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Do drones have a realistic place in a pandemic fight for delivering medical supplies in healthcare systems problems?

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Abstract The advancement of Unmanned Aerial Vehicle (UAV) technology in terms of industrial processes and communication and networking technologies has led to an increase in their use in civil, business, and social applications. Global rules in most countries had previously limited the use of drones to military applications due to their deployment in the open air, drones are likely to be lost, destroyed, or physically hijacked. However, more recently, the presence of COVID-19 has forced the world to present new implementing measures which will also widen the use of drones in civil and commercial and social applications, especially now in the delivery of medicines for medical home care. In the period of required public isolation as a consequence of the SARS-COV-2 pandemic, this knowledge has become one of the principal partners in the fight against the coronavirus. This paper offers a summary of the medical drone manufacturing, with a specific emphasis on its approval by the pharmaceutical sector to solve logistical problems in healthcare during times of sensitive need. We also discuss the numerous challenges to be met in the integration of drones to save our lives and suggest future research directions. The question that arises for this problem, how to optimize delivery medical supplies times in-home health care made up of drones? We conducted a synthesis literature review devoted to the use of UAVs in healthcare with their different aspects. A total of different research made are given to describe the role of UAV in Home healthcare with the presence of SARS-COV-2. We conclude that the drones will be able to optimize the way of eliminating contamination with a very high percentage (through the reduction of human contact) with the increase of the flexibility of the flight (reaching the less accessible regions every hour of the day).
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1. Introduction

Technological advances in robotics have enabled companies to create new systems for order preparation, inventory management, delivery, and management. Nowadays, drones also called Unmanned Aerial Vehicle (UAV), this is a flying device controlled remotely by a person or a computer, have become real working tools, and their fields of application are becoming very broad, such as in the audiovisual sector, security, and surveillance, energy, and health.[1–3]

In addition to big data, artificial intelligence and other gears similar medical robots, UAVs have become the focal letterings in this inaccessible fight outstanding to their adaptability and the fact that they are a justly extended technology that is easy to implement and even now in the hands of many security forces everywhere the world. These are some of the jobs with which UAVs are linking the gaps in times of pandemic. The SARS-COV-2 outbreak has had a huge impact on healthcare manufacturing. One of the crucial zones where that impact has been most extremely touched is in the distribution of drugs and medical provisions to pretentious areas and the transportation of test samples to diagnostic labs.[4] Throughout crises like this pandemic, holdups in drug distribution and sample testing can be enhanced through robotics, artificial intelligence, and engineering.

Following the success of their use, now in the situation of SARS-COV-2, drones are occupying more and more space in government, especially for services, in particular, package delivery of medicaments, control of curfew, and for detection of the temperature of shoppers in major shopping centers.

In recent years, robotization and process automation have grown tremendously. Companies have considered these technologies in their industries. Among these technologies, we find drones, which are integrated into the problems of transport.[5,6] One or more drones can assist the delivery vehicle. The advantages of a drone are its speed and these low costs. While its capacity and total travel time are limited, these limits have given rise to the concept of last-mile delivery.

From 2000, drones began to be used more frequently in non-military activities. They have become more accessible, helping many types of businesses to use them in various activities, such as line inspection, aerial surveying, cartography, geography, film engineering services, and delivery. Home care has had its place in society for a long time and is becoming more and more legitimate in the face of the evolution of an aging population and the presence of the SARS-COV-2 epidemic. It is a sector that is still experiencing many changes depending on demographic, political, and economic factors. Since the presence of SARS-COV-2, Ref. 1 has dealt with the organization of care in a hospital establishment. Indeed, this literature deals not only with the organization of care but also with all support activities such as the distribution of medicaments, meals, linen, …. In our context, patients are no longer located in a single structure, but each is at home. Consequently, the problem no longer concerns only the organization of care but also the construction of rounds for careers, the delivery of medicaments, and equipment necessary for care.

Our objective is to carry out an inventory on the problems of optimization relating to the tours[7] of the unmanned aerial vehicles within a framework of the structure of maintenance at home in the presence of SARS-COV-2 and its effect on health and the minimization of COVID + cases. The problem of home support involves mobilizing staff to carry out work-related activities in different places. A curfew and fear of infection, several countries have resorted to drones to carry out these various operations.

