework (figure 1) which later drawn the objectives of the present study

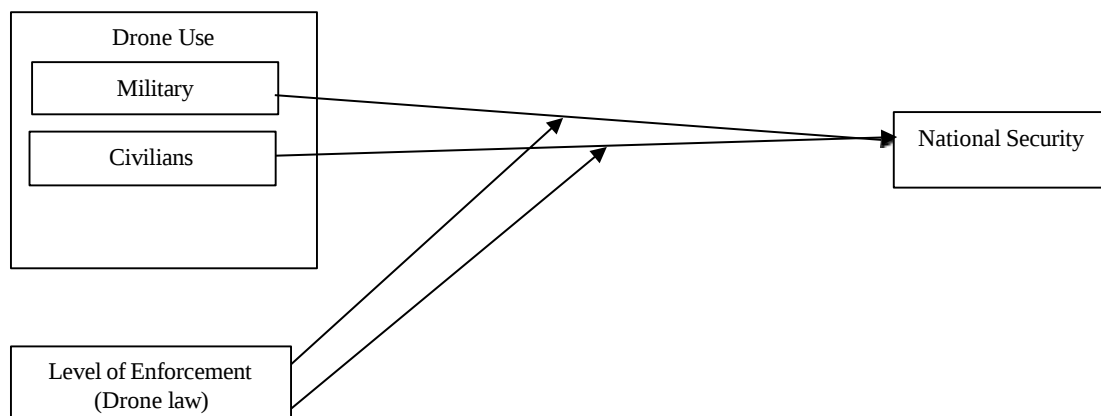


Figure 1 Research Framework

The goal of this research is to uncover factors that influence the usage of drones by military and civilians, as well as on the misuse of the technology that has put national security at risk. The

implementation of drone legislation is expected to reduce the risk of a national security breach. This continues to the next section to further understand the use of drone technology in military and among the civilians. Previous studies have been reviewed to identify the recent use and misuse of drone to support the present study.

Literature Review

Drone Technology History

After reviewing the Imperial War Museum's website on the history of drones, it stated that drones had been employed in warfare since the 19th century, when the Austrians bombed Venice using pilotless hot-air balloons. This advancement in the usage of drone as a means of communication and gathering data makes it easier to comprehend and strategies against adversaries. Drone has created its own business by developing pilotless flying vehicles that are extensively used nowadays. Unmanned technology progressed throughout the interwar era, and today, in modern combat, the use of drones has increased the amount of data acquired, as well as its richness, precision, and dependability. After the use of Queen Bee, a biplane modified to be controlled by radio from the ground. This has expanded the technology to reach its potential. Anti-aircraft gunners used Queen Bee as a remote-controlled target for target practice, similarly to Nazi V1 Doodlebug. At the most basic forms of today's cruise missiles, it is still act and use as guided bombs. Furthermore, in the 1950s, the United States (US) and others discovered that they were unmanned and might be used as remotely piloted aircraft. The tiny drones, which were radio-controlled and equipped with film cameras, flew over China and North Vietnam capturing imagery intelligence without putting their pilots in danger of being caught by the communists. During the Cold War, drones were still considered a fringe technology. Drones used to be unstable, small but expensive, and pilots had to keep their analogue radio signals within range to function.

Meanwhile, drones in the United States began as espionage planes before being upgraded to assassination weapons. Throughout Washington's 15-year-long war on terror, they have been employed in at least seven nations to fulfil those tasks. They have been collecting data, feeding the military's voracious need for combat intelligence, and tracking down and executing terrorists and rebels. Under President Barack Obama, the US drone war grew dramatically, it began their lives as espionage planes before being upgraded to assassination weapons. This has led to hundreds of strikes that have been carried out by the Pentagon's Joint Special Operations Command and the highly clandestine Central Intelligence Agency in Yemen, Pakistan, and Somalia. Advocates claim that the drone programme has saved American lives and avoided the need for clumsy military operations as was in 2003 Iraq war (The Beureau of Investigative Journalism). Figure 2 shows the history of drone use in military since 1900 to 2003. This explains that the use of drone technology is not recent, but the development of the technology improves from time to time to suits demand and needs of drone use.

