David **Fiedler**

PhD student · Artificial Intelligence Center

Czech Technical University in Prague, Karlovo náměstí 13, Prague 2, Czech Republic

(+420) 737-472-531 | david.fido.fiedler@gmail.com | F-I-D-O | david-fido-fiedler | David Fiedler |

ORCID: 000-0001-5374-1089

Education

Faculty of Electrical Engineering, CTU in Prague — *Prague, Czech Republic*

PhD in Computer Science — *2017–2024*

- Advisor: Michal Pěchouček
- Advisor specialists: Michal Čáp, Michal Jakob
- Thesis: Large-scale Mobility-on-demand: Simulation Studies and Optimization

Faculty of Applied Sciences, University of West Bohemia — *Pilsen, Czech Republic*

MSc in Intelligent Computer Systems — *2014–2016*

- Thesis: Use of Multiagent System Methods for Implementation of Artificial Intelligence in Real-time Strategy Games, supervisor: Ondřej Rohlík

Faculty of Applied Sciences, University of West Bohemia — *Pilsen, Czech Republic*

BSc in Computer Science — *2010–2014*

- Thesis: Managing Contacts on Android Platform, supervisor: Ladislav Pešička

Research Projects

Large-scale Mobility-on-demand: Simulation Studies and Optimization — *CTU in Prague*

PhD Thesis project — *2017-2024*

- This thesis focuses on improving the large-scale Mobility-on-demand (MOD) systems. Simulation studies are used to better understand MoD systems and answer related research questions. Based on the insights gained from the simulations, we propose a new optimization method for optimal plan chaining. This new method has the potential to improve the efficiency of various MoD-related problems, which we demonstrate with the example of vehicle dispatching (Dial-a-ride problem).
- Currently, the thesis is submitted and waiting for defense. The last manuscript from the thesis focused on optimal plan chaining is in review in *Transportation Research Part C: Emerging Technologies*. Finally, a subsequent manuscript focused on the plan chaining application is in review in *Nature Computational Science*

Feasibility of eVTOL Transport in Urban Environments — *CTU in Prague*

Bell Textron Inc. Multi-Modal Traveler Modeling Project — *2021*

- This project studied the viability of using electric vertical take-off and landing travel system for urban mobility.
- Our transportation team defined the goals and requirements with Bell Textron Inc. and developed a simulation model to evaluate the feasibility of the eVTOL system.
- I focused on the simulation model and optimal eVTOL station positioning.
- We delivered the codebase and summarized our findings in a report.

Publications

Published

Fiedler, D., & Mrkos, J. (2023). Large-scale Ridesharing DARP Instances Based on Real Travel Demand. *2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC)*, 2750–2757. https://doi.org/10.1109/ITSC57777.2023.10422146

Fiedler, D., Čertický, M., Alonso-Mora, J., Pěchouček, M., & Čáp, M. (2022). Large-scale online ridesharing: The effect of assignment optimality on system performance. *Journal of Intelligent Transportation Systems*, *0*(0), 1–22. https://doi.org/10.1080/15472450.2022.2121651 **(citations: 1, 0, 1)***

Fiedler, D., Čáp, M., Nykl, J., & Žilecký, P. (2022). Map Matching Algorithm for Large-scale Datasets. *Proceedings of the 14th International Conference on Agents and Artificial Intelligence Proceedings of the 14th International Conference on Agents and Artificial Intelligence*, 500–508. Retrieved February 24, 2024, from https://www.scitepress.org/Link.aspx?doi=10.5220/0010849100003116 **(citations: 3, 0, 3)**

Schaefer, M., Čáp, M., Fiedler, D., & Vokřínek, J. (2021). On-demand Robotic Fleet Routing in Capacitated Networks with Time-varying Transportation Demand. *Proceedings of the 13th International Conference on Agents and*

Artificial Intelligence, 907–915. Retrieved February 24, 2024, from https://www.scitepress.org/Link.aspx?doi=10.5220/0010261009070915

Fiedler, D., Čertický, M., Alonso-Mora, J., & Čáp, M. (2018). The Impact of Ridesharing in Mobility-on-Demand Systems: Simulation Case Study in Prague. *2018 21st International Conference on Intelligent Transportation Systems (ITSC)*, 1173–1178. https://doi.org/10.1109/ITSC.2018.8569451 **(citations: 14, 2, 9)**

Fiedler, D., Čáp, M., & Čertický, M. (2017). Impact of mobility-on-demand on traffic congestion: Simulation-based study. *2017 IEEE 20th International Conference on Intelligent Transportation Systems (ITSC)*, 1–6. https://doi.org/10.1109/ITSC.2017.8317830 **(citations: 12, 1, 5)**

In Review

Fiedler, D., Difonzo, F. V., & Mrkos, J. (2024, February 24). *Optimal Chaining of Vehicle Plans with Time Windows*. arXiv: 2401.02873 [cs, math]. https://doi.org/10.48550/arXiv.2401.02873

*The citation format is: (citations: *WoS IF*, *WoS*, *other*), where the numbers are citations from journals indexed in the WoS with impact factor (*WoS IF*), citations from other publications indexed in the WoS (*WoS*), and citations from other sources (*other*).