In this paper, we discuss emergency strategies, lessons from past epidemics, and the vital role that health care managers can play in shaping responses to infectious diseases in today's global society with the use of drones to facilitate tasks and avoid any infection where SARS-COV-2 continues to spread worldwide.[8] Also, we are interested to give the impact of using the drones in minimizing the total cases of SARS-COV-2. Social data, when integrated with environmental data, makes it possible to map the vulnerability of areas potentially affected by SARS-COV-2. The purpose of this article is to discuss the application of UAVs as a technology to support patients for home care, also for the distribution of drugs, food, control, etc.

The main contribution of this paper is to offer a review of the application of UAVs in the world to the distribution of medical drugs, blood, meal, control of curfew…etc. This tool will be very useful for healthcare and for stopping the propagation of SARS-COV-2. Among other things, the utilization of UAVs has produced potential savings in time and distance while promoting the judicious use of drones. The subsequent scenarios demonstrated the impact of certain operational changes on the entire distribution. The comparison of the results obtained in the word shows several promising avenues for improvement. Finally, the presentation of drone delivery with a new classification represents a novelty in the reference related to this subject.

The rest of the paper is organized as follows. The Section 2 presents a review of the references on work that addresses the potential use of UAVs. Section 3 gives an outline of different aspects of drones. Section 4 describes the potential applications of drones in Healthcare with the presence of the SARS-COV-2 pandemic. A discussion is given in Section 5. The paper ends with a conclusion as well as on research prospects in the same context in Section 6.

2. Related works

The use of drones for commercial purposes has received a lot of attention lately, as Amazon has announced plans to use UAVs to deliver packages to clienteles. It is a very interesting and transformative knowledge with many intended and unintended significances.

The future use of UAVs in healthcare is also very exciting. How can manufacturing use this technology to improve safety and the delivery of care? Healthy to start, UAVs have even now been tested to deliver food aid and medical supplies in zones affected by a catastrophe, pandemic, etc. Prompt delivery of vaccines, drugs, and supplies directly to the source could reverse deadly communicable disease outbreaks like the COVID-19 case today. Communication equipment, mobile technology, portable shelters make up the vast list of what could be delivered quickly in areas where critical damage to infrastructure would prevent typical land or air transportation also the contamination of dangerous diseases.

The references review is divided into two parts: the first concerns the different uses discussed in the references by the

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UAVs in different sectors (private, military, health, etc.). The second part rather looks at the different resolution approaches, namely exact methods, heuristics, metaheuristics, or hybrid methods inspired by different related disciplines. In our review of the references, we do not deal with the "systems control" aspect. The Refs. 9,10 presents an introduction to the technical and material problems related to control. A survey of multi-hop networks of unmanned aerial and aquatic vehicles has been presented by Ref. 11.

In Ref. 12 has been studied driver performance due to small applications of unmanned aerial systems near roads. The authors claim that the post-experience questionnaire revealed that about 30% of the participants had seen a drone in flight near a road before this study.

Recently, give a state of the art on the use of drones in clinical microbiology and infectious diseases: current situation, challenges, and obstacles.[13] The authors summarize current knowledge regarding the use of drones in healthcare, focusing on infectious diseases and/or microbiology.

Ref. 14 provide a review of the reference on the potential applications integrating drones in smart cities, their implications, and the technical and non-technical problems faced by this integration. It also discusses the enabling regulations and technologies currently available and under development that can be used to support such integration.

Finally, in other publications such as Refs. 15–23 we can observe a combination of several forms of drone application in different sectors. We are observing more and more researchers opting for methodical and algorithmic diversity which can solve specific problems. Table 1 describes a survey listing application of UAVs in different sectors in healthcare.

Several solution methodologies are presented in the reference, we can cite the paper in Ref. 24 who was interested in the problem of target identification. Did he try to answer the following question: how many photographs are sufficient to identify the target and at what angles should they be taken? To answer this question, it was based on a probabilistic distribution that describes the image quality according to the distance between the UAV and the target and according to the angle of view to the largest dimension of the target. This is important because it involves an adequate repositioning of the aircraft to have the correct photo angles.

A simulation model (HERMES) has been proposed by Ref. 25 to make analyzes for an evaluation objective of an Unmanned Aerial System (UAVs) for the distribution of vaccines for patients with different geographical dispersion taking

Table 1 A survey listing application of UAV in different sector in healthcare.

