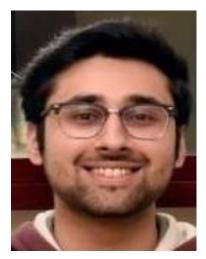# Reseach Paper

An Overview of the Predominance of China in the World of Micro Drones

Dr. Faran Awais Butt
Member Board of Experts, PRCCSF
& Assistant Professor, Electrical Engineering
Department, University of Management and
Technology (UMT), Pakistan

Muhammad Bilal Sher Khan Shirwani,
Research Associate, Electrical Engineering
Department, University of Management and
Technology (UMT), Pakistan

COMMUNICATION UNIVERSITY OF CHINA

中国传媒大学
COMMUNICATION UNIVERSITY OF CHINA

Institute for a Community
with Shared Future
人类命运共同体研究院

1. __The Rise of Micro-Drones: An Overview:__

The term "drone" or "UAV (Unmanned Aerial Vehicle)" has become synonymous with military applications, but it encompasses a wide range of flying devices that can vary in size from just a few inches to the size of an airplane. These flying machines are not just used by the military but also by children, hobbyists, and businesses for various purposes.

In terms of aerodynamics and mechanical structure, drones can be classified into several categories including Single-Rotor Drones, Multi-Rotor Drones, Fixed-Wing Drones, Fixed-Wing Hybrid Drones, etc. Additionally, they can also be classified based on their applications, such as Tactical Drones, Reconnaissance Drones, Large Combat Drones, Non-Combat Large Drones, GPS Drones, Photography Drones, Racing Drones, etc. The versatility of drones allows them to be used for an array of functions, making them a popular choice for both personal and commercial use. In recent years, the number of small unmanned aerial vehicles available to civilian users has grown significantly due to factors such as low cost, simplicity of use, and filming. Leisure activities, agriculture, parcel delivery, search and rescue operation, etc. A micro air vehicle (MAV), also known as a micro aerial vehicle, is a type of miniature unmanned aerial vehicle (UAV) that has a size restriction and may be autonomous. Crafts in the modern era can be as small as 5 centimeters. Commercial,

research, government, and military applications are driving development, with insect-sized aircraft reportedly on the horizon. The small craft allows for remote observation of hazardous environments that ground vehicles cannot access.

Micro air vehicles (MAVs) that can be carried by an infantryman to man-portable UAVs that can be carried and launched like an infantry man-portable air-defense system are all examples of miniature UAVs. The phrase is most commonly used to describe those that are employed for military purposes. National regulatory bodies have given small UAVs a variety of definitions, many of which exclude size precisions and differ in weight measurement criteria. These standards range from less than 2 kilograms for Canada to fewer than 25 kg for the US.

2. <u>Risk Factor with Hobbyist Drones:</u>

The increased commercialization of drones has made them readily available to the public, however, there is growing concern over accidental or intentional misuse of these platforms. Incidents of drones being involved in anti-social activities, privacy invasion, collision risk (with other UAVs and larger aircraft), and illegal transportation of substances or explosives have been reported.

Detection and tracking of UAVS with radar present significant challenges because small UAVs typically have a low RCS and fly at low speeds and altitudes in comparison to larger aircraft. Small UAVs can also perform highly varied motions such as hovering, complicating the task of distinguishing them from stationary clutter. The high maneuverability of small UAVs also complicates tracking because it is impossible to make

strong assumptions about the expected UAV motion. They have a low radar cross-section, fly at a low altitude, move at a slow speed and hence they are difficult to get tracked. China is a country that not only dominates the world of commercial civilian drones but also has a very high safety factor not only in terms of technology but also in terms of its policies for its usage.

3. <u>Chinese Market in Commercial Drones:</u>

There are over a hundred UAV developers/manufacturers in China. Chinese companies are global leaders in the civilian drone sector, and China is the world's second-largest drone market behind the United States. DJI, a Chinese drone maker, has a 74 percent civilian market share in 2018, with no other company accounting for more than 5%, and $11 billion in global sales predicted in 2020. It is predicted that Chinese companies will produce more than 80% of civilian drones by 2022. The music, television, and film industries all use their camera drone technology.

3.1 <u>Industry:</u>

In 2014, the team at Sinopec, a leading company in the management of oil pipelines in southern China, was introduced to the capabilities of drones. During this time, they witnessed drone-based inspection missions in various industries, including some of their Chinese counterparts. The potential benefits of this innovative technology captured their attention as Sinopec must inspect different sections of their pipelines on a daily basis, including remote and treacherous mountainous areas that present hazards to their

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inspection teams. The use of drones for these inspections can significantly reduce the risk to their personnel while improving the efficiency and accuracy of the inspection process. They began inviting drone companies, including Microdrones, to field test systems over their pipelines in 2015. It took two years, but the team finally began large-scale drone-based pipeline inspection operations in late 2017. To date, these systems have flown over 40,000 kilometers of pipeline, saving the company time and money while also lowering the risk of worker injury.