Teaching Experience

Courses

Parallel and Distributed Computing — *CTU in Prague*

Teaching Assistant, BSc course — *2020–2023*

- Teaching tutorials in C++ on topics in parallel computing
- Tutorial organization for the parallel part of the course
- Maintanence of assignments and coding exercises
- Preparation of the programming exams

Introduction to Artificial Intelligence — *CTU in Prague*

Teaching Assistant, BSc course — *2017–2018*

- Teaching tutorials on search algorithms, Constraint programming, and game theory
- Assignments: introduction, coder review, and grading

Multiagent Systems — *CTU in Prague*

Teaching Assistant, MSc course — *2020*

- Teaching tutorials on Multiagent Systems (about $25\,\%$ of the course)
- Preparation, code review, and grading of the multi-agent planning assignment

Student Supervision

2021–2023	**Martin Bláha***, Combined Solution for Ridesharing and Delivery in Urban Areas	*CTU in Prague*
2021–2022	**Adéla Kubíková**, Optimizing Ridesharing with Transfers in Urban Areas	*CTU in Prague*
2020–2021	**David Mokoš**, Online Planner for Food Deliveries	*CTU in Prague*
2020–2021	**Pavel Martinec**, Single-vehicle DARP Optimization for ridesharing using Operational Research Methods processing tool	*CTU in Prague*
2020–2021	**Jan Trávníček**, User interface and user accessibility functions for RoadGraphTool, a road network processing tool	*CTU in Prague*
2020–2021	**Lukáš Kulhánek**, GPU Parallelization of the Backtracking Algorithm for Single-vehicle DARP	*CTU in Prague*
2019–2020	**Michal Cvach**, Implementation of the Transit Node Routing Algorithm in the AgentPolis Simulation Framework	*CTU in Prague*
2019–2020	**Olga Kholkovskaia**, Scalable Offline Ridesharing Algorithm	*CTU in Prague*
2018–2019	**Matouš Dzivjak**, Estimating the Parking Capacity in Cities Using Aerial Images	*CTU in Prague*
2018–2019	**Aleksandra Pravednikova**, Analyzing the Impact of Changes in Road Network to Traffic Densities	*CTU in Prague*
2017–2018	**Martin Koryťák**, Operating Speed Estimation on Road Segments	*CTU in Prague*

Internationalization

Delft University of Technology — *Delft, Neatherlands*

Three months internship related to mobility-on-demand — *2018*

- At the Department of Cognitive Robotics, Faculty of Mechanical Engineering (3ME)
- Advisors: Michal Čáp, Javier Alonso-Mora

Languages & Tools

Languages

●●●●● **Czech**, native
●●●●○ **English**, fluent
●○○○○ **French**, basic communication skills

Programming Languages

●●●●○ Python
●●●●○ Java
●●●●○ C++
●●○○○ PHP
●●○○○ JavaScript
●●○○○ C#

Tools

Database PostgreSQL, PostGIS, MySQL, SQLite
GIS QGIS, Overpass API
Front-end HTML, CSS, Bootstrap, jQuery, JavaFX
Other Git, LaTeX, Gurobi, Slurm

Open Source Software

SiMoD *Java, Python*
Maintainer, main contributor *2016-PRESENT*

- Simulation of Mobility-on-Demand Systems (SiMoD) is a software tool for simulating the operation of mobility-on-demand systems.
- The tool consists of an event-based simulation in Java and supporting Python scripts for input, output, and analysis.
- The simulation contains implementations of various algorithms for dispatching, rebalancing. There is also a station positioning algorithm in the Python part.

DARP Instances *PostgreSQL, Python*
Maintainer, main contributor *2023-PRESENT*

- Instances for large-scale ridesharing (DARP) problems together with the code for generating them from open data.
- Instances combine data from OpenStreetMap, municipality data, and Uber Movement.
- Three areas are covered: New York City, Chicago, and Washington, D.C.

Shortest Distances *C++*
Maintainer, contributor *2019-PRESENT*

- Tool and library for fast computation of shortest distances in road networks.
- Various methods and datastructures are implemented with different trade-offs between memory usage and speed.
- The tool consists of a preprocesor for creating the datastructures and a query tool for computing the distances.
- There is a Java binding for the library.

Agentpolis *Java, Python*
Maintainer, contributor *2016-PRESENT*

- Event-based transportation simulation framework.
- Main dependency of SiMoD and similar projects
- Versatile and highly configurable.

