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# "Articial Intelligence and Drones to Combat COVID-19"

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**ABSTRACT—**

The Globally, an approximate of 380,000 patients succumbed to death due to the pandemic COVID-19 which also infected more than six million people since December 2019. Not sparing anyone, COVID-19 infections are widely reported among healthcare professionals, sanitation workers and researchers too while global leaders and various governments are providing their best in defending their citizens against this airborne and contact spread virus. In order to contain the virus and protect millions of lives from this deadly corona virus, there is a need to have a combination of advanced engineering technology and medical facilities. Application of applied science, engineering and technology diffuse almost every aspect of contemporary living. Grasping the fundamentals to determine humanity's most imperative and forthcoming challenges is essential. Artificial Intelligence, the technology that learns, adapts and reciprocates the actions according to the situations, finds optimum position in the fight against corona virus and acts as a powerful tool against this pandemic. In this research article, the author discusses how Artificial Intelligence (AI) and drones can be leveraged to fight the deadly virus.

## I. Introduction

Globally, an approximate of 380,000 patients succumbed to death due to the pandemic COVID-19 which also infected more than six million people since December 2019. In order to contain the virus and protect millions of lives from this deadly coronavirus, there is a need to have a combination of advanced engineering technology and medical facilities. Artificial Intelligence, the technology that learns, adapts and reciprocates the actions according to the situations, finds optimum position in the fight against corona virus and acts as a powerful tool against this pandemic.


**Fig 1:** Collective Image of 12 Disruptive Technologies

Figure 1.1 shows the 12 most disruptive technologies that directly or indirectly run the world at present, and has a huge impact in the way many things function in the society at present. Research has already examined many sub-areas of application, such as the legal framework of use, the general or specific application possibilities, the limitations of management and control, as well as the dilemmas of route planning, the issue of efficiency and its human and ethics aspects. Drones can be used effectively in the fight against SARS-CoV-2 virus, commonly known as COVID-19. COVID-19 is a global pandemic that was first identified in Wuhan city, China and started spreading to different countries of the world. The medical community roughly defines COVID-19 infections as an illness that is caused by novel corona virus termed as severe acute respiratory syndrome corona virus. The primary transmission of COVID-19 occurs through droplets of saliva or discharge from nose when an infected person coughs or sneezes. In this life-threatening scenario, the Artificial Intelligence technology has been successfully applied to manage.

The evolution in technology is tremendous and rapid which results in the development of disruptive technologies Figure 1 illustrates a total of 12 disruptive technologies that are being used in various facets of life such as Artificial Intelligence, Advanced Robotics, Internet of Thing (IoT), Cloud Computing, Automation of Knowledge work, Global Internet Penetration, Autonomous and Near Autonomous Vehicle, Next Generation Genomics, Renewable

Energy, 3-D printing, Advanced Oil and Virtual/Augmented Reality. These disruptive technologies can be leveraged to put up a great fight against the pandemic through different ways.

## II. Methodology

The set of different sensors comprises the first main block. Some of the most important ones are; a barometer, a pilot tube, a current/voltage sensor, an IMU(inertia measurement unit), distance and temperature magnetometer sensors. The second block is the autopilot, which interprets the information from the sensors and all other components. Autopilot also keeps the aircraft balance and allows it to fly. The third main block is the communication unit which comprises the remote controller module, the tele-metric module and the video transmitter. AI can augment drones and create health applications where smart devices like watches, mobile phones, cameras and range of wearable device can be employed for diagnosis, contact tracing and efficient monitoring in COVID-19. Applications like AI4COVID-19 that rely on audio recording samples of 2 s cough can be used in telemedicine.