Reference	Objective	Sector application
Ref. 23	The Objective of the study is to give the essay the progress of conventions for administering blood compartments and evaluate the experience with airborne blood transfusions	Samples blood transportation
Ref. 19	The authors stretch a tentative clinical robot using a UAV as a grid topology	Telesurgery
Ref. 16	The aim is to sketch the demand, possibility, and dangers concerning the use of small UAVs to transport blood and pharmaceutical products to hospitals	Blood transportation
Ref. 21	Develop a geographic technique to the location of a network of medical drones	Cardiac Arrest
Ref. 18	Investigate the feasibility of a drone system to respond to the cardiac arrest out hospital.	Cardiac Arrest
Ref. 27	Optimization of a drone grid	Cardiac Arrest
Ref. 20	Delivering of Defibrillator Using a Drone Out-of-Hospital	Emergency Medical Services
Ref. 22	The objective is to discover the potential use of UAVs in finding and detecting victims and of motor-powered transportation of search and rescue workers in a mountain environment.	Search and Rescue
Ref. 28	The objective is to optimize the transportations of blood products with UAV	Blood transportation
Ref. 11	The aim to help the reader to transmit valid methods and procedures among aerial and aquatic requests	Military missions, environmental and healthcare
Ref. 1	The aim is to examine the current state of drones in healthcare	Different sectors
Ref. 29	The aim is to assess how UAVs can help fighters in the case of an earthquake, tsunami, flooding, and any natural catastrophe.	Natural catastrophes response and humanitarian relief aid
Ref. 30	The authors give a state of the art on the energy management strategy for hybrid UAV	Economic and Energy sources
Ref. 15	The author investigates the potential beneficiaries of 5G in three main use-cases: vehicle-to-everything (V2X) communication, drones, and healthcare	Communication
Ref. 13	Literature review of the use of drones in healthcare	Infectious diseases, microbiology
Ref. 5	The paper analyzes the preferences in the direction of drone delivery from the viewpoint of consumers	Consumer drone delivery
Ref. 31	Resistance assessment for UAVs based on a complex network theory	Network grid

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into consideration the capacity of the drone and minimizing the associated costs of delivery compared to a traditional delivery system.

Ref. 26 offers a robust digital drone legal application with the main objective of the analysis of essential drone log parameters via a Graphical User Interface (GUI) developed using JavaFX 8.0. The authors use two popular drones to conduct this research (DJI Phantom 4 and Yuneec Typhoon H). The goal is to offer a powerful approach to effectively investigate drone crimes.[27–30] In Table 1 we give a survey of UAV applications.

Table 1 discuss the majority of studies addressed the use of UAV in health care.[1,5,11,13,15,16,18–23,27–31] Eleven of seventeen studies give a lecture on an emergency and evaluation of the use of drones to transport blood samples and to help situations of out-of-hospital cardiac arrest. In all of the studies, the use of UAV seems to provide better results than traditional methods in minimizing the intervention time.

3. Different aspects of UAVs

The legal aspect is that the development and rapid spread of drones have not allowed laws and regulations to adapt to their arrival. Legislation has lagged, and it has been slow to meet the expectations of a technology that continues to advance. We are currently in a kind of jungle in which the rules to be respected are unclear and it is complex to identify in which direction the legislations will develop/will develop. Currently, each country has its own rules and there are no common lines. In the following we give the possible different UAVs aspects.

3.1. Environmental aspect

The environmental aspects of drones focus on the freight transport sector is one of the most polluting sectors, which causes global warming. According to surveys, it accounts for a fifth of global greenhouse gas emissions.[32,33] The use of drones in this area may help reduce emissions, but the real reduction will only be possible under certain conditions.

In recent years, drones have evolved a lot, technology has become increasingly efficient and usable in several areas. Despite all this development, drones are still characterized by technical constraints such as payload and limited autonomy, weather conditions which can be a significant problem for drones.

3.2. Social aspect

The social aspect of drones is that the rise of autonomous vehicles in the logistics sector has raised uncertainty about the impact that this technology could have on the workforce (Most skeptics believe that the use of autonomous vehicles will harm the labor market because automating the delivery process is equivalent to eliminating the tasks that are currently performed by a human being).

Regarding the risks to the protection of privacy and personal data, you should know that drones are normally equipped with cameras allowing pilots to direct them. The recording by drones of images of people in their house or their garden can constitute an invasion of privacy and private property, as well as a violation of the rights of citizens in this matter. A series of other applications and on-board devices capable of collecting and processing personal data can also be installed on a drone, leading to potentially serious infringements of the right of citizens to the protection of their privacy and their data.

