2019
MCM/ICM
Summary Sheet

Send in the Drones: Developing an Aerial Disaster Relief Response System

Summary

When a disaster occurs, the situation in affected area is often unpredictable, which attach great difficulties to supplies delivery and rescue operation in traditional way. The Aerial Disaster Relief Response System (ADRRS) use unmanned aerial vehicle to conduct a clipper transport and road reconnaissance ignoring terrain factors.

But in what basement locations and composition of UMA can we service better for the affected area and follow-up relief action. Based on the maximum delivery range and Genetic algorithm, we construct a selection model to meet the demand of Puerto Rico in 2017 or possible further disaster.

First, the maximum delivery range determined by geographic data gained from Google Earth alone with the longest reconnaissance distance, we obtained three best ISO container locations to carry out the next step. In this part, whole five target hospitals are separated into three independent areas. Each area has only one ISO container carrying all the needed material to operate the delivery and reconnaissance mission. We also considered our locations should get access to the major high way or the suburb in order to get minimum manpower support.

Second, we designed a group consist of a freight fleet, a reconnaissance fleet and medical supplies for each area to satisfy certain relief mission for a day which can normalize our system. Then, we confirm the optimal packaging strategy for each area by combining two processes, analyzing the number of groups an ISO container can contain and minimize the unused space in ISO container. This is where we conduct our modified genetic algorithm.

Finally, the flight map is given in a topographic form. We provide the delivery and reconnaissance plan respectively. Some UAV conduct both delivery and reconnaissance mission, which you will find no difficulty in distinguishing them clearly. We also continue to optimize the whole system by adding more freight fleet to increasing the containers' utilization under guidance of humanitarian.