

Drone Surveillance in the Modern Agriculture

Tsvyatko Bikov, Grigor Mihaylov, Teodor Iliev, Ivaylo Stoyanov

University of Telecommunications and Post
Sofia, Bulgaria, cbikov@gmail.com

GOAL OF THE STUDY

Drone technology is no longer available for military organizations only. It is so advanced and inexpensive, that every technology enthusiast could purchase and start using it in just a couple of minutes, without the need of any specific training. This level of accessibility of the drone technology allows its application to be expanded and reach various niche industries, including agriculture. Amongst the sheer activities that the modern drones are capable of, there is one that could help the nowadays farmer not only reduce their need on additional manpower, but also their monthly cost required to raise and protect their livestock, regularly monitoring it from the sky.

METHODOLOGY OF THE INVESTIGATION

Unmanned Aerial Vehicles (UAV) or Unmanned Aircraft System (UAS) are already available, not only as military-grade class technology, but also as consumer-grade. The UAV could be classified like every other aircraft, based on their weight (Fig. 1) and operational role, range (Fig. 2)

The Federal Aviation Administration (FAA) in US requires all drones under 25 kilograms (except those that weigh less than 250 grams) that are flown exclusively under the Exception for Recreational Flyers to be registered.

Combining both the classifications can provide a decent framework that could be followed by both governances and manufacturers.

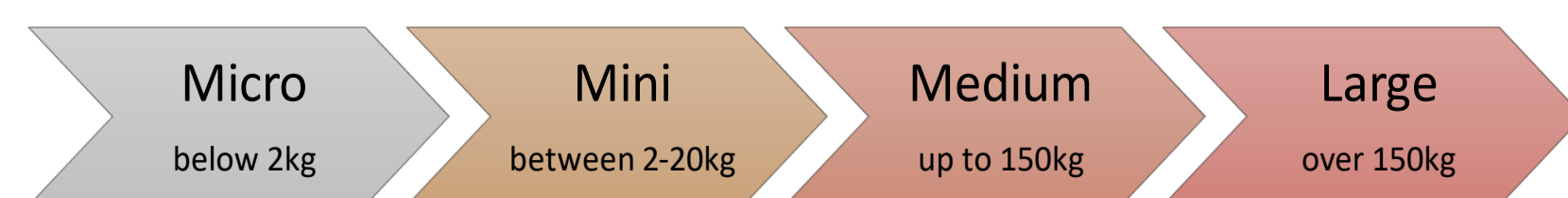
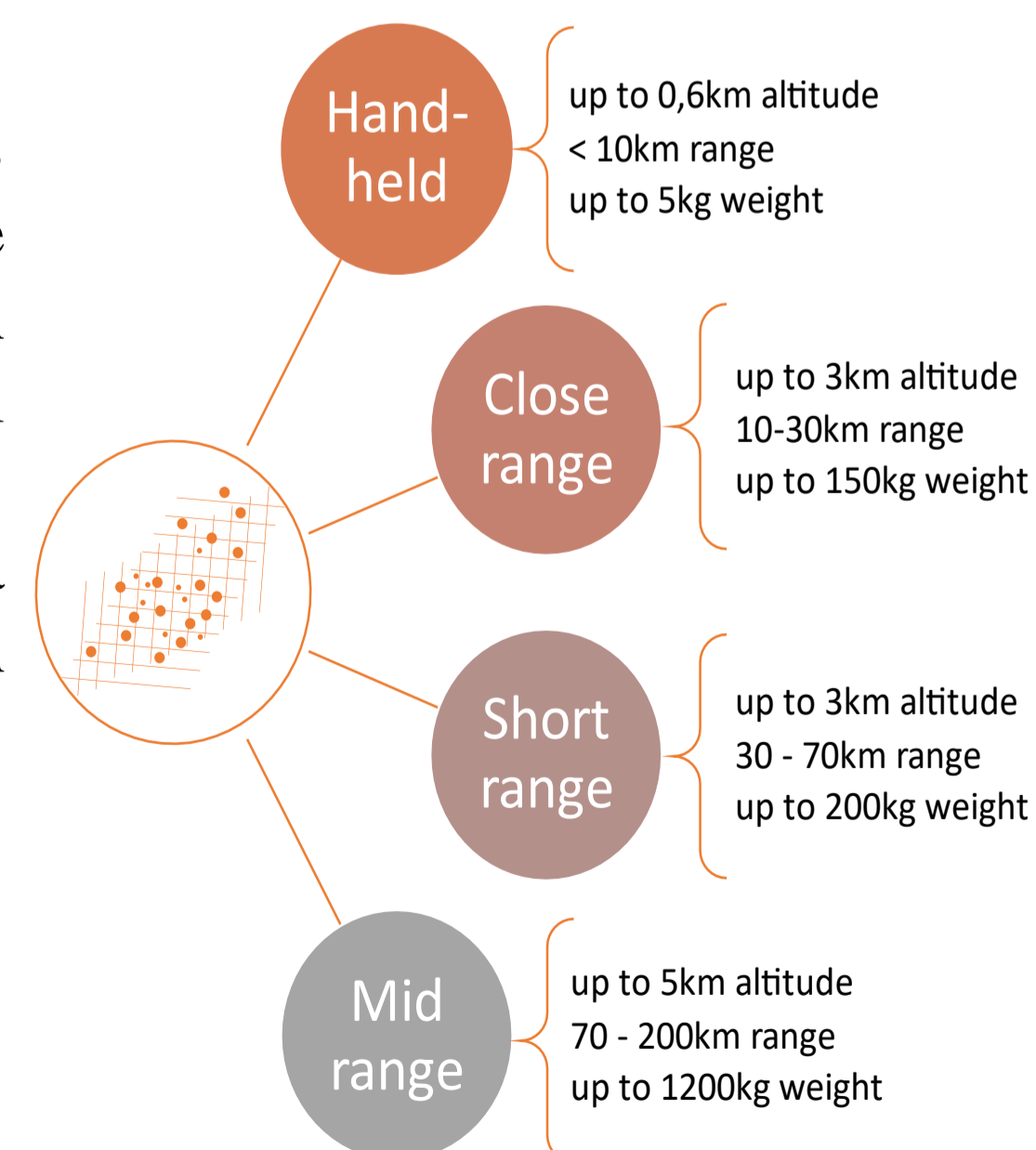


