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FOCUS OF ARTIFICIAL INTELLIGENCE ON DRONE AS UNMANNED AERIAL VEHICLE FOR MANKIND

***[1]Dr. Tirtha Ghosh, [1]Dr. Debabrata Devbhuti, [2]Dr. Dhrubo Jyoti Sen and [3]Pruthviraj K. Chaudhary**

[1]Jnan Chandra Ghosh Polytechnic, 7-Mayurbhanj Road, Kolkata-700023, West Bengal, India.
[2]School of Pharmacy, Techno India University, Salt LakeCity, Sector-V, EM-4/1, Kolkata-700091, West Bengal, India.
[3]Shri Sarvajanik Pharmacy College, GujaratTechnological University, Arvind Baug, Mehsana-384001, Gujarat, India.

***Corresponding Author: Dr. Tirtha Ghosh**
Jnan Chandra Ghosh Polytechnic, 7-Mayurbhanj Road, Kolkata-700023, West Bengal, India.

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ABSTRACT

There are two meanings for drone then: a "male bee," or a "monotonous, sustained sound." The aircraft's function can clue you in: it's an extension of the "bee" meaning. Drones are bigger and heavier than worker bees, and they leave the hive and swarm in the fall. These can be used to transfer organs from donor to patient, often between 4 to 36 hours depending on the type of organ. These could make organ delivery faster, safer and more cost-effective. Drones can be used to deliver medical supplies cost-effectively to people residing in remote areas and those affected by natural disasters or emergencies. Drones can also be used inside hospitals for delivering biological samples or medicines from floor to floor or from building to building. Potential applications of UAVs in healthcare are broad based.

KEYWORDS: UAV, Prehospital Emergency Care, Laboratory Diagnostic Testing, Surveillance, Vaccines, Haematological products, External defibrillators, Cloud computing.

INTRODUCTION

Drones are more formally known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems. Drone technology has evolved and thrived in recent years, from technically staffing critical military regions to enticing enthusiasts all over the world. Individuals, businesses, and governments have realized that drones have a variety of valuable qualities, including:

- Aerial photography for journalism and film
- Express shipping and delivery
- Gathering information or supplying essentials for disaster management
- Thermal sensor drones for search and rescue operations
- Geographic mapping of inaccessible terrain and locations
- Building safety inspections
- Precision crop monitoring
- Unmanned cargo transport
- Law enforcement and border control surveillance
- Storm tracking and forecasting hurricanes and tornadoes

An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without any human pilot, crew, or passengers on board. One of the primary roles of AI in drone technology is autonomous flight. AI algorithms can enable drones to fly autonomously without the need for human intervention. Autonomous flight enables drones to cover larger areas and perform tasks more efficiently.[1]

Drones are small or medium-sized unmanned aerial vehicles (UAVs). They're unique in that they can drive remotely and autonomously, and they're capable of maintaining a controlled, sustained level of flight.[2]

The first unmanned aircraft was created 16 years after the flight of the Wright's brothers. The drone, called Ruston Proctor Aerial Target. There are few prototypes that were developed through World War I, World War II and Cold War. Drones then evolved via military applications. DJI currently dominates more than 70% of the global drone market. According to a report by Drone Industry Insights, the market is expected to grow from $30.6 billion in 2022 to $55.8 billion by 2030. The Shenzhen-based company was formed in 2006 out of a college dorm room by its founder Frank Wang. Drones have been successfully used for the rapid and safe transportation of organs.

