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T1 _____	<b>1908904</b>	F1 _____
T2 _____		F2 _____
T3 _____	Problem Chosen	F3 _____
T4 _____	<b>B</b>	F4 _____

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**2019**  
**MCM/ICM**  
**Summary Sheet**

## Arrangement for DroneGo

### Summary

After the worst hurricane to ever hit Puerto Rico, lots of people were injured. Highways and roads were blocked and damaged by the flood. We establish a model to both meet the needs of medicine delivery and road reconnaissance with rotor wing drones.

Our model takes into account the following factors: the number of cargo containers, the type and the number of drones, the number of medicines, the associated packing configuration for each cargo container, the exact locations of cargo containers, and the schedule for each drone. Before establishing the model, we develop necessary assumptions and essential notations to make a reliable scenario.

After analyzing the locations of hospitals and flight distance of drones, we decide to set three containers because of the long distance among hospitals. Then, we quantify the associated packing configuration quality by the following three aspects: the minimum time to complete medical supply delivery, the amount of medical supply, and the reconnaissance ability. We use AHP Algorithm and the normalization method to determine the weights of these three factors and evaluate the Comprehensive Evaluation (CE) value. Then we use the greedy algorithm to get the best-associated packing configuration with the highest CE value under the ideal condition.

After that, we choose the approximate optimal positions for all cargo containers by image analysis to determine the optimate associated packing configuration in reality (using Bisection). We process the map of roads and populated places into pixels. Then, we can determine the exact location of containers by counting the occupied pixels of roads and populated places.

We provide the schedule plan for each drone. Then, we test our model and provide the evidence to show the stability and reliability of the work. In the end, we analyze the strengths and weakness of the model and conclude the result in our report.

**Keywords:** Drone, Route Planning, 3D Bin-Packing, AHP

