The study and design of polarization remote sensing payloads system for unmanned aerial vehicles

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Compared with manned aerial vehicles, UAV is characterized by small size, light weight, low-cost, high mobility and strong adaptable, and it has already become the focal point of preferential development of aviation department in various countries. Polarization remote sensing is a new tendency in the field of remote sensing technology. It has more incomparable advantages compared than traditional remote sensing. It is significant for discerning various geographic objects of earth surface accurately, obtaining three-dimensional information such as the surface density of geographic objects, missile guidance, flight safety, military stealth and anti-stealth technique, etc.

In view of engineering and utilization, the paper establishes a polarization remote sensing payloads system with high technical coarctation for unmanned aerial vehicles, using existing research achievements of UAV Remote Sensing platform, long-term polarization theoretical research and conclusions of the ground experiment. It meets the requirements of intermediate-scale and small-scale UAV's applications in some aspects such as size, weight, energy consumption, work pattern and imaging quality. The payload system comprises the control Industrial Personal Computer (IPC), the camera management box, four polarized digital cameras, camera power, the camera IPC and the power management box. The UAV platform supplies 27V power. The control IPC is the control junction of the whole system, which controls system work by controlling the camera management box. The work flow of system is as following:

(1)The UAV platform supply 27V power for the payload system, the airborne control IPC starts up and sends power switch signal to the camera management box by the parallel port, and the power management box is time delay controlled by the camera management box.

(2)After the power management box starts up, dc power is supplied to the camera IPC and four Nikon D200 digital cameras.

(3)The airborne control IPC connected to the camera management box by the parallel port controls Nikon D200 digital camera shooting timing,

(4)The camera IPC receives and stores camera shooting images real-time through the camera control program, and extracts the quick view from the image, then sends the quick view to the airborne control IPC by direct network cable.

(5)The airborne control IPC packs the quick view (from the camera IPC), flight posture information, POS data of the shooting points (from RS422 low-speed asynchronous module) and flight track real-time data, then it sends the data packets to the UAV system, and the UAV system sends the data packets to the ground measuring controlling vehicle by the wireless communication link eventually.

Conclusion

For the purpose of different test, several joint debugging was done on ground. It was realized that automatic control to polarization RS imaging equipment that can automatically store and send getting polarization data. Polarization remote sensing payloads system for unmanned aerial vehicles is rare at home and abroad. It compensates the limitations at the aspects of kind and performance of imaging sensors UAV can carry in China.