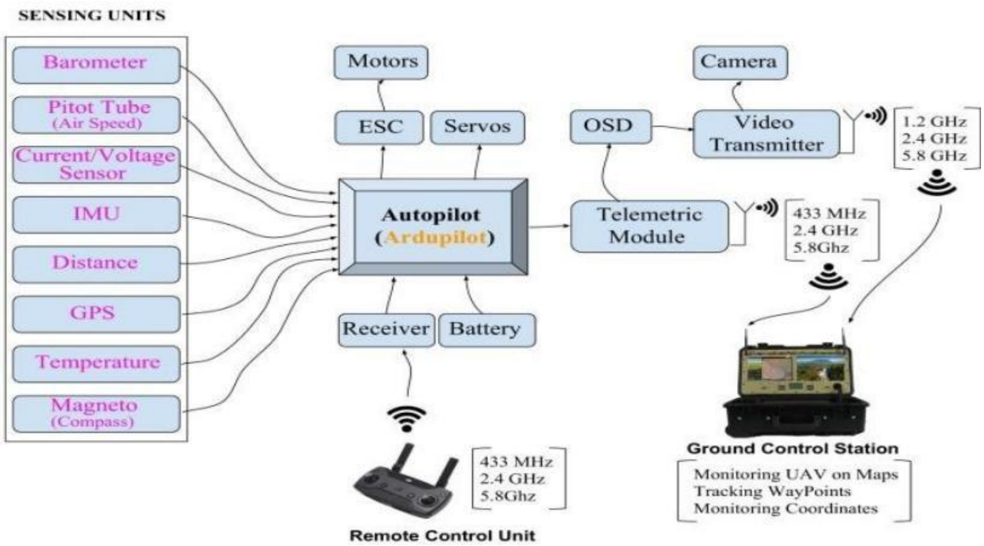


**Fig. 2:** Block of Drones.

Fig. 2 shows the different functioning blocks of a drone that completes the purpose of the UAV. The health sector saw rapid diagnostics with high precision in the recent times, especially in finding the novel corona virus (COVID-19) due to technological progress in this sector. Utilizing AI-driven algorithms for earlier detection of coronavirus is at its final stage and it could potentially pave the way for better preparedness. The outbreak of corona virus (COVID-19) in china was predicted by few AI- modelling driven companies such as BlueDot and Metabiota, way before it reached the global countries. They made it possible by scouting its impact and its spread. In order to ensure the occurrence of enhanced data sharing, there needs to be efficient data protocols in place so that the data is shared among various resources, networks and systems while at the same time, not compromising privacy and prevention of oversight, specifically in case of medical data.

## III. Technology

### *Artificial Intelligence*

Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment. AI applications include advanced web search engines (e.g., Google), recommendation systems (used by YouTube, Amazon and Netflix), understanding human speech (such as Siri and Alexa), self-driving cars (e.g., Tesla), automated decision-making and competing at the highest level in strategic game systems (such as chess and Go). The ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a specific goal. A subset of artificial intelligence is machine learning, which refers to the concept that computer programs can automatically learn from and adapt to new data without being assisted by humans. Deep learning techniques enable this automatic learning through the absorption of huge amounts of unstructured data such as text, images, or video. Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the most simple to those that are even more complex. The goals of artificial intelligence include mimicking human cognitive activity. Researchers and developers in the field are making surprisingly rapid strides in mimicking activities such as learning, reasoning, and perception, to the extent that these can be concretely defined. Some believe that innovators may soon be able to develop systems that exceed the capacity of humans to learn or reason out any subject. But others remain skeptical because all cognitive activity is laced with value judgments that are subject to human experience. As technology advances, previous benchmarks that defined artificial intelligence become outdated. For example, machines that calculate basic functions or recognize text through optical character recognition are no longer considered to embody artificial intelligence, since this function is now taken for granted as an inherent computer function.


**Fig. 3:** Getting Machines to simulate human intelligence is the fundamental goal of AI.

Fig. 3 depicts the current scenario of the industry in which the individuals and developers are getting the machine to simulate human intelligence. AI is continuously evolving to benefit many different industries. Machines are wired using a cross-disciplinary approach based on mathematics, computer science, linguistics, psychology, and more. The applications for artificial intelligence are endless. The technology can be applied to many different sectors and industries. AI is being tested and used in the healthcare industry for dosing drugs and different treatment in patients, and for surgical procedures in the operating room. Other examples of machines with artificial intelligence include computers that play chess and self-driving cars. Each of these machines must weigh the consequences of any action they take, as each action will impact the end result. In chess, the end result is winning the game. For self-driving cars, the computer system must account for all external data and compute it to act in a way that prevents a collision. Artificial intelligence also has applications in the financial industry, where it is used to detect and flag activity in banking and finance such as unusual debit card usage and large account deposits—all of which help a bank's fraud department. Applications for AI are also being used to help streamline and make trading easier. This is done by making supply, demand, and pricing of securities easier to estimate. Since its beginning, artificial intelligence has come under scrutiny from scientists and the public alike. One common theme is the idea that machines will become so highly developed that humans will not be able to keep up and they will take off on their own, redesigning themselves at an exponential rate. Another is that machines can hack into people's privacy and even be weaponized. Other arguments debate the ethics of artificial intelligence and whether intelligent systems such as robots should be treated with the same rights as humans. Self-driving cars have been fairly controversial as their machines tend to be designed for the lowest possible risk and the least casualties. If presented with a scenario of colliding with one person or another at the same time, these cars would calculate the option that would cause the least amount of damage. Another contentious issue many people have with artificial intelligence is how it may affect human employment. With many industries looking to automate certain jobs through the use of intelligent machinery, there is a concern that people would be pushed out of the workforce. Self-driving cars may remove the need for taxis and car-share programs, while manufacturers may easily replace human labor with machines, making people's skills more obsolete.

