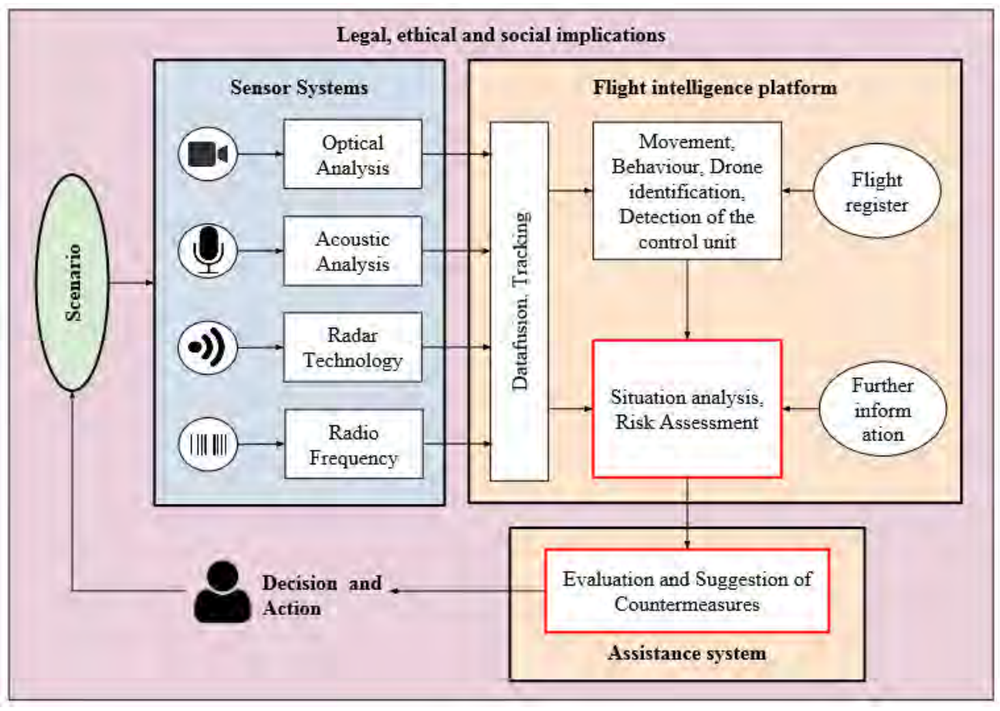
Decision Support Security System for Handling Unauthorized Unmanned Aerial Vehicles (UAVs)

Introduction

Making informed decisions requires adequate situation awareness, importantly knowledge of the protected assets in the scene and the possible threats that can be posed on them by a drone. In most cases, a decision has to be made amidst a set of alternatives often characterized with multiple criteria.

Objective

The scope of this thesis is enveloped the ArGUS project handled by the Fraunhofer IOSB as marked in the figure below:



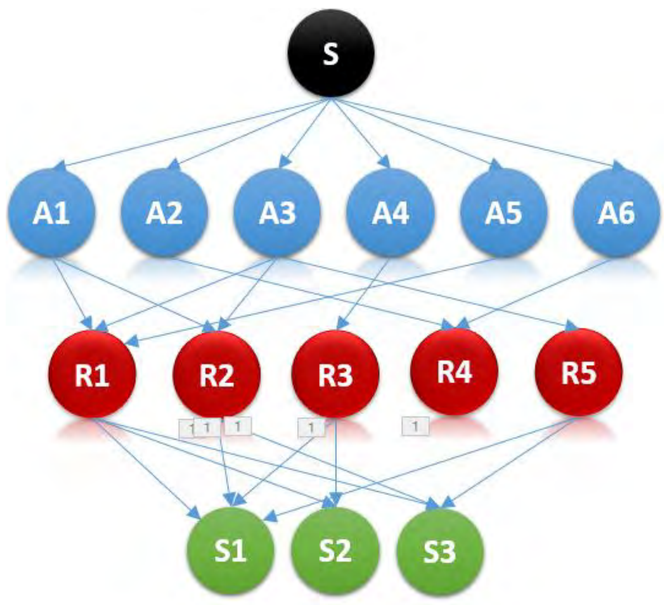
ArGUS project concept

The objective of the master thesis are to:

- Simulate and visualize flight scenarios
- Present an abstract modelling of the associations between an hostile object (drone) and the protected assets in the scene
- Present a concept for the situation analysis and risk assessment for the evaluation and consequences of suggested counter measures

Implementation

The Bayesian Belief Network (BN) is used to model the variables in the situation and calculate the joint probability (P_A) of each counter measure



The **expected utility** for each counter measure are further calculated

$$EU(A) = \sum_{o \in O} P_A(o)U(o)$$

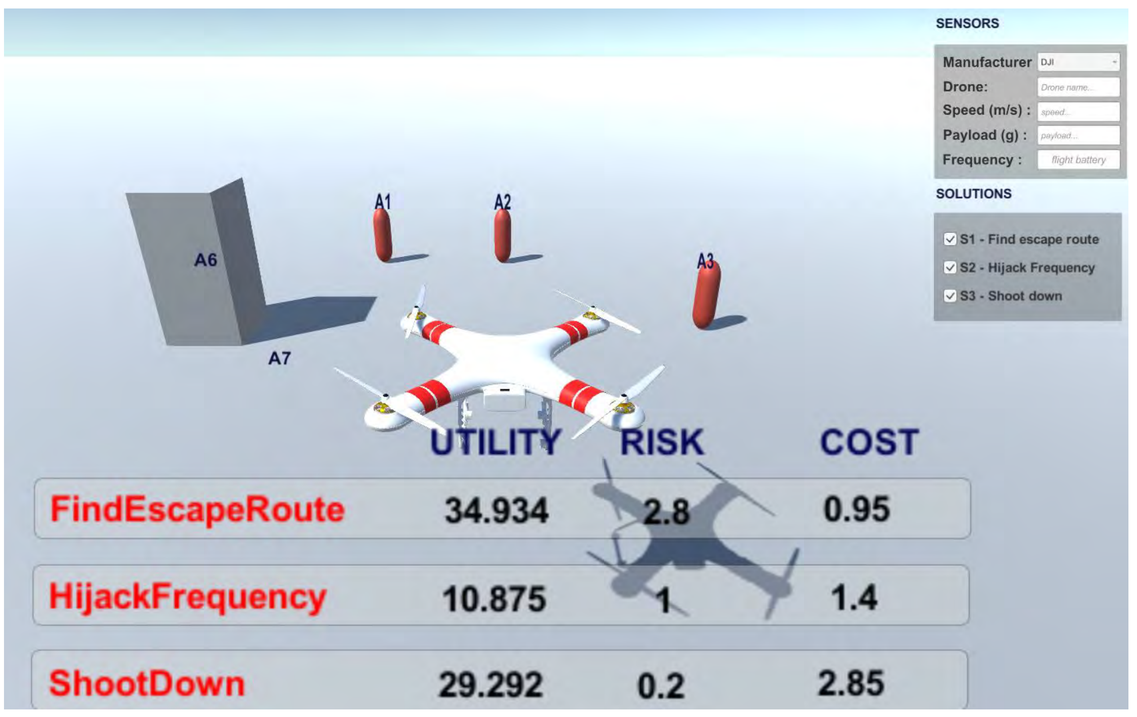
The **risk** for using a given counter measure

$$R_{S_n} = \sum_{a \in A} a \sum_{S_n \in a_s} S_{nR}$$

is the summation of all the corresponding risk that all assets in the situation can use.

And the **cost** for using a given counter measure is given by the sum of all risk of assets that is not covered by such solution

$$C_{S_n} = \sum_{a \in A} a \sum_{S_n \notin a_s} a_{value}$$



Drone standing in relation with assets in an example scene

Evaluation

BNs provide good implementation for problems with high degree of complexity, uncertainty and probabilistic reasoning. Inferencing from a BN should be supported with local rules for a good decision support.

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