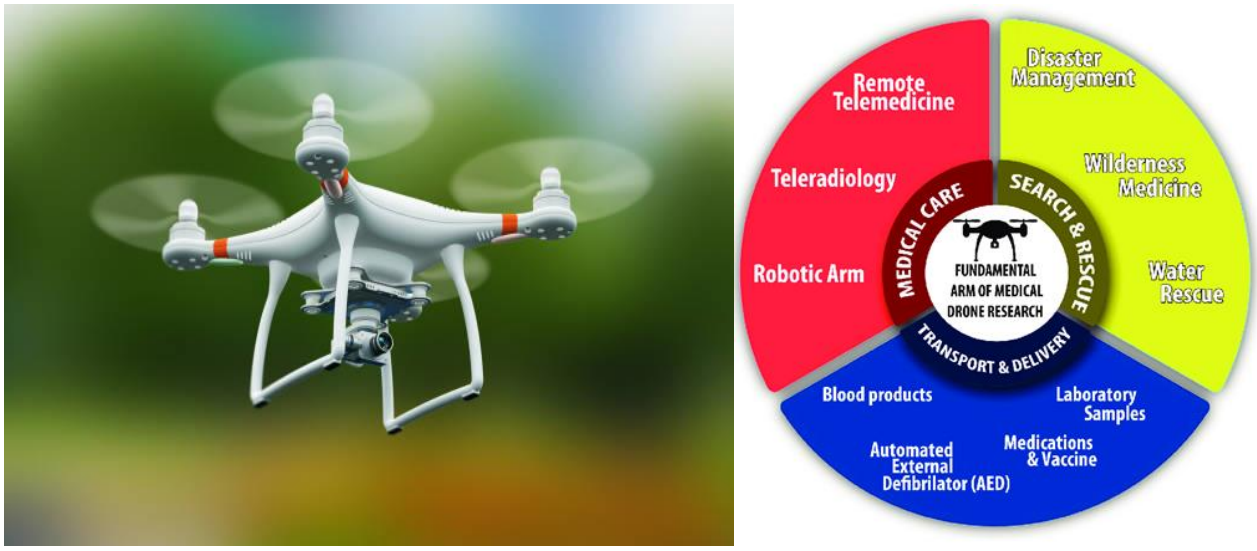

Figure-1: Drones.

They provide an advantage over traditional methods by avoiding traffic, reducing transportation time, and thus increasing the viability of the organ for transplant. Medical drones can deliver items such as drugs, serum and small medical devices quickly and to remote areas. Where retailers are still testing drones for the delivery of large packages to their customers, medical drones are already being used in developing countries.

They include (1) Prehospital Emergency Care, (2) Expediting Laboratory Diagnostic Testing and (3) Surveillance. Currently, UAVs have been shown to deliver vaccines, haematological products and automated external defibrillators. These are fixed-wing drones have rigid wings and can carry high-density payloads and data link equipment. Based on utility and size, these are further categorized as large, medium and small fixed-wing drones. Drone delivery of medical supplies, Meghalaya. Conducted its drone delivery trial in November 2021. From Nongstoin to Maweit PHC and is the first State in. The country to set up a functioning drone station that. **Keller Rinaudo** is the CEO and co-founder of Zipline, a drone delivery company that delivers life-saving medicine to remote places. The company began by focusing on delivering blood for urgent medical situations. **Keller Rinaudo Cliffton** is an American robotics and autonomous airplane entrepreneur and the CEO and a co-founder of Zipline.[3]

Figure-2: Keller Rinaudo [CEO].

Report Overview: The global commercial drone market size was estimated at USD 19.89 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 13.9% from 2023 to 2030. The market growth is attributed to the increasing enterprise application of drones across various industry verticals.

Here's a rundown of the four main types of drones, their uses, their strengths and weaknesses:

- **Multi-Rotor Drones.**
- **Fixed-Wing Drones.**
- **Single-Rotor Drones.**
- **Fixed-Wing Hybrid VTOL.**

Drone swarms and indoor operations are only permitted with drones in the Nano and Micro categories. Only approved regions and conditions approved by the DGCA [Directorate General of Civil Aviation] are permitted for swarm operations. Drones in the small, medium and large categories should not be flown in enclosed spaces.[4]

Organ delivery drones are able to carry freight up to 180kg. These drones are designed to transport vital organs such as hearts, kidneys, and livers from one location to another in a safe and efficient manner. Drones are able to transport objects on relatively short distances. Drone delivery will increase in 2023. Drones will be altering the way goods and services are delivered across a variety of industries. Drone technology improvements have made it possible for businesses to benefit from this new method of transportation to enhance operations and maximize productivity. The Meghalaya government in partnership with Startup Tech.

Figure-3: Drone controller.