3.3. Technical aspect

In recent years, drones have evolved a lot, technology has become increasingly efficient and usable in several areas. Despite all this development, drones are still characterized by technical constraints. First, the Payload and limited autonomy; unlike traditional delivery methods, such as vans or cars that can load up to around 300 packages and travel up to 500 km before the tank is empty, drones have more limited limits. Currently, drones can only carry a single package of reduced dimensions and weight. Second, weather conditions can be a significant problem for drones. Adverse weather conditions can have negative effects on the flight of the drone and therefore affect the safety of the goods transported and the people and infrastructure overflown. Third, a threat to civil aviation; Subsequent work has shown that drones pose a great threat to aircraft. Under the same conditions, the impact of a drone with an airplane causes more structural damage than the impact of a bird.

Drones are increasingly used in the professional world, and the crisis caused by the coronavirus epidemic has shown this to us. However, the police force and the surveillance of populations should not be limited to illustrating the use of this type of device. Using a professional drone can save considerable time for monitoring high-voltage lines, railways, and even gas and oil structures.

Faced with these multiple needs, for example, China is using the DJI brand, the leader in consumer drones to deal with this pandemic (which has just marketed the Mavic Air 2). The new DJI model has nothing to do with consumer drones, although they are more and more efficient. DJI aims to improve and facilitate "public security, rescue, mapping operations, as well as critical inspections of infrastructure and in the energy sector".

The drone is not left out on the photo and video part. It offers three sensors including a 20-megapixel telephoto lens for hybrid zoom up to $\times 23$. A second sensor offers an ultra-wide-angle focal length, for a resolution of 12 megapixels. Finally, a third laser sensor measures distances ranging from 3 m to 1.2 km. Table 2 gives the specification of a different platform of UAVs.

One of the features that particularly caught our attention invites its user to select points of interest on the map to monitor, then take a photo to report the state of infrastructure for example. Fig. 1 gives a photo taken from the Mavic Air 2 controlling traffic.

4. Potential UAV applications in health

Drones are used in several countries. Several projects have been launched in Africa because the regulations are less strict than in European countries and therefore it is less complicated and faster to obtain authorizations from local governments to carry out tests or set up a network. In Malawi, the United Nations Children's Fund (UNICEF), a United Nations agency

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Table 2 Example of a different platform of UAVs.

UAVs	Category	Power source	Weight (kg)	Endurance (min)	Altitude capacity (m)
DJI Mavic	Rotary	Battery	0.725	27	5000
DJI Phantom 4	Rotary	Battery	1.36	28	6000
Trimble UX5	Fixed	Battery	1.134	50	5000
DJI Mavic Air 2	Rotary	Battery	0.570	34	5000

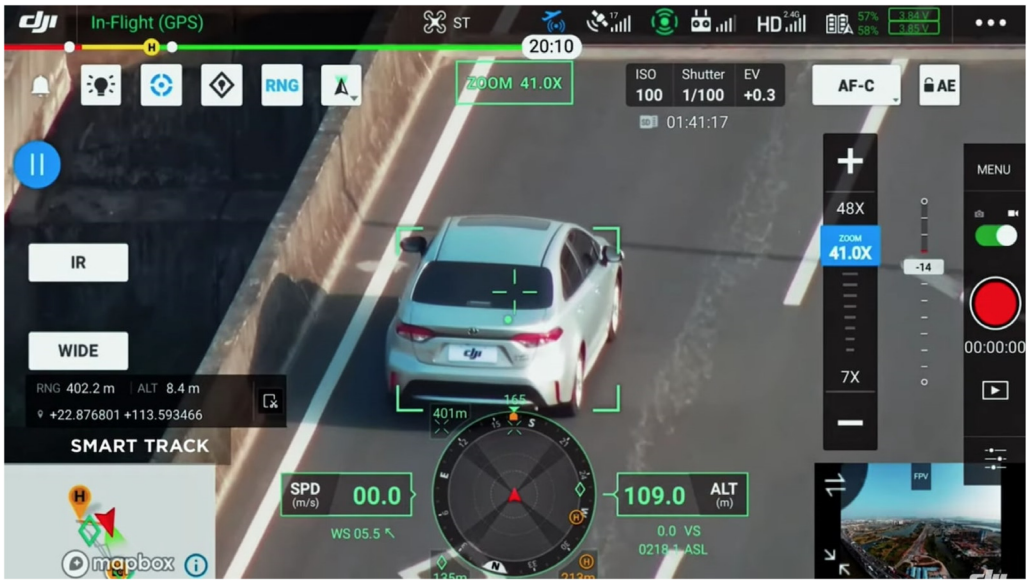

Fig. 1 Infrastructure traffic controlled by a UAV (Mavic Air 2).

working to improve the lives of children around the world, has begun testing a transport system by drones testing babies for Human Immunodeficiency Virus (HIV), in collaboration with the local government. This project aims to minimize the transport time between the places where blood samples are taken and the laboratories where the samples are analyzed.

