

# Analytical analysis of cyber attacks on unmanned aerial systems

## Abstract

Cyber security has emerged as one of the most important issues in the operation of Unmanned Aerial Systems (UASs) due to their heavy reliance on the on-board autopilot systems. As the first step to implement an autopilot system that is robust to possible cyber attacks, we have conducted a study to identify potential cyber threats and vulnerabilities inherent in the given UASs. In an attempt to study these vulnerabilities in more detail, this paper presents an analytical algorithm to test the behavior of UASs under various cyber attacks and quantify their severity accordingly. Compared to a numerical approach, the analytical algorithm enables the prediction of the most effective cyber attack combinations without the need to compute the severity of all the attack combinations, thereby greatly reducing the computational cost. The performance of the proposed algorithm is demonstrated with a linearized longitudinal motion of a rotorcraft example.

## Indexed keywords

Analytical algorithms, Analytical analysis, Autopilot systems, Computational costs, Cyber security, Longitudinal motion, Numerical approaches, Unmanned aerial systems, Algorithms, Crime

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