Eagle has unveiled Asia's first drone delivery hub and network Meghalaya Drone Delivery Network (MDDN), which is aimed at providing universal access to healthcare for the people in the state. Early last year, Bengaluru-based food delivery firm Swiggy called for bids in the drone-as-a-service (DaaS) market for its grocery service - Instamart. It selected Garuda Aerospace, Marut Dronetech and Skye Air Mobility for running pilots.[5]

Drone Operating System: Drone System is also called as UAV (Unmanned aerial Vehicle). Mainly drone is a flying robot that can be remotely configured or run on the basis via the software application controlled flight plans in their embedded system working in conjunction with onboard sensors & GPS. A real-time operating system (RTOS) is an operating system that provides precise time constraints for the execution of tasks, enabling it to be much more predictable than general-purpose operating systems. RTOSes are divided into two general categories – soft and hard. Software is used to analyze, process and enhance images captured by drone and unmanned vehicle camera payloads. Image processing software can be used to extract features from images for intelligence, or to create geospatial and photogrammetry products such as maps and 3D models. Drones, UGVs and unmanned marine vessels may make use of AI (artificial intelligence) software such as deep learning algorithms, either via onboard computing platforms or cloud services. This may be used to carry out functions such as autonomous navigation, obstacle avoidance and image recognition. Drone is an Embedded Operating System for writing real-time applications in Rust. It aims to bring modern development approaches without compromising performance into the world of embedded programming. By far, the most popular software platform for drone mapping that you can download and use for free is WebODM. This is open-source software that has been around for a few years and has been improved vastly by its active user community. Drones rely on a combination of hardware and software components to achieve successful takeoff, flight and landing. Drones are often equipped with rotors or fixed wings, sensors, navigation systems and gyroscopes (for stability), and are operated by ground control stations. The code for drone programming is written in both C and C++. C is strongly associated with UNIX, as it was developed to write the UNIX operating system. C is a function-driven language because C is a procedural programming language. Therefore, for advancement, when required, C++ programming language is used. In python, the pymavlink library defines the MAVLink messages in python form. The dronekit python library uses pymavlink and establishes a connection with the drone. This allows direct control of the drone right from a python script, so any MAVLink drone is therefore a programmable drone. One of the primary roles of AI in drone technology is autonomous flight. AI algorithms can enable drones to fly autonomously without the need for human intervention. Autonomous flight enables drones to cover larger areas and perform tasks more efficiently. Drone APIs let you write code to control and integrate with PX4-powered vehicles, without having to understand intimate details of the vehicle and flight stack, or having to think about safety-critical behaviour.

The flight controller is the brain of a drone. A small box filled with intelligent electronics and software, which monitors and controls everything the drone does. And just like the brains of different organisms, flight controllers also vary in sizes and complexity. Drone controllers work by sending commands or instructions to the drone. The controller sends these commands via a radio signal, which is then received by the drone's receiver.

Table-1: Drone classification.

Drone type	Advantage
Multi-rotor drones	Easy to control and maneuver VTOL [vertical take-off and landing (VTOL) aircraft] and hover flight Often lower price Portability. They are called multi-rotor because they have more than one motor, more commonly tricopters (3 rotors), quadcopters (4 rotors), hexacopters (6 rotors) and octocopters (8 rotors), among others. By far, quadcopters are the most popular multi-rotor drones. Two multi-rotor drones flying at height.
Fixed-wing drones	Longer flight time Can carry a heavier payload Greater stability in the wind Higher flight speeds. A fixed-wing drone has one rigid wing that is designed to look and work like an aeroplane, providing the lift rather than vertical lift rotors. Hence, this drone type only needs the energy to move forward and not to hold itself in the air. This makes them energy-efficient.
Single-rotor drones	Single-rotor drones are very durable and robust and have a long flight time. If a gas engine is used, the flight time can be extended. Due to their construction they can transport heavy loads. The rotating rotors allow the machine to stay in the air and make various manoeuvres.
Fixed-Wing Hybrid VTOL	Hybrid VTOL Fixed-Wing UAVs combine the benefits of multirotor platforms with fixed-wing drones and transition between the two modes during flight. VTOL fixed-wing drones are a versatile choice for a wide range of commercial and military aerial applications.

The receiver then converts the signal into the appropriate commands to control the drone's movements. Drones work much like other modes of air transportation, such as helicopters and airplanes: the engine is turned on, it starts up, and the propellers rotate to enable flight. Then, the pilot uses the remote control to direct its flight from the ground. Many drones have the option to set a course automatically. Photogrammetry software uses images captured by a drone to create 2D and 3D maps, models, and orthomosaics. Photogrammetry software creates realistic 3D depictions of topographic surfaces by merging geotagged images of the same features from multiple perspectives. Sky-Drones Cloud is tightly integrated with all hardware and software products including autopilots and SmartLinks. The data transmitted from drone to ground station is also available in the cloud. Data can be synced either post flight or during the flight with LTE connectivity.