5G technology has also been integrated into the petrochemical industry in China. The high bandwidth 5G network significantly reduces lag in intercom systems and patrol drones when compared to 4G networks, and increases working efficiency. Over the last decade, China has quickly grown to become the drone industry's manufacturing and technological powerhouse, unlocking new market opportunities through affordable and accessible drone equipment.

3.2 Agriculture:

Drones are increasingly being used in China's agricultural sector for crop protection, spraying, monitoring, and risk mitigation. Between 2016 and 2017, the number of agricultural drones is estimated to have doubled, reaching 13,000 aircraft. As the world's

leading manufacturer of civilian drones, China has easy access to drone technology, and current adoption levels only reflect the market's early stages of exponential growth.

As part of their efforts to advance agricultural and rural modernization, Chinese authorities issued a guideline in May 2020 to promote digital technologies such as agricultural drones in rural areas. By July 2020, Xinjiang had over 5,000 agricultural drones powered by China's Beidou Navigation Satellite System, serving over 1.3 million hectares of fields, according to official data. The use of micro-drones in agriculture annihilates large areas of farm production in a short period, cutting off the food supply and causing starvation in many communities.

"Using drones is safer than traditional manual spraying," said Yasha Chen, DJI Sales Director, referring to the fact that people are not in direct contact with pesticides when using drones. The T16 can also automatically avoid obstacles. Pakistan has expressed gratitude to China. A nearly eight-hectare plot of land can take a week with eight people to get pesticides. The same task can be done in an hour by using a proper micro-drone. A drone sprays pesticides 50 to 80 times faster than traditional methods. China now has nearly 50,000 agricultural drones, and more companies are joining the effort to make China's agriculture more intelligent.

4. <u>Micro-Drones and China-Pakistan Friendship:</u>

China and Pakistan have a strong bond of mutual support and appreciation. This is evident in China's recognition of Pakistan's various contributions and its consistent demonstration of gratitude. The prominence of micro-drones in China has also been reflected in Pakistan,

where these devices are widely utilized across different sectors, including filming and

leisure activities. To maximize the benefits of this technology, Pakistan can adopt China's practices and techniques in the agriculture sector. By doing so, farmers in Pakistan can receive specialized training and improve their productivity. As a gesture of goodwill, China's Ministry of Agriculture and Rural Affairs gifted Pakistan with 12 DJI T16 farm drones in 2020.

4.1 <u>Use of Micro-Drones by Pakistan and China to combat locust Attacks in Pakistan:</u>

The menace of locusts has always affected Pakistan year after year, however, in the last two years this swarm has devastated the crops like never before. One of the main reasons for the locust swarm to appear in numbers greater than before is due to rising global temperatures. This aids the locust eggs to survive through winter and as a result, the

quantity of egg hatching increases as the warm weather arrives. Changing temperatures due to global warming have led to abnormal rainfall and moisture which creates ideal breeding grounds for locusts, and leads to their rapid reproduction. This poses a severe risk to poor countries with agricultural-based economies such as Pakistan, where the loss of crops on a large scale not only causes economic damage but can lead to significant food shortages. To combat this locust attack, China has come forth to aid Pakistan by providing 50 drones, 300,000 liters of pesticides, and $5 million in technical support. The use of fixed and rotary-wing unmanned aerial vehicles (UAV) has the potential to improve desert locust monitoring, early warning, and rapid control, while also lowering survey and control costs. The government of Pakistan is also negotiating the lease of six aircraft for three to four months to eliminate locusts from the agricultural fields of the country. China has further offered to set up a manufacturing plant in Pakistan as well as to provide technical support and training so that Pakistan can build its rapid disaster response capabilities. The National Radio Telecommunication Corporation (NRTC) has also produced indigenous drones to help combat locusts. Apart from spraying pesticides on crops, these drones will also be used to eliminate adult locusts and hopper bands in already identified breeding zones. This will prevent the desert locust from spreading to other areas where the ecological conditions are favorable for breeding.

5. <u>Use of micro-drones for combating coronavirus by China</u>

The coronavirus pandemic has affected every nation on earth and curbing its spread was a very daunting task for most nations. Many developed countries were confused regarding

the spread of the virus, and despite their best efforts, they initially failed and the death toll kept on increasing. During this disaster, China was the first to rise. From building hospitals in a matter of days to employing strict surveillance and assistance through drones, the world's second-largest economy managed to significantly cushion the impact of the coronavirus. Not only did China successfully manage to control covid-19, but also became a model nation for others. The drones that were originally built for spraying pesticides over crops were converted to spray disinfectants on public spaces as well as on vehicles that were traveling between impacted areas. Drone spray proved to be more efficient and consistent as compared to hand spray. The transport of medical samples was also done through drones to prevent unnecessary human contact. Transportation of medical supplies from hospitals to various locations through drones took less than half as much time as would've been required by a ground vehicle. Similarly, transporting consumer items to remote areas which were already difficult before covid due to difficult terrains was also done through drones which could complete a 2 km flight in just 10 minutes. China provided its law enforcement agencies with drones to monitor whether people were maintaining proper SOPs. Drones were also equipped with loudspeakers to disperse crowds. Autonomous drones are also equipped with a deep learning algorithm to identify people wearing face masks as well as identify potential hotspots.

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