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*Mathematical Modeling, Dynamics, and Simulation of Search and Rescue Operations through UAVs.*

The use of unmanned aerial vehicles (UAVs) to accomplish tasks is a fast growing field in technology today for search and rescue operations. This multidisciplinary area requires precise mathematical modeling, description of associated mechanics, and evolution of probabilistic algorithms. In this project, we consider the development of a unified model for a UAV that incorporates the dynamics along with a decision-making framework using probabilistic search algorithms. The governing differential equations describing the dynamics are solved via numerical algorithms, and its performance compared for our model. Bayes filters are implemented to detect the presence of targets in the search area through calculations of belief functions. The proposed models are validated computationally for benchmark applications including searching a savannah in Africa for poachers to identifying residues of pesticides in crops. The computational results will be compared against experimental results obtained via drones that are built as a part of this research. (Received September 22, 2015)