Proposal for an invited session

"Efficient Routing: Models, Algorithms, Performance Evaluation an Practical Applications" for IFAC MIM 2022

Invited session identification code **k48wu**

Session co-chairs

Prof. Michael Khachay – Krasovsky Institute of Mathematics and Mechanics, Ekaterinburg, Russia
Prof. Alexander Petunin — Ural Federal University, Ekaterinburg, Russia
Prof. Chrysostomos Stylios – University of Ioannina, Greece

The main topic of this special session covers algorithmic aspects of a wide class of combinatorial optimization problems stemming from relevant real-life applications in industry, production, logistics, and artificial intelligence, where it is required to find optimal (e.g., shortest) routes for moving vehicles, couriers, laser cutters, aircrafts, or even mobile robots.

Mathematically, all these problems are generalizations of the classic Traveling Salesman Problem (TSP), Vehicle Routing Problem (VRP), or Orienteering Problem (OP). All of them are intractable in general case and even in very specific settings. Meanwhile, there are many positive results in the field of efficient approximation of their subclasses in the class of algorithms with theoretic guarantees, problem-specific branch-and-bound and branch-and-cut algorithms, and heuristics / metaheuristics, which usually have an amazing numerical performance.

In this session, we plan to discuss

- novel mathematical models coming from industrial or economical applications and their descriptions in terms of mixed integer programs and constraint programming

- novel approaches to mathematical studying of these models including algorithmic design, theoretical bounds, implementation, and numerical performance evaluation.

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Main session topics include but not limited to

Theoretical and numerical analysis of combinatorial optimization problems generalizing TSP, VRP and OP including the Generalized Traveling Salesman Problem, Asymmetric TSP, Capacitated VRP, Tourist Trip Planning Problem, Shortest Paths Problems with Must-Pass Nodes, etc.

- novel mathematical models in terms of integer or mixed optimization

- problem-specific branch-and-bound and branch-and-cut algorithms
- polynomial-time approximation algorithms with theoretical performance bounds and approximation schemes
- efficient approximation thresholds
- polynomial time solvable subclasses and exact algorithms, including special schemes of dynamic programming

- randomized algorithms
- heuristics and metaheuristics
- numerical algorithm analysis and benchmarking

- computational intelligence and evolutionary algorithms

- real-life routing problem settings stemming from industry, production, and logistics

- novel mathematical models and algorithms of the tool path problem for the CNC sheet metal cutting machines

- routing with dynamic constraints

Submission

Authors interested in submitting their research, refer to www.ifac.control.org. All papers should be two column format as per IFAC manuscript style. The full length draft paper must be submitted by December 25, 2021. All submitted papers will be peer reviewed by IPC members. The corresponding author submits the paper on line as an invited paper session with code **k48wu.**

Important dates

Deadline for submission	December 25, 2021
Notification of acceptance/rejection	February 15, 2022
Deadline for final submission	March 15, 2022

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