***Drones***

An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without any human pilot, crew, or passengers on board. UAVs are a component of an unmanned aircraft system (UAS), which includes adding a ground-based controller and a system of communications with the UAV. The flight of UAVs may operate under remote control by a human operator, as remotely-piloted aircraft (RPA), or with various degrees of autonomy, such as autopilot assistance. Drone-based

healthcare system is having various advantages over CCTV-based monitoring including

(i) it can cover those areas which are hidden in CCTV footage,

(ii) drones are multipurpose, it can be used for medicine delivery, sanitization, thermal imaging, scanning, etc., and

(iii) drones can monitor the patient from a close position as compared to CCTV. Medical sensors attached to a drone (such as accelerometers, biosensors, MEMS etc.) can measure the patient conditions more closely and accurately compared to CCTV, and

(iv) loud noise is not there in every type of drone. There are quite drones (like DJI Mavic Pro Platinum, Parrot Mambo, and DJI Phantom 3 Pro) designs that are more beneficial for indoor hospital systems. In the proposed system, one or more drones move-around and push/pull the required information/instructions from sensors as and when required. The data is processed initially at the drone for initial instructions. Thereafter, it is shared with other systems for further detailed processing. The internet of drones is constituted for longer data transfer and analysis. This internet of drones avoids collisions through either Radar/LiDAR systems or collision avoidance strategies. Apart from Radar/optical systems, collision avoidance strategies are required if a large number of drones are used for different services. Each of these services governs their strategy for drone movement. Using collision avoidance strategies, a pre-planned drone movement strategies could be implemented and short-distance based collisions could further be avoided with Radar/Optical systems.

**Fig 4:** Civilian UAV

Fig. 4 shows a manufactured UAV that is used for civilian activities. 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 forest fire monitoring, aerial photography, product deliveries, agriculture, policing and surveillance, infrastructure inspections, science, smuggling, and drone racing. The term drone has been used from the early days of aviation, being applied to remotely-flown target aircraft used for practice firing of a battleship's guns, such as the 1920s Fairey Queen and 1930s de Havilland Queen Bee. Later examples included the Airspeed Queen Wasp and Miles Queen Martinet, before ultimate replacement by the GAF Jindivik. The term remains in common use. In addition to the software, autonomous drones also employ a host of advanced technologies that allow them to carry out their missions without human intervention, such as cloud computing, computer vision, artificial intelligence, machine learning, deep learning, aircraft that has first-person video, autonomous capabilities, or both. An unmanned aerial vehicle (UAV) is defined as a "powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal. However missiles with warheads are not considered UAVs because the vehicle itself is a munition. Also, the relation of UAVs to remote controlled model aircraft is unclear. UAVs may or may not include remote-controlled model aircraft. Some jurisdictions base their definition on size or weight; however, the US FAA defines any uncrewed flying craft as a UAV regardless of size. The term unmanned aircraft system (UAS) was adopted by the United States Department of Defense (DoD) and the United States Federal Aviation Administration (FAA) in 2005 according to their Unmanned Aircraft System Roadmap 2005–2030. The International Civil Aviation Organization (ICAO) and the British Civil Aviation Authority adopted this term, also used in the European Union's Single- European-Sky (SES) Air-Traffic-Management (ATM) Research (SESAR Joint Undertaking) roadmap for 2020. This term emphasizes the importance of elements other than the aircraft. It includes elements such as ground control stations, data links and other support equipment. A similar term is an unmanned-aircraft vehicle system (UAVS), remotely piloted aerial vehicle (RPAV), remotely piloted aircraft system (RPAS). Many similar terms are in use. "Unoccupied" and "uninhabited" are occasionally used as alternatives to "unmanned". Under new regulations which came into effect 1 June 2019, the term RPAS (Remotely Piloted Aircraft System) has been adopted by the Canadian Government to mean "a set of configurable elements consisting of a remotely piloted aircraft, its control station, the command and control links and any other system elements required during flight operation" The earliest recorded use of an unmanned aerial vehicle for war-fighting occurred in July 1849, with a balloon carrier (the precursor to the aircraft carrier) in the first offensive use of air power in naval aviation. Austrian forces besieging Venice attempted to launch some 200 incendiary balloons at the besieged city. The balloons were launched mainly from land; however, some were also launched from the Austrian ship SMS Vulcano. At least one bomb fell in the city; however, due to the wind changing after launch, most of the balloons missed their target, and some drifted back over Austrian lines and the launching ship Vulcano. The Spanish engineer Leonardo Torres y Quevedo introduced a radio-based control-system called the "Telekino" at the Paris Academy of Science in 1903 with the intention of testing an airship of his own design without risking human lives. Significant development of drones started in the 1900s, and originally focused on providing practice targets for training military personnel. The earliest attempt at a powered UAV was A. M. Low's "Aerial Target" in 1916. Low confirmed that Geoffrey de Havilland's monoplane was the one that flew under control on 21 March 1917 using his radio system. Following this successful demonstration in the spring of 1917 Low was transferred to develop aircraft controlled fast motor launches D.C.B.s with the Royal Navy in 1918 intended to attack shipping and port installations and he also assisted Wing Commander Brock in preparations for the Zeebrugge Raid. Other British unmanned developments followed, leading to the fleet of over 400 de Havilland 82 Queen Bee aerial targets that went into service in 1935. Nikola Tesla described a fleet of uncrewed aerial combat vehicles in 1915. These developments also inspired the construction of the Kettering Bug by Charles Kettering from Dayton, Ohio and the Hewitt-Sperry Automatic Airplane - initially meant as an uncrewed plane that would carry an explosive payload to a predetermined target. Development continued during World War I, when the Dayton-Wright Airplane Company invented a pilotless aerial torpedo that would explode at a preset time. The film star and model-airplane enthusiast Reginald Denny developed the first scaled remote piloted vehicle in 1935. Soviet researchers experimented with controlling Tupolev TB-1 bombers remotely in the late 1930s.