Use: It is directly benefiting over 5.19 lakh people by improving healthcare accessibility and creating local employment in the drone delivery ecosystem. Drones have also significantly reduced delivery times and improved the quality of medical care in remote areas. The top industries using drones include real estate, agriculture, construction, law enforcement, shipping and logistics, and security. The industry using drones the most out of all of these might surprise you. Beyond surveillance and delivery applications, UAVs are used for drone journalism, search and rescue, disaster response, asset protection, wildlife monitoring, firefighting, communications relay, healthcare and agriculture. An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without any human pilot, crew, or passengers on board. UAVs were originally developed through the twentieth century for military missions too "dull, dirty or dangerous" for humans, and by the twenty-first, they had become essential assets to most militaries. As control technologies improved and costs fell, their use expanded to many non-military applications. These include aerial photography, precision agriculture, forest fire monitoring, river monitoring, environmental monitoring, policing and surveillance, infrastructure inspections, smuggling, product deliveries, entertainment, and drone racing.[6]

Table-2: Capacity of drones.

Group	Group 1	Group 2	Group 3	Group 4	Group 5
Size	Small	Medium	Large	Larger	Largest
Max take-off weight	< 20 lb	> 20 & < 55	> 55 & < 1320 lb	>1,320 lb	>1,320 lb
Operating altitude	< 1,200 ft	< 3,500 ft	< 18,000 ft	< 18,000 ft	> 18,000 ft
Speed	45mph	70mph	100mph	135mph	179mph

UAVs may be classified like any other aircraft, according to design configuration such as weight or engine type, maximum flight altitude, degree of operational autonomy, operational role, etc. According to the USDD [United States Department of Defense], UAVs are classified into five categories below:

Group-5: These UAS weigh more than 1320 pounds; normally. Operate higher than 18,000 feet MSL at any speed (Reaper, Global. Hawk/Triton, UCLASS) Groups 4 and 5 are the largest of DoD UAS, weighing over 1,320 pounds, and operating at all speeds and altitudes.[7]

Group-4: These aircraft operate at all altitudes, usually below 18,000 feet MSL.

Group-3: The growing interest in UAVs in recent years has led to the strong emergence of various types of aircraft with varying configurations and components in terms of shape and size. UAVs are divided into four types: single-rotor, multi-rotor, fixed-wing, and hybrid.

These UAS weigh more than 55 pounds, but less than 1320 pounds.

Group-2: UAS typically are in the 21 – 55 pound weight class; normally operate below 3500 feet AGL at speed less than 250 knots.

Group-1: UAS typically less than 20 pounds in weight; normally. Operate below 1200 feet above ground level (AGL) at speeds less than. 250 knots (Raven).

Future: The Indian drone industry, valued at Rs 2,900 crore in 2022, is projected to grow to Rs 81,600 crore by 2025 and Rs 2.95 lakh crore by 2030, with a 60% hardware indigenization (according to a FICCI-EY report in 2022). The global commercial drone market growth was valued at USD 8.77 billion in 2022 and is projected to grow from USD 10.98 billion in 2023 to USD 54.81 billion by 2030, exhibiting a CAGR of 25.82% during the forecast period.[8]

Figure-4: Domestic drone.

Abraham Karem (Baghdad, Born 1937) is a designer of fixed and rotary-wing unmanned aircraft. He is regarded as the founding father of UAV (drone) technology. Abraham Karem (born 1937) is a designer of fixed and rotary-wing unmanned aircraft. He is regarded as the founding father of UAV (drone) technology.[9]

Nishant Unmanned Aerial Vehicle (UAV) developed by DRDO for Indian Army was successfully flight tested near Kolar on 20 June 2008. Nishant has completed development phase and user trials. The present flight tests are pre confirmatory trials before induction into services. The first pilotless vehicles were developed in Britain and the USA during the First World War. Britain's Aerial Target, a small radio-controlled aircraft, was first tested in March 1917 while the American aerial torpedo known as the Kettering Bug first flew in October 1918.

Benefits: Let's take a closer look—here are the five biggest benefits construction operations are realizing from using drones in their work.[10]

Savings. Using drones in your construction work can help you save money.

Safety.

Improved Data = Improved Decision Making.

Better Planning.

Make Your Operations More Scalable and Repeatable.

Figure-5: Abraham Karem.

