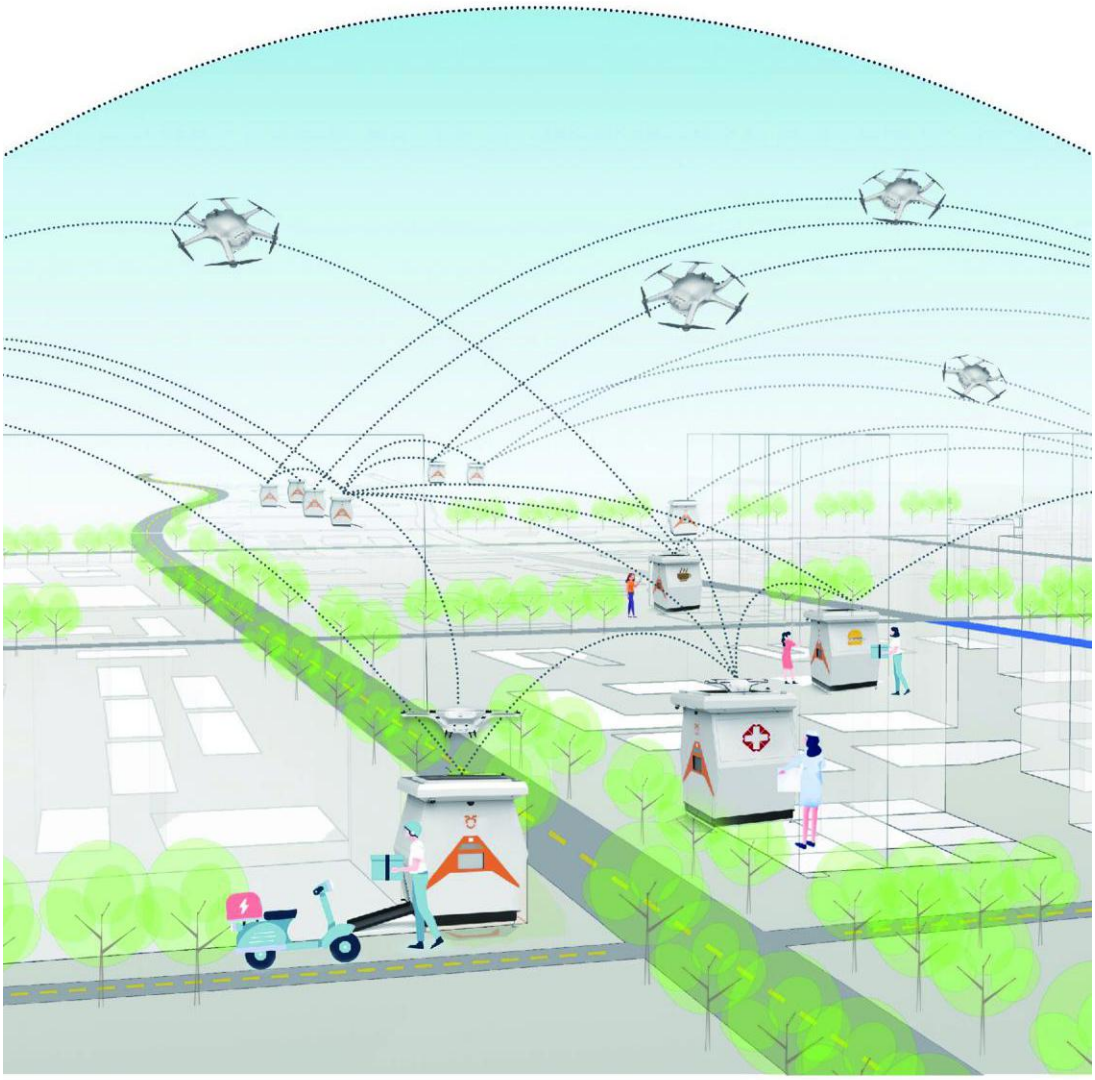

Antwork is a drone delivery company with cutting-edge technologies and reliable solutions. Our ADNET system is consist of delivery drones, unmanned stations and customized UTM, supporting fully autonomous operation. CAAC issued world's first approval for commercial drone delivery in highly populated cities to us, after conducting a SORA certification in Oct. 2019. We have done over 20,000 delivery flights since 2016, collaborating with top companies including China Post, Alibaba and KFC, etc.,

- REPORT SUMMRIES

1 The 5G robotic delivery network is the solution for the future cities.

With the rapid development of e-commerce, take-out food business, new retail, the demand of urban delivery services in urban areas has been increasing a lot. Meanwhile the disappearance of the demographic dividend has led to a significant shortage of delivery labors. Fast, safe, zero-emission and human labor-independent robots will become an indispensable infrastructure for urban logistics in the future.