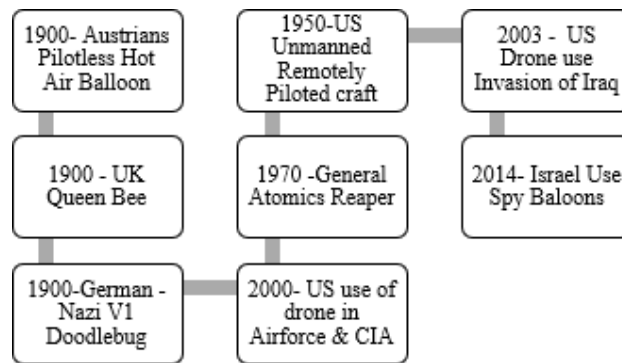


Figure 2 Drone Use in Military since 1900 to 2003

The use of Drone in Military and Public

The earlier limitation on limited wide beam coverage has been improvised as a result of drone use in military surveillance and as a medium to communicate via satellites. The most recent satellites feature many high-power coverage regions, each of which covers a specific geographical area. The use of GPS in drones for training purposes and to remotely control the drone to targeted regions. The primary purpose for the employment of military drones, according to the researcher, is for surveillance and intelligence gathering. Meanwhile, aircraft such as the Global Hawk and the newer Ultra LEAP, which has logged 18,000 combat flying hours, are used by military units for essential surveillance tasks. Unmanned Aerial Vehicles (UAVs), often known as drone communication, are a growing field of study that can be applied to both military and civilian applications. This has led to the conclusion that using a drone as a mode of communication to maintain links with ground stations is a good way to boost real-time data rates. In the situation of countries that still facing war, drone role is not limited as a medium of communication but also as destroyer. The ideas and concept were exploited by the Palestinians, replicating the Israeli spy balloons in figure 3[7].



Figure 3 Israeli Spy Balloons



Figure 4 Palestinian flying bomb

One of the stories [8] exposed the employment of a Skystar aerostat surveillance device in Jerusalem to track confrontations between Palestinians and Israeli military sources. Jerusalem has benefited from drone-delivered communication in protecting its national security. Drones are no longer only employed by the military; citizens are now using them as well. Figure 5 shows the positive inclination on the usage

of drone among public projected by US Department of Transportation. The extension on the use of drone among public has led towards the national issues pertaining to safety. However, study conducted indicated that drone has also aided communication as key enabler of 5G and act as resilient to public safety network [9], [10], [11]. In other report found, the use of drones has also been used in assisting firefighters during emergency situations [10], [11]. The situation shows a continuous climb on the use of drone until the year 2035. Future of drone use is bright and expected to be much advanced.

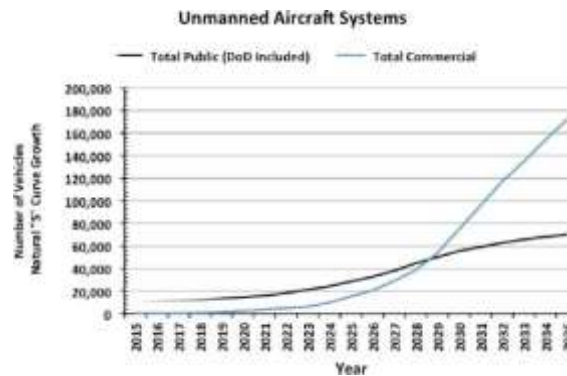


Figure 5 The Unmanned Aircraft Systems use projection.

Source: US Department of Transportation [13]

Civilians continuously admire, the drone photography shots for the purpose of creativity and entertainment. Demand raised and, drone training course were offered to interest civilians. Normal model available for purchases DJI's latest commercial drone platform that takes inspiration from modern aviation systems. Offering up to 55 minutes of flight time, advanced AI capabilities, 6 Directional Sensing & Positioning. It also used to make a routine inspection of important infrastructure such as in oil and gas and telco infrastructure. It also assists in real time analysis of equipment health using thermal camera. Thus, the importance of drone technology was continuously solving human's problems. The importance and the use for benefiting will reward the user, misuse of one technology will lead to chaos, thus enforcement of law on the use of one technology is needed to ensure safety of one nation. The next section explains the role of drone in modern warfare that involving the civilians act as military. The act of irresponsible civilians using drone and use it for attacking is also at concern.