Advantages: Drones can also be used to study and monitor protected species that are dangerous or inhabit hard-to-reach areas. Conservationists can more easily prevent poaching and deforestation. With drones, the cost of research and surveys can be cut, and areas can be covered quickly without hiring additional specialist teams. Drones, sometimes referred to as unmanned aerial vehicles (UAVs), carry out tasks that range from the mundane to the ultra-dangerous. These robot-like aircrafts can be found rescuing avalanche victims as well as dropping off groceries at your doorstep — and almost everywhere in between. Enhanced Efficiency and Cost Savings: One of the primary advantages of UAVs lies in their ability to complete tasks quickly and efficiently. Compared to traditional methods that often require manual labor or extensive resources, drones can accomplish the same tasks in a fraction of the time.[11]

The Pros and Cons of Drone Technology
PROS: Drones are fun to fly.

CONS: Not everyone takes kindly to seeing drones fly near or above them.
PROS: Drones are cheaper and easier to deploy than manned aircraft.
CONS: Drones can cause damage to property and injury to people.
Disadvantages: Drones can capture images, video, and other data from private property, potentially violating an individual's right to privacy. In some cases, drones may even be used to collect data on individuals without their knowledge or consent, leading to concerns about the potential misuse of this information.

Development of hundreds of more uses of drones are underway due to the multiple investments pouring into this promising industry everyday.[12]

Figure-6: Military drone & Agriculture drone.

Military Drone Technology: The military is probably the oldest, most well-known, and most contentious application of drones. In the early 1940s, the British and American forces began utilizing extremely crude kinds of drones to spy on the Axis powers. Drones today are far more advanced than UAVs of the past, including thermal imaging, laser range finders, and even airstrike instruments. The MQ-9 Reaper is a well-known military drone. The aircraft is 36 feet long, can travel 50,000 feet in the air undetected, and is outfitted with a variety of missiles and intelligence gathering systems.[13]

Delivery Drone Technology: Delivery drones are typically unmanned aerial vehicles (UAVs) that bring meals, packages, or commodities to your front door. These flying vehicles are known as “last mile” delivery drones because they make deliveries from nearby retailers or warehouses. Instead of depending on delivery drivers with inefficient trucks, retailers and grocery chains throughout the country are turning to drones as a more effective delivery alternative. These drones can deliver 55 pounds of items to your front door without requiring you to leave the house. Amazon, Walmart, Google, FedEx, UPS, and many other major corporations are all testing various types of delivery drones.

Drone for Emergency Public Rescue: Due to the scale or severity of the disaster, it is not always safe to send humans into a rescue situation. This is where drones come into play. In the event of a capsized boat or a drowning person, officials can deploy an Autonomous Underwater Vehicle (AUV) to assist in the rescue.[14]

Drone for Agriculture: Drones have also shown to be advantageous to the agriculture business, providing farmers with a variety of options for optimizing their crops to maximize efficiency and minimize physical strain. UAVs make field surveys, sowing across fields, tracking livestock, and predicting crop yields easier while saving agriculture workers important time.[15]

Figure-7: Outer space drone & Wildlife conservation drone.

Drone for Outer Space: NASA and the United States Air Force have been testing unmanned aircraft designed for space flight. The Air Force's ultra-secretive X-37B UAV looks like a small space shuttle. It has been quietly circling the Earth for the past two years, setting a record for the longest unmanned aircraft flight (781 days and counting). Although the Air Force has been ambiguous, it has stated that "the primary objectives of the X-37B are twofold: reusable spacecraft technologies for America's future in space and operating experiments that can be returned to, and examined on Earth." When it comes to the future of space exploration and innovation, it appears that drones have been prioritized.[16]

Drone for Wildlife and Historical Conservation: Drones are a less expensive and more efficient way to conserve wildlife. With humans on the ground, tracking wildlife populations is practically difficult. The ability to track travelling groups of animals, ranging from Orangutans in Borneo to Bison on the Great Plains, allows wildlife conservationists to gain a better understanding of the health of their species and ecosystems. Conservation drones are also useful in the fight against poaching in Asia and Africa.[17]

Drones are also being employed in global forestry projects. These drones scan the forest floors of burned-out forests, dropping seed vessels containing seeds, fertilizers, and nutrients that will help a tree rise from the ashes. Since the early 1990s, there has been around 300 million acres of deforested land. What would take humans approximately 300 years to reforest can be performed more efficiently with seed-planting drone technology.

Figure-8: Medical & 3D modelling drone.