## IV. Applications

- Combating any future pandemic situation.
- Controlling the spreading of the virus by analyzing and predicting the possible rate of increase in the infected people.

## V. Advantages

- Faster in understanding the virus and accelerating medical research on drugs and treatments.
- Drone-based healthcare system is having various advantages over CCTV-based monitoring including it can cover those areas which are hidden in CCTV footage, drones are multipurpose, it can be used for medicine delivery, sanitization, thermal imaging, scanning, etc.,
- Accurate in detecting and diagnosing the virus, and predicting its evolution.
- Assisting in preventing or slowing the virus' spread through surveillance and contact tracing.
- Responding to the health crisis through personalized information and learning.
- Monitoring the recovery and improving early warning too.
- State of the Art Emergency Response
- Safer to execute.
- Robust in its application and reliable.

## VI. Conclusion

In this research article, a detailed investigation on the impact and importance of Artificial Intelligence on COVID-19 pandemic is conducted. AI plays a key role in identification of the suspected people. Artificial Intelligence contributes at the place where the blood samples are filtered based on the predefined AI model. The treatment process utilizes AI in the form of protein structure prediction and drug repositioning. The data-set creation, hosting and bench-marking of the COVID-19 pandemic is crucial in order to help the researchers in drug discovery and disease prevention. There should exist data warehouses about the disease. The impact of AI upon global crisis, unemployment and other destructive should also be considered. Thorough problem and context understanding, coupled with the right drone solution could really offer a breakthrough for the use of this technology, however, it also needs to be supported by appropriate regulatory framework, local skills and sustainability plan. Seeing the full picture is essential to enable supply chain managers make cost-efficient and impactful decisions as part of their COVID-19 response. The instances of drone use in transportation of lab samples or medical supplies still need time to demonstrate impact or transformational value, however number of countries managed to deploy drones quickly due to the regulation and other foundations which served as enabling factors. For drones to be considered a viable solution to COVID-19 pandemic, the specific problem must be clearly defined, and a context analysis for using drones must be prioritized that would ultimately help design better drone solutions and use cases, demonstrating an actual impact on health (and related) outcomes. A proper understanding of the design of the existing health supply chain system must be done to inform the most potent use cases, locations, routes, commodities and transportation modalities, and will provide a strategy for (cost-)effective and efficient supply chain's optimization by drones. The effective use of technology cannot be scaled without building an appropriate support system and enabling environment. In order to operationalize the use of drones for pandemics or, in general, health supply chain work, enabling environment becomes crucial. Finally, technology sourcing and service provider selection needs to be guided through a rigorous, well defined procurement process and quality assurance. Building a support system and an enabling environment requires focus on a few different, but essential aspects

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