



Séminaire-Webinaire conjoint avec / Joint Seminar-Webinar with
Chaire en Planification des systèmes intelligents de logistique et de transport /
Chair on Intelligent Logistics and Transportation Systems Planning



MARIA ELENA BRUNI
University of Calabria, Italie



THE DRONE LATENCY LOCATION ROUTING PROBLEM UNDER UNCERTAINTY

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Authors: *Maria Elena Bruni, Sara Khodaparasti, Guido Perboli*

Abstract: In this seminar, we present a location routing problem arising in the last-mile drone delivery context, where drones are used to deliver small packages to a set of customers. Each drone is launched from a fulfillment center to serve multiple customers on a single trip. The goal is to find the optimal subset of fulfillment centers to use as drone launching and landing platforms and the optimal drone routes with the aim of minimizing the sum of customers' waiting times. We study the problem under two realistic assumptions. First, the drone energy consumption is a nonlinear function of the drone load that varies along the route, as parcels are delivered. Second, the drone flight time is not deterministically known.

To hedge against drone flight time uncertainty, we adopt a robust optimization approach. Due to the complex nature of the problem, which turns out to be a nonlinear mixed-integer problem, we design an exact method based on a tailored efficient Branch&Check algorithm that uses customized no-good cuts. The computational experiments show the validity of the proposed model and the promising performance of the exact method. Moreover, we present a case study on last-mile parcel delivery in Turin, Italy, providing insights into the advantages of a drone-based delivery system.

Bio: Maria Elena Bruni is Associate Professor in Operations Research at the University of Calabria since 2006 and collaborating member of CIRRELT (Montreal, Canada). She received a Ph.D in Operations Research at the University of Calabria and a M.S. in Public Economy from the University of Sapienza (Rome). Her research activity focuses on combinatorial problems under uncertainty and risk, with applications mainly in scheduling, routing and healthcare. She is co-author of more than 70 papers accepted in refereed journals and author of two book chapters. She received the best paper prize of the *IMA Journal of Management mathematics* in 2016.

LUNDI / MONDAY

18 septembre 2023, 11h00
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Room 5441

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Teodor Gabriel Crainic