Role of drone in Modern Warfare

Modern drone Warfare also portrays in the modern gamification and gain its popularity application by modernizing it with bundling C4 with drone. This acted not limit to deliver visual communication with command centre, it acts as a destroyer in critical condition which has been captured spying or attacking by remoting drone through targeted location. The combination of C4 explosive and drones has increased its capacity as a medium of communication in the command centre as well as to diminish evidence before it is traced by the opponents. There are two types of drones used which are fixed wing drone and rotary-wing drone that both has its own advantages and its limitations. Figure 6 shows the fixed wing drone that has a simple structure with higher speed. It is contradicting with the rotary wing (figure 7) drone that allows to hover to move at any direction with vertical take-off and landing. Regardless on differences of drone types used. The similarities of both drones are meant to collect the visual data to be transmitted to the command centre for military and to the pilot for civilians remoting the drone.



Figure 6 Drone (fixed wing)



Figure 7 Drone (rotary wing)

The functions are extended as from communication tools in collecting visual data and now it has become as a dangerous weapon that kills. The new modern warfare is now moving forwards by using the swarm drone technique. Chan in his report, reported on UK, US, Saudi Arabia and Israeli Ministry of Defence reports on attack of drone swarms on its airspace [14]. This new revolution of drone uses as medium of communication in gathering information lead to national security threat.



Figure 8 Illustration drone swarm
(Source: Google image)

A generic design for job order in swarm settings is shown in the literature as seen in figure 8 [15]. UAV swarm, as noted by Mitch, Prakash, and Saleh, is an example of this architecture that may do operations that are important for commercial purposes [16]. They also mentioned that using swarm has advantages including saving time, lowering man-hours, lowering labour expenditures, and lowering other operational costs. McMullan, a researcher, believes that drone swarms will revolutionise future international battles [17].

The impact of the technological aspect on drone swarm command-and-control model strategy, as well as the human component on human difficulties in drone swarm autonomy, was underlined [18]. Drone swarms are being used in military operations to help future missions. Table 1 shows the use of drone swarms in military operations to enable further justification of the operation, including technical and human components.

Table 1 UAV military use activities

Non-lethal	Electronic Warfare
Lethal	Close air support
	Close combat attack
	Air interdiction
	Strategic attack
	Suppression enemy air defence
	PSYOPS
	Communication relay
	SAR

flaws. Cryptographic procedures, in general, ensure message security and control signal assurance. Consequently, security concerns like unauthorized access, malicious control, unlawful association, or other malevolent attacks need to be mitigated effectively with limited or no consequences on the performance.

Methodology

Secondary research, often known as desk research, is a type of research that makes use of previously collected data. Existing data on the employment of drone technology in the military and among civilians is compiled and summarised. Furthermore, literature was gathered on elements that impact their decision to deploy drones, to improve the overall effectiveness of research. Secondary research was undertaken using information from journal articles, research reports, and other comparable materials, as well as credible websites.

Review on google scholar platform on "Drone and military," "drone and civilians," and "drone risk and national security" were among the keywords used in the search. Between 2018 and 2021, about 18,400 research linked to the use of drones in the military and threats 16,900 among civilians and national security were conducted. The study went on to evaluate and update the existing regulations and laws to keep tabs on how they were being used.

1.0 findings

These section summaries the review findings found from the keyword search relating to drone used in military and publics (commercial use), followed by identifying factors used of drone in modern warfare as medium to communicate to the command centre base. Last but not least, it also explains on uncontrolled use of drone among the publics might threat national security.

Objective 1: To identify the use of drone as a medium to communicate to military command center in monitoring air surveillance to protect national security.

Review has illustrated and explained on the wide use of UAV or drones in military in order to protect national securities. The advancement of drone technology and strategies have expanded drone use in the swarm to further make the role of using drone in communicating in military is much efficient. The communication to the command centre using drone has becoming much easier and reliable compared to the world war I and World War II in gathering the opponent's information. Furthermore, drone use in military also not only limiting to monitoring the air surveillance but also to gather information amongst Delivery drones operating in US have risen 54% this year its competitors. The present study reviews

also found that the use of explosive attached to drone, in a critical situation to whether attacking or removing evidences.