2 ADNET+5G is an efficient form of robotic delivery network.

The ADNET+5G system integrates in drones, unmanned vehicles, unmanned hub stations and unmanned charging depots, and also through the algorithm enables seamless collaboration between robots, so as to make full use of speed advantage of aerial delivery by the drones and the user-friendly interaction of the unmanned vehicles. At the same time, unmanned hub stations and unmanned charging depots help to realize full automation of the whole network in terms of the material cycle and energy cycle.

In addition, the upper limit of manpower delivery system will be restricted seriously by labor supply during the process of increasing delivery demand. The disappearance of the demographic dividend is driving up labor costs gradually, but the cost of robot delivery will continue to decrease with the expansion of manufacturing scale. At present, the intersection of the two has emerged, and with the upgrading of technology, the advantages of robots will be prominent increasingly in the future.

3 Safety is a core premise of large-scale operation of robotic delivery network.

From design, development, testing to operation of ADNET, safety is always the first priority, which ensure the safety of flight as the primary focus of the system. The safety of the system is guaranteed by the subsystem redundancy, the complete fail-safe mechanism, the large-scale emergency strategies and the equipment of the certified security personnel. Finally, the security of the system has been verified fully by running tests in a real environment with multiple scenes for a long time.

- Introduction

Antwork is a tech company devoted in providing large-scale robotic delivery network solution. We believe our innovation will not only help to make delivery more convenient, but also save human couriers from tough labors. More importantly, our technology will provide best delivery service to every consumer. "Just make a wish" is our unchangeable mission.

- Purpose

Maximized values of connecting

According to different types of urban delivery needs, ADNET can build a robots delivery network at commercial district scale or city scale.

Moreover, the robotic delivery networks of multiple commercial districts in the same city can be connected to each other, and form a network eventually covering the whole city, connecting every consumer, every business and every public service provider in the city. City scale ADNET can provide complete inner- city instant delivery service, which can cover all kinds of demands such as medical emergency, high-timeliness delivery and C2C delivery, and shorten the time span of connection between any two points in the city to less than 30 minutes.

The delivery network of the commercial district scale can cover a range of about 5km in diameter, and also can connect the surrounding restaurants, supermarkets and pharmacies for the consumers within the service range to deliver the goods in an average time of 10 minutes for take-out and daily life.

- Market description

The blue print of ADNET deployment in Hangzhou city

Taking Hangzhou as an example, we designed an ADNET deployment plan covering the whole city (with the ring expressway as the boundary). After the completion of the first phase of the delivery network, it can meet the instant delivery demand of 60,000 orders per day, accounting for 5% of the total demand of Hangzhou's instant delivery market.

When planning the geographical distribution of drones and routes, we avoided the restricted flight areas of local civil and military airports, scenic spots, squares and other crowd gathering locations, and kept the flight safety risk to the minimum.

- Challenges and potential solutions

Laws and regulations

At present, the government is still in the process of establishing and improving the regulatory system and regulations for the regular flight of drones. Therefore, the deployment and operation of ADNET must be in deep cooperation with the regulatory authorities, starting with typical scenarios test operations. ADNET needs to fulfill the most adequate reliability verification, and cooperate closely with the authorities to carry out the research and development of relevant laws and regulations. On the other hand, the unmanned vehicle in ADNET is designed as small and low-speed vehicle, and only operating inside industrial or residential parks. So it is of low risks by design.

Public acceptance

The operation of ADNET requires the public to get used to and accept the new service experience of robotic delivery. Although the service flexibility and humanization of robots are not good enough, they work better in terms of speed, cost, reliability and privacy protection, comparing to traditional human delivery. The public acceptance will continue to improve with the popularity of the robot service.

The drone in the ADNET is flying at a noise level of about 60-80 decibels, equivalent to the volume of a normal car driving on the road. This has the effect of noise on nearby residents or passers-by. In response, ADNET will replace the propellers of drones with low-noise version to reduce aerodynamic noise by 50% in the future. In addition, it will isolate noise sources from consumers by deploying more charging depots and unmanned hub stations on the roof of building.

Battery technologies

At present, the lithium polymer battery commonly used in multi-rotor drones has low energy density, limited life cycles and high material cost, resulting in unsatisfying endurance and high battery cost , which accounts for about half of the total cost of each delivery flight. To overcome the disadvantages, on one hand, ADNET uses unmanned hub stations as delivery relay nodes to extend the distance range covered by drone delivery. On the other hand, the battery with capacity attenuation after long-term use of drones can be used consequently by unmanned vehicles, which has lower requirements on the battery reliability. Thus the battery life can be significantly extended and the operating cost of the system can be reduced.

- Key considerations

High speed

The drones flies in a straight line, which is not affected by road congestion, and the time span is guaranteed.

Low cost

There is no need for delivery personnel, and the labor cost saved allows users to enjoy lower delivery cost.

Privacy protection

No phone calls and knocking on the door, which protect the privacy and personal safety.

Responsiveness

Robots can be on call 24 hours a day with zero latency.

Safety

The two sides of the mobile phone are connected by a robot without human involvement, the goods are more safe and sanitary.

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