

RESEARCH ON MULTI-UAV TASK ASSIGNMENT AND PATH PLANNING

Yao X., Balukho I. N., Kolchevsky N. N.

Belarusian State University

e-mail: 2689366072@qq.com, kolchevsky@gmail.com

Summary. *With the rapid development of UAV technology and the promotion of low-altitude economy, UAV applications are penetrating throughout the industry [1], and collaborative mission execution has become a mainstream trend. This paper focuses on the task allocation and path planning problems in multi-UAV collaborative mission planning.*

Unmanned aerial vehicles, referred to as UAV, have a wide range of applications in a number of fields [2]. For example, Jacolby Harvey, Idan Fiksel et al. have invented an unmanned aerial inspection system that detects damage to aircraft surfaces by acquiring images and LiDAR data from UAV-mounted cameras and LiDAR sensors [3]. An example of such a system is an aircraft inspection system (UAS) using UAVs, which includes components linked together to perform various tasks. UAS consists of: UAV system (configured to fly and automatically collect information about the object); computing system with communication system (remote transmission and exchange); artificial intelligence system (machine learning, data processing); device system (access, control, confirmation, processing, visualization) (figure 1).

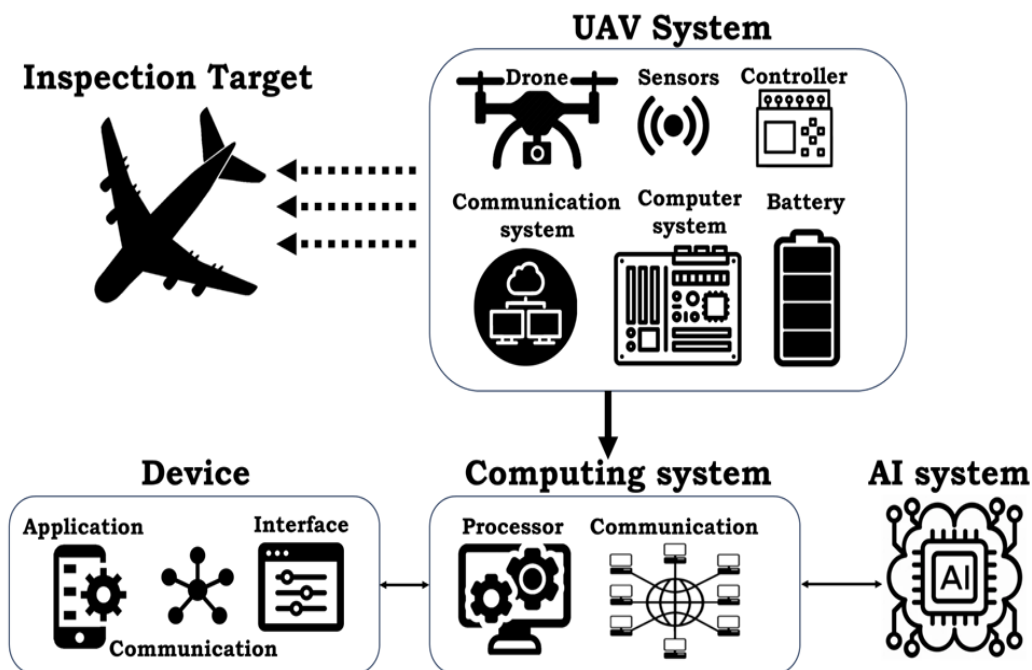


Figure 1 – UAV-enabled aircraft inspection system

In order to explore the problem of task assignment and path planning for multiple UAVs, firstly, the scheme optimization of task assignment for multiple UAVs is achieved by hybrid coding and fusion of the ideas of genetic algorithm and particle swarm algorithm, and the effective convergence of the algorithm is ensured.

Secondly, the basic constraints of the UAV path planning model are constructed, and the RRT algorithm is improved to introduce the idea of target gravity in order to achieve efficient search of target points with obstacle avoidance capability.

Finally, the feasibility of the task allocation method and the improved RRT algorithm is verified through MATLAB modelling simulation. Based on the task allocation results, the improved RRT algorithm is used to plan a path for each UAV, and finally a complete task allocation scheme and UAV flight path are formed.

Countries have different legal regulations on the use of UAVs, such as China, which avoids military risks through export controls, and Belarus, which manages use through import controls and national registration. Countries should strengthen communication and develop reasonable regulatory policies to balance safety and innovation. At the same time, the drone industry should take social responsibility to improve safety and enhance public trust.

References

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