

Secure Framework for Unmanned Aerial Vehicles

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The Unmanned Aerial Vehicles (UAV), known also as drones, can be autonomous or need human intervention to be remotely controlled. They are characterized by their low maintenance costs and their simple installation. That's why they have been exploited in many different domains like commercial, agricultural and military domains. However, their security requirements are gradually exposed.

In this context, this thesis proposal aims to design and to validate a secure UAV framework using new security approaches to manage security requirements in UAV context. Several scenarios have to be defined to pinpoint the different security requirements and test the proposed solutions. Different intelligent approaches based on artificial intelligence techniques (machine learning, deep learning, game theory, etc.) should be considered to optimize the energy consumption of the proposals.

Tasks planning

- 1) Task 1: To elaborate a state of the art related to the security requirements and proposed solutions to solve security attacks to which the unmanned aerial vehicles are exposed.
This task should be validated at least by one survey paper.
- 2) Task 2: To elaborate a state of the art related to the use of the artificial intelligence techniques related to the energy consumption in UAV.
This task should be validated at least by one survey paper.
- 3) Task 3: To design and validate a secure framework to improve and secure intra and inter communications in the unmanned aerial vehicles.
This task should be validated at least by one journal paper and one conference paper.
- 4) Task 4: To propose, specify and validate a new security approach to secure the UAV based on one of the artificial intelligence techniques. The security approach should be dynamic and contextual to take into account the mobility and distributed aspects of UAV.
This task should be validated at least by one journal paper and one conference paper.
- 5) Task 5: To study the energy impact of the solution proposed through a performance evaluation and improve the green aspects of the proposals.
This task should be validated at least by one journal paper or one conference paper.

References :

- [1] Zhi, Y., Fu, Z., Sun, X. *et al.* Security and Privacy Issues of UAV: A Survey. *Mobile Netw Appl* **25**, 95–101 (2020). <https://doi.org/10.1007/s11036-018-1193-x>
- [2] S. Tanwar, Q. Bhatia, P. Patel, A. Kumari, P. K. Singh and W. Hong, "Machine Learning Adoption in Blockchain-Based Smart Applications: The Challenges, and a Way Forward," in *IEEE Access*, vol. 8, pp. 474-488, 2020.