In Ruanda, the Zipline company has set up a drone delivery project for blood bags in less accessible areas of the country. The hospital, which has no more blood in stock, places the order by SMS and about thirty minutes after the blood bags are "parachuted" by a drone.

The condition of forced separation due to the rapid feast of the SARS-COV-2 virus has caused the edition of nutrition and bundle delivery structures, which are a possible source of contamination. Before this pandemic, the USA and the Dominican Republic had already confirmed how useful UAVs are when it comes to distributing vital medical provisions. During the SARS-COV-2 pandemic, its usefulness was also inveterate in China, where corporations made use of UAVs to transport medical samples from the Xinchang Hospital to the Center for Disease Control and Prevention in Zhejiang, 3 km left. Separately from being a safe mode to transport these categories of goods, UAVs optimize the distribution time.

Inside the healthcare manufacturing, call for medical UAVs is largely obsessed with the blood transportation section, for moving blood to patients and samples to testing labs in emergencies. This is surveyed by the use of UAVs for the delivery of dangerous drugs to emergencies. Another rising request is for the delivery of vaccines, in combination with government administrations, to isolated areas and during outbreaks. Fig. 2 displays the market division by application range.

Drones have provided a similar type of surveillance in the world, but it's not the only way the country has used drones in response to the coronavirus epidemic. The farming models were modified to spray disinfectant on public places, and the drones also transported medical and quarantine supplies to reduce people's exposure to each other and reduce delivery times. In this situation, we see the existence of different variants of drone delivery, different solving approaches, and several related fields that share the same problem. In the following we give the potential applications of UAVs: we cite the Consumer drone delivery, aerial spray, and disinfection, detecting the ill with pandemic UAVs, surveillance epidemiology (Curfew application), real-time monitoring and information.

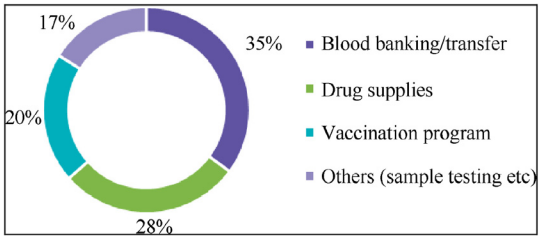

Fig. 2 Application use of medical drones (source: Beroe Analysis, marketwatch.com).

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4.1. Drone consumer delivery

The coronavirus pandemic has also helped to force the use of UAVs to distribute food. The Chinese e-commerce company JD.com has launched its group of UAVs to carry out numerous food distributions assessments that replace one hour of transportation times with a flight of around 10 min. To ensure, they had to plan aerospace routes, request authorization to entree the air space, and receive the local government's confirmation. These experiments prove how UAVs can be a slice of the response to public health emergencies, like the results of tests earlier conducted to deliver blood in Rwanda and Ghana.

The whole world knows and understands the ability of technology to bring about positive change. However, when its benefits are distributed unequally across different layers of society, technology creates barriers, divides people, and impedes social development and economic growth. Our experience has shown us that the right technology, used right, can build bridges. A recent example is the delivery of drugs through drones. By using drones to deliver goods, medicines, and food even the most remote and hard-to-reach places in rural and remote areas become instantly accessible and connected.

Fast and efficient alternatives to using cars, trucks, and trains to cross unreliable terrain, drones can get to these places in minutes and with minimal risk of contamination. We see drones as part of a larger smart logistics initiative that brings people, places, and goods closer, faster, and easier. Whether it's an emergency, where the minutes saved can mean lives saved, or simply being able to quickly deliver essentials, medicines, and goods to people who need them, drones facilitate impractical journeys.[6]

Besides, as the cost of deliveries in rural areas of some countries is five times higher than in urban areas, the use of large-scale drones can help level economic opportunities and access affordable consumer goods between regions by reducing the costs of rural logistics.

4.2. Disinfecting common areas with UAV

Disinfecting large zones or places that are hard to access is also one of the important activities throughout this fight against coronavirus. Providing with human resources in around dangerous places, or reducing human intervention to the lowest are some of the profits of using UAVs for these tasks.