Drone in Medicine: How do you get medical supplies to people who live in remote areas? What device could you utilize to transport organs to transplant patients? Drones can address both of those questions. Unmanned aerial vehicles are now being utilized to carry emergency medical supplies and goods to remote villages in Alaska. Instead of depending on dog sleds, snowmobiles, or ambulances that can't manage the snow, Alaskans are turning to drones to get life-saving medical supplies delivered promptly.

Drones are also being used to transport donated organs to transplant recipients. A kidney was recently moved from one hospital in Maryland to another in under five minutes using a specially designed drone. This has the potential to reduce the painfully sluggish rate at which donations typically arrive (if they arrive at all). Organs are typically supplied through chartered or commercial flights. Delays and failures in judgement create dangerous two-hour or longer delays for 4% of all organ deliveries. Drones can significantly reduce time while also providing a safer and more secure means of organ transportation.[18]

Drone for 3D Modeling: LiDAR drones are equipped with LiDAR sensors, which survey landscapes and collect detailed data that can be used to create 3D models. Drones with LiDAR technology can provide significantly more accurate data than drones without the technology. Aside from making it easier for drones to navigate varied surfaces, LiDAR allows them to locate targets in search and rescue missions, evaluate crops in agriculture, and many other things.

Drone for Photography: Drones have been a benefit to aerial photographers who employ UAVs to get expansive shots. Have you ever wanted to have a bird's-eye view of your favorited city, beach, or building? There are drones designed exclusively for photography that offer a different perspective on some of your favorite locations. For instance, an AI-powered drone can analyze data from its sensors, such as cameras and lidar, to identify objects and terrain features. It can then use this information to make decisions about where to fly, how to avoid obstacles, and how to complete its mission.[19]

The Birth of Unmanned Aerial Vehicles (UAVs)

Year	Drone Model	Notable Feature
1917	Aerial Target	First recognized drone
1918	Kettering Bug	First radio-controlled aircraft
1935	DH.82B Queen Bee	Inspired the term "drone"
1960	MQM-57 Falconer	Aerial reconnaissance

Figure-9: Drone with Artificial Intelligence.

Artificial intelligence gives machines the ability to interact in an intelligent way. This is why the fusion between drones and artificial intelligence represents the response to many needs in aerial imagery and provides new headlines in the future of aerial technology for different sectors like Energy, Construction, Security, Agriculture. Thanks to its expertise in artificial intelligence, DRONE VOLT offers solutions based on drone, computer vision and neural networks, like:

- Object detection, counting, segmentation and tracking
- Person or animal detection and tracking
- Crowd counting
- Thermal detection
- Check compliance of the use of face masks in public spaces and in professional places
- Detection of the use of protective equipment (glasses and helmets)
- Face detection and recognition
- Fire and smoke detection
- License plate reading
- Crack damage detection on surfaces

Figure-10: Multifunctioning Drone.

Drones with AI can also be used in the military. For example, they can monitor border regions, identify threats, and notify response teams. In addition, they can improve the security of military bases and the safety of soldiers during combat. AI plays a crucial role in enabling drones to make intelligent decisions in real-time. By leveraging advanced algorithms and machine learning techniques, drones equipped with AI can analyze their surroundings, detect obstacles, and autonomously plot the most efficient flight path to reach their destination. Autonomous drones are UAVs (unmanned aerial vehicles) that use AI-powered software for navigation and operations. AI enables drones to take auto Michigan Medicine recently announced its new partnership with Zipline, a San Francisco-based service that uses drones to deliver prescription drug orders to members' homes. The service is slated to begin in 2024.nomous flights and collect and analyze real-time high-quality visual information for many real-world tasks.[20]

CONCLUSION

Use of unmanned drones is feasible for delivery of life-saving medical supplies in austere environments. Drones repeatedly and accurately delivered medical supplies faster than other methods without additional risk to personnel or manned airframe. Drones and unmanned aircraft will be used by numerous enterprises and government agencies. Complementary technologies such as 5G, augmented reality, and computer vision are likely to drive drone market growth and improve drone

communication and intelligence. As the usage of personal and commercial drones grows, government agencies will refine their laws and restrictions. Drones will also provide new security flaws and attack vectors. With the integration of Artificial Intelligence (AI), drones have become even more versatile, efficient, and accurate in performing complex tasks. AI algorithms enable drones to perform tasks such as object recognition, navigation, and data analysis with greater speed and accuracy.

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