Objective 2: To identify factors used on drone as a medium to communicate to air force command center in monitoring air surveillance to protect national security.

In the study conducted by Yoo, Yu & Jung, stated that many of the users are not ready in this new technology. This perception is more towards public [30]. However, drone used has raised concerned, not only limiting to the military but also publics. The next objective of the present study focuses on the factors obtained through review. Part of the factors include operational factor that relates to the employment in military operation. Secondly on the technical factor of the strategy of command- and-control models of a drone swarm and human factor which explains on dilemmas of human in drone swarm autonomy. While study conducted by Terwilliger and his friends in 2015 added the other factor namely “perceived need” which achieving a clearer understanding of the primary factors that drive legal developments (i.e., current and future) that anticipated to improve among its stakeholders. This scholar also added that human factor now has a common expectation that humans will “learn to adapt” to the controls and displays provided with a system and, with proper training and familiarization.

Objective 3: To identify purpose of drone use among civilians.

Drones are increasingly being used by the general public for commercial objectives, such as surveying on estates, reaching difficult-to-reach visual locations for construction purposes, and even for entertainment and creative sectors. Drone law restrictions in every country will be a powerful supplement to reducing concerns about national security threats. It is fully expanded on some of the countries on drone legislation imposed to maintain national security as a first priority, as discussed in the preceding part. Drones are gaining popularity among the general public due to their ability to reduce costs, improve efficiency, and provide new innovative services. Drones are very beneficial in places that are remote, inaccessible, or dangerous. Civil drones must conform with existing civil aviation legislation, mainly the Civil Aviation Act 1982 and the Air Navigation Order 2016 (ANO) [31], according to UK statute. In 2018, the ANO was updated to include new drone restrictions, such as prohibiting small drones (up to 20 kg) from flying over 400 feet or within 1 km of airport borders, with fines [31]. Drone photography and filming for research, business or recreational purposes, environmental monitoring, emergency response to aid search and rescue, and sport are all examples of public use of drones.

Objective 4: To identify the misuse of drones and threat to national security

Drones can collect data and photographs without attracting attention, causing many people to worry that their right to privacy is being violated. If government agencies deploy drones to survey the public, this might happen. Meanwhile, if users are unfamiliar with drone technology or the legislation, they may mistakenly fly dangerously or into a forbidden location, such as an airport. Human mistake or a technological breakdown can cause pilots to lose control unexpectedly. Other aircraft, as well as people, vehicles, and infrastructure on the ground, may be endangered as a result [33]. Drones' speed, low cost, and expanding flight range and ability to carry objects make them appealing to those who may use them maliciously, irresponsibly, carelessly, or with criminal intent, such as disrupting other aircraft. By photographing individuals without their consent, you are invading their privacy [34]. Potential facilitation of cyber-attacks, such as hijacking a Bluetooth mouse with a drone carrying a radio transmitter. Physical attacks are made easier, for example, by reconnaissance of key infrastructure or by bringing bombs or other damaging items in a terrorist attack [35]. Other illegal activities, such as smuggling contraband into jails or finding vulnerable residences for burglaries, are made possible.

Conclusions & Discussions

Humans have been aided by technology in reducing risk, remaining productive, imaginative, and creative. Every technology's benefits to people would be realised if it was employed responsibly. However, when one technology is mishandled, it can be disastrous. Many news releases have backed this argument, citing the misuse of drones and the harm they pose to national security. With a little imagination, such as the Russians' recent introduction of a drone that looks like a snowy owl and is untraceable [39], the misuse of technology as advanced as this might allow them to collect information on their opponents, potentially causing a conflict between two countries.

That does not, however, apply simply to Russia; it also applies to other countries. The deployment of a drone carrying a radio transmitter for instance able to hijack a Bluetooth mouse could potentially facilitate cyber-attacks. This worsens the national security in protecting one country. In compare to cyber-attacks, physical attacks are made easier by reconnaissance of key infrastructure or the transport of explosives or other damaging items in a terrorist attack [35], [36], [37]. Yet, both of the attacks will unguard our national security as a whole. Drone operations in restricted places such as airports put people in danger of an accident or data collection that is illegally obtained by the public for security purposes. Therefore, rules and regulation and its enforcement towards the drone users are crucial to ensure the national security.

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