Where necessary, including stations, supermarkets, or small courtyards, drones are used to spray disinfectant in public places. Compared to traditional means, the use of drones makes it possible to avoid direct contact, especially in places requiring regular disinfection.

The Spanish Military's Emergency Unit is integrating these UAVs to conduct nebulizing tests on open zones, and large vehicles with some very satisfactory results as they define on their localization: "These UAVs have a 10-liter load capacity. In normal use, they could disinfect nearly half of a hectare for each battery charge, which means this superficial will be roofed in 15 min."

In China, this technology has also been used for the same purpose. As specified on the World Economic Forum, we have confirmed that depending on the use, pulverization with UAVs can be 50 times more effective than pulverization done by persons. We describe in Fig. 3 an example of a drone with a loading package and liquid disinfect ready to flight.

As governments around the world seek effective measures to mitigate the SARS-COV-2 pandemic, it is the frontline workers who are at risk as they work to keep their communities safe. Drones quickly became a vital technology for public security agencies during this crisis, as they can safely monitor public spaces, broadcast messages over loudspeakers, spot dangerous activities, disinfect large areas, create 2D and 3D maps of future test sites or problem locations, and provide live video from critical areas – all from a safe distance. A drone was used to spray disinfectant into the air in Kunming, capital of southwest China's Yunnan Province, to prevent the epidemic of the new coronavirus. The drone, loaded with 10 L of disinfectant at a time, can disinfect an area of approximately 8000 m^2. Disinfection by unmanned aerial vehicles can avoid the risk of cross-infection and improve work efficiency, compared to manual disinfection (e.g., Ref. 13).

4.3. Detecting ill with pandemic UAVs

A vital action to stop the pandemic is distinctive healthy people from the revolting to separate the latter. To fix so, hence far an individual required to be involved, additionally to the patient, to squared their temperature and inspect them, or conduct the test to detect SARS-COV-2.

The thermal camera drone will automatically detect each person due to the high precision infrared which has been widely used in overcrowded areas to help management and evacuation on site.

The objective of the companies is to associate their technologies to fully optimize the use of UAVs in a pandemic. These UAVs associated with information services to screen medical care, sensors, and cameras to square a person's temperature and breathing rate from a distance. They have also intended algorithms that make it conceivable to understand human movements like coughing or sneezing in the context of epidemiological nursing. Even though there are no tests of these devices' level of efficiency, on Ref. 24 it is a talented developer that could optimize the other monitoring approaches even now ongoing.

During the peak of the epidemic, China used drones to distribute medicines or disinfect the streets. Drones could now take on a new function: detecting potentially SARS-COV-2 patients on the street. As part of the precautionary measures to combat the Coronavirus, the Qassim Municipality, in Buraidah (Saudi Arabia), used an air thermal scanning technique using a "Drone" plane equipped with modern and multispectral thermal cameras operating on artificial intelligence.

Fig. 3 Drone to disinfect streets and bring medicines.

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The "Drone" plane reads the body temperature of individuals inside the crowds and human groups in the open areas and determines those who have an abnormal temperature automatically, so that preventive measures are taken, to follow the safety of shoppers. This is part of the protective procedures applied by the Municipality of Al-Qassim to avoid the coronavirus, furthermore to a set of preventive measures instigated by buyers by offering sterilization materials and indicative information (see Fig. 4).

4.4. Surveillance epidemiology

When the coronavirus epidemic took hold in China, the authorities deployed an impressive technological arsenal to monitor compliance with the confinement instructions. The use of drones carrying banners with Quick Response (QR) codes or loudspeakers to encourage people to return home has made people smile in Europe. And yet, today, these same measures are deployed in Madrid in Spain, and also in France. The drones come to reinforce the police forces mobilized on the ground to make respect the instructions and to control the certificates of displacement. They make it easier to spot onlookers, especially in areas where access is more complicated.

During confinement, the drones are out. In a few days, these remote-controlled flying cameras have become essential auxiliaries to the authorities responsible for enforcing safety instructions and inviting firmly passersby to stay home. Already massively used by the police in China or Korea, drones have been deployed in Italy, where Civil Aviation has eased the constraints relating to their use, in Spain, Greece, and the United States. In France, police, and gendarmerie have taken off a large number.