Fig. 1. UAV classification by Weight

Fig. 2. UAV Classification by range

AGRICULTURAL DRONE SURVEILLANCE CONCEPT

Another usage of the modern UAVs that is not as recognized and adopted as the field mapping and the crop spraying in the agriculture is for field surveillance and security

To take full advantage of the drone technology, the following use case was developed, using consumer grade UAV system (DJI Mavic Pro) and software that enables the device to execute pre-defined semi-autonomous flight missions (Litchi for DJI Drones).

To eliminate the need of persistent human presence we've developed a drone mission that will start from the mountain cow farm and will cover a square kilometers around it .

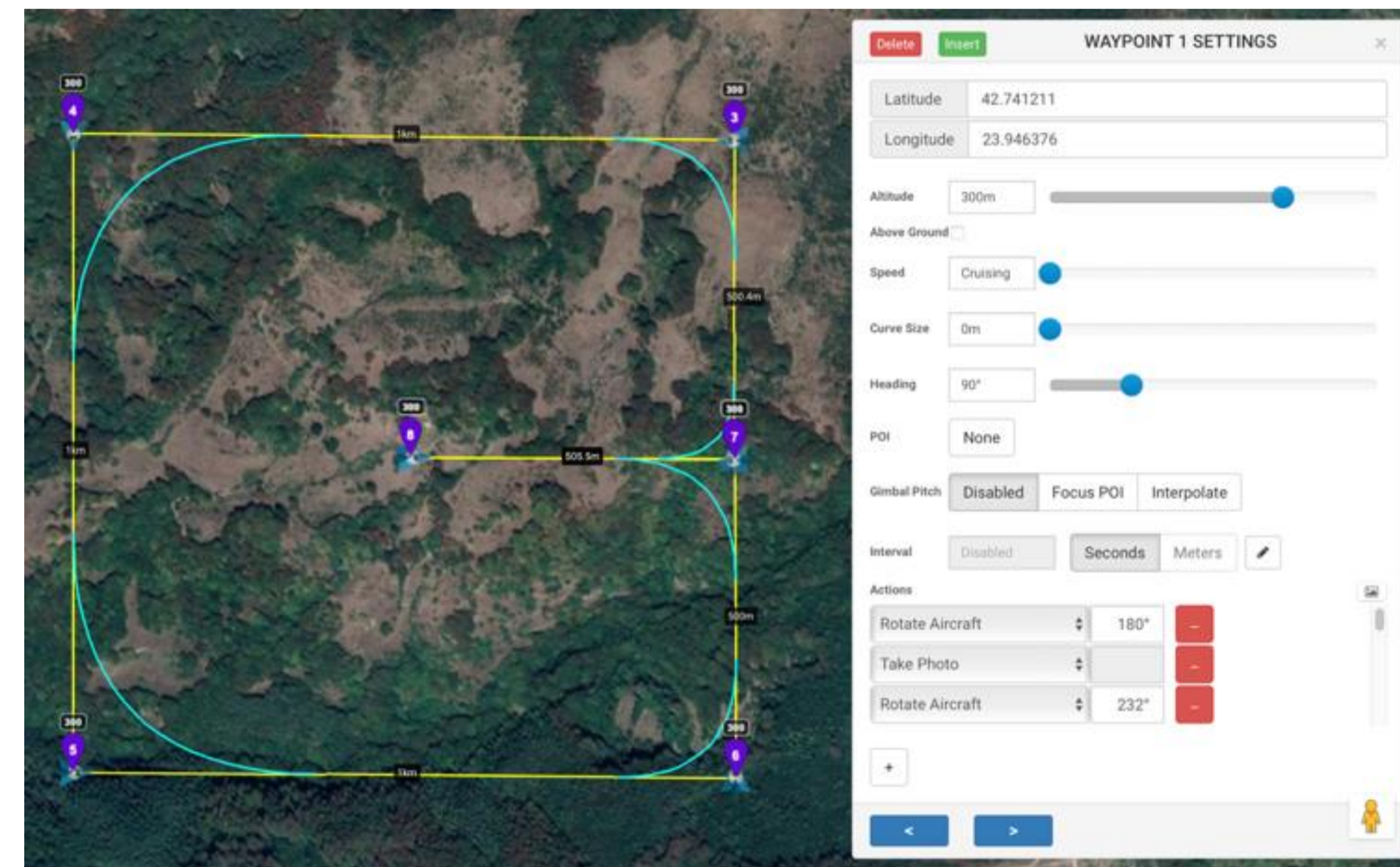


Fig. 5. Flight mission development

As a secondary flight scenario, it was used the same flight route, but instead of taking photographs on every waypoint it was used Video recording with aircraft rotation to 360 degrees on every 100 meters of the flight. Having that footage for every mission execution could not only provide details of the current position of the herd, but also could help surveilling the environment for potential external threats like humans, animals or other.

CONCLUSIONS

The use case we covered in this paper could be used with the same efficiency in urbanized areas or even closed spaces, only tuning the altitude of the aircraft, and considering the line of sight during the flight. The evaluation of the areas of application, the benefits of having "eyes in the sky" and the potential savings that can be achieved with a drone solution, showed us that the benefits of using drones outweigh the potential disadvantages and complications that could arise as a result of their use. .