4.5. Drones to real-time monitoring and information

The use of drones for real-time monitoring and information is still being developed as an activity, and the humanitarian sector is very interested in it. The use of drones to obtain real-time information live video streams broadcast directly from the drone to the operator, for example presents additional possibilities that have not yet been sufficiently explored in the field. Small drones broadcast live videos, mainly in tactical situations, to help understand potential roadblocks or to quickly assess structures and infrastructure. Within the humanitarian community, however, the focus is more on features that would allow assessment and monitoring of large areas, in particular:

Fig. 4 A drone equipped with thermal cameras.

(1) Identify and monitor displaced populations, their movements, and temporary settlements.
(2) Carry out large-scale assessments of an affected region or assess remote and hard to reach areas.
(3) Track logistics convoys in real-time.

These features would require medium to large drones and sophisticated data transmission technology. As an example, we can cite China, which uses pigeon drones to monitor the population in the presence of the coronavirus. These new drones mimic the action of a bird's wings to climb, dive, or spin in the air. They would be able to reproduce about 90% of the movements of a real pigeon. Besides, they produce very little noise, which makes them very difficult to detect from the ground, and are so realistic that real birds often fly alongside them, says the Hong Kong daily. Pigeon drones weigh only 200 g, have a wingspan of about 50 cm, and can fly at speeds of up to 40 km/h for up to 30 min.

A drone with a speaker allowed the Madrid police to inform residents of the Spanish state's emergency formulas. This conjunction of technology is also a way to encourage social retreat between government security forces, which are very important to keep up with other aspects necessary during the fight against this disease.

In France, drones have already used in the context of confinement measures intended to halt the spread of SARS-COV-2. The prefecture of the Alpes-Maritimes and the city of Nice have been using drones fitted with loudspeakers to identify and disperse groups of people who do not respect confinement or precautionary measures in the city of Nice. Also, broadcasting messages ordering walkers to stay at home.

In Tunisia, the Ministry of the Interior is using new technologies: a "land-based drone" robot that reminds citizens to order. As the SARS-COV-2 pandemic continues to spread around the world, it is becoming urgent for governments to enforce the confinement measures they have decreed. Some compete with muscular methods, others with ingenuity. The Tunisians thus chose to relegate the task to a land drone. The new device, in the test phase, was revealed by the Interior Ministry. We see a robot walking through the streets of Tunis and ordering citizens who are still in circulation to present their identity card and, possibly, the pass to work. For those who have no justification for their movements, he reminds them of the rules of confinement.

5. Discussion

The use of UAVs in airspace around the world is still fairly limited at present due to aviation sector regulations and constraints associated with the issuance of permits. Some police forces have reported use in specific cases, but there is no evidence that these vehicles have been used for surveillance in the public or private sectors. That said, given global efforts to develop aviation safety regulations, the increasing availability of technology, and projections for the global market, it is to be expected that the use of these vehicles will proliferate in recent years. The world for the foreseeable future.

The study done throughout this paper shows the contribution of drones in the health sector and especially in the pandemic that has affected the world. We have noticed that drones are gaining ground in the medical sector. They are

currently mostly used in remote areas of low-income countries, but they are attracting the interest of many investors. The delivery of the last kilometer by drone will find an economic model in remote areas, especially in Africa. The drone makes it possible to quickly deliver blood products and collect samples in areas underserved by road or in emergencies.[34]

Another interpretation that we can argue that innovation in medical biology is fueled by scientific and technical progress in its core business, including the use of autonomous vehicles which suggests a transformation in transport and logistics.

In terms of safety and security, the use of drones presents considerable risks. As reported in the media, drones have been spotted over or near airports, disrupting civil aviation and/or threatening flight safety; crashed to the ground; flew over critical infrastructure, embassies, or tourist attractions; have injured people.

The possible repercussions on the political and social environments when using drones are given by the following research which clearly shows that in the future, the use of technologies to combat the spread of the virus could lead to new disturbances. Indeed, the potentially sustainable strengthening of mass surveillance technologies could have many impacts on political and social dynamics. The privacy implications of surveillance are fairly well known, but UAVs could add another dimension due to their mobility, constant presence, and scope for collecting personal information, using different advanced technologies onboard. The type of sighting these vehicles would be, given their constant presence, very different from what humans can do. Besides, the proliferation of UAVs could incite strong reactions or have a chilling effect in public places if all people felt that they were being spied on or that they could be. One can imagine that society would have much lower expectations for privacy if the use of UAVs for surveillance activities or all kinds of tracking or intelligence gathering activities came to be trivialized to the point of being considered an accepted foray into our lives.

The recommendations that can be given are:

(1) Develop a continental regulatory framework for the use of UAVs worldwide and harmonize the policies of different countries and regions (health communities)
(2) Foster collaborations, partnerships, networks and knowledge exchanges, triangular, and regional to facilitate the generalization and use of drone technology.

Drones can provide a first response in the event of a medical emergency, by quickly bringing on-site the most suitable equipment for the situation, especially when every second count. We can now say that governments are convinced that the measures taken by the use of drones in the health sector make it possible to contain the pandemic.

Humanitarians and their potential partners must continue to assess the real impacts of the use of drone technology, paying particular attention to the opportunity costs. Humanitarian aid requires effective human interactions and an understanding adapted to the context of the situation on the ground. Even though drones, with their aerial vision, can significantly contribute to the understanding of conditions in crises, they cannot replace the professionals who work directly with the affected communities.

Confidentiality, security and ethical concerns related to the use of data may exist in certain scenarios, in particular when collecting, aggregating, and sharing large amounts of data. Humanitarian actors must address these concerns on a case-by-case basis and address issues in the general interest of the whole community.

The impact of the use of drones on the ground is not yet known, or foreseeable. This uncertainty should not hamper the innovation process, as progress is made in exploring the humanitarian applications of drones. Pilot deployments must and can respect basic humanitarian principles, and decisions to proceed with such deployments can and should be based on reasonable confidence in the potential for substantial benefits. Due to the persistent military overtones, all processes should be carried out in the most transparent way possible, openly communicating the reasons and results of the use of drone technology. The connotations of "secrecy", "stealth" and "spying" precede drones, perhaps more than any other new tool, and an open, shared, and transparent approach can moderate lingering prejudices.

Evaluations have shown that the use of drones in this pandemic has generated a lot of interest in communities, and has influenced successful participatory processes to improve communities through community health. The potential humanitarian added value must be clearly expressed and communicated to regulators, particularly in the coming years, when the landscape of possible uses for drones begins to emerge.

To increase the chances of a regulatory environment receptive to humanitarian uses, humanitarian workers and their partners must express themselves and continue to engage with national or international regulatory bodies. Collaboration is the key. According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), "What many actors are asking for today is not a traditional coordination mechanism, but rather a functional ecosystem in which actors can collaborate " This ecosystem of actors is already well placed to answer all the questions that arise from the use of drones in humanitarian contexts, and the community is quite capable of continuing to support and encourage an open learning environment in this evolutionary process.

6. Conclusions

Evidence is growing that drones can help aid workers improve the quality and effectiveness of aid in specific applications. Among the most promising uses of drones in humanitarian action are: (A) Mapping; (B) the delivery of essential products to remote or difficult to access places; (C) support to assess the damage; (D) improving situational awareness; (E) the healthcare sector in the presence of a pandemic.

Some of the drones deployed for these uses require only limited technical skills, especially if they are used on a small scale to support localized damage assessments or other processes through health in the presence of SARS-COV2 for support patients at home.

UAVs are expanding the delivery of important medicines to rural societies and remote areas around the world. They are often the best way to send a product in the shortest possible time when road transport is threatened or obstructed throughout an illness. During a pandemic such as COVID-19, it is vital to deliver patient samples more quickly to central laboratories for testing, as this allows doctors to make treatment decisions earlier and advance patient results. The development of UAV

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rules could allow UAVs to be licensed as a logistical solution for incremental efficiency in healthcare. All of this could ultimately extend the direct supply chain to patients and improve explanations of the cold chain.

Autonomous vehicles, such as drones, represent a great opportunity for the health sector; countries should be able to make the most of them. They provide a possible solution to the problems that currently characterize the presence of coronavirus in surveillance, Aerial spray, and disinfection, Consumer drone delivery, detect temperature with thermal cameras and Lessons learned, to follow up on the fight against this virus. Drones will be able to optimize the way of eliminating contamination with a very high percentage (through the reduction of human contact) with the increase of the flexibility of the flight (reaching the less accessible regions every hour of the day).

This work allowed me to tackle a subject that has interested me for a long time and to analyze a technology that I think will revolutionize the health field in which I would like to work after I have finished my studies. Through my research work as well as the interview and analysis of the work carried out, I learned new information that enriched my knowledge and which I integrated into my work. We just have to wait for new developments to know when we will be treated and deliver medicines by mobile robots and drones.

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