Info plugin for Maven *Java*
Maintainer, main contributor *2024-PRESENT*

- Maven plugin for listing dependencies cached in the local repository.
- Available at Maven Central.

Awards

Taxify Challenge. *Online*
1st Place *2018*

We developed the best dispatching algorithm for ride-hailing services among all teams in the international competition.

Simpleway Transportation Hackathon *Paralelní Polis*
3rd Place *2017*

Our idea for this hackathon was to create a system for mobility-on-demand with transfers. We have developed a prototype dispatching algorithm that was able to dramatically reduce the number of vehicles needed compared to the system without transfers.

Vision of Mobility in Prague 2030

Online

1st Place *2017*

This competition was organized by the Prague Institute of Planning and Development. We developed a complete vision of future mobility in Prague, including mobility-on-demand, ridesharing, dynamic pricing for parking, or congestion pricing.

Writing

Smart Mobility Group developer manuals

Developer manuals

Founder & Main Contributor *2023–PRESENT*

- A set of manuals for junior developers in the Smart Mobility Group, Artificial Intelligence Center, Czech Technical University in Prague.
- Covers the basics of developing software in several programming languages, maintenance of operating systems, and manuals for software related to tasks in the Smart Mobility Group.

Metodika vzdělávání na rádcovských kurzech

Methodical Guide for the Scout Organization

Coordinator & First Author *2022*

- A methodical guide for the organization of scout courses for the leaders of the scout patrols.
- It covers all topics that should be taught in the courses and the manual for the organization of the courses.
- Additionally, the guide is connected with a set of specific activities that can be used in the courses.

Presentation

PrgAI Mobility Meetup

Prague, Czech Republic

Potential and Risks of Mobility-on-demand Systems *2019*

- Presentation for the members of the PrgAI community, open to the public.
- The presentation covered the potential of mobility-on-demand systems, specifically the systems with ridesharing, and presented the results of the simulation study prepared for the Intelligent Transportations Systems Conference.

Meeting of the IT and Smart City Committee, Prague City Assembly

Prague, Czech Republic

The Impact of Ridesharing in Mobility-on-Demand Systems: Simulation Case Study in Prague *2019*

- Presentation for the members of the committee and also for the members of the Prague City Assembly, including the Mayor of Prague.
- The presentation covered the potential of mobility-on-demand systems, specifically the systems with ridesharing, and presented the results of the simulation study prepared for the Intelligent Transportations Systems Conference.

AutoSympo

Roztoky, Czech Republic

Potential and Risks of Mobility-on-demand Systems *2019*

- This conference was organized by the Josef Božek National Competence Center for Surface Transport Vehicles
- The presentation covered the advantages and risks of mobility-on-demand systems and concluded with the recent results evaluating those advantages and risks.

Work Experience

Artificial Intelligence Center, CTU, Prague

Prague, Czech Republic

Researcher *September 2016–Present*

Citya

Prague, Czech Republic

Consultant *July 2022–Present*

RTSof

Pilsen, Czech Republic

Developer *June 2014-–August 2016*

ANTStudio

Pilsen, Czech Republic

Developer *November 2013–May 2014*

Extracurricular Activity

Academia and Education

Academic Senate of Faculty of Electrical Engineering, CTU

Prague

Member *2018–2021*

- Commision for the development of the faculty
- Work on the new election rules for the faculty that were implemented in 2021.

Technologická olympiáda

Prague

Mentor *2022, 2023, 2024*

- Technologická olympiáda is a czech national competion for highscool student teams.
- The teams should present novel solutions to one of the given problems.
- The mentor's role is to consult with the teams and give them feedback on their ideas and presentations.

Scout Movement

ČLK Hrádek: qualification course for young Scout leaders

Hrádek u Sušice, Pilsen, Online

Instructor — *2021–PRESENT*

- Instructor: methodology (2022–PRESENT)
- Instructor: planning (2021)
- Adventure and experience: team leader (2021–2023), team member (PRESENT)
- Instructor: Scoutcraft (2023–PRESENT)

Department of Scouts and Guides

Prague, Online

Member — *2017–PRESENT*

- Department of Scouts and Guides coordinates the education in the Czech Scout Association for older children (10–15 years old, all genders).
- Main responsibility: team (patrol) system

Committee for the revision of the *Skautská Stezka*

Prague, Online

Member — *2013–2019*

- Skautská Stezka is the main self-education material for children in the Czech Scout Association.
- This committee was responsible for the last big revision of the material.
- The revision completely changed the structure and system, redesigned most of the activities and tasks and changed the design and storyline of the material.

Scout Group Stopa Plzeň

Pilsen

Deputy — *2013–2019*

- This group consists of five Scout units, approximately 400 members.
- Main responsibilities of the group are coordination between units and organization of common events.

Scout Unit Vločka Plzeň

Pilsen

Leader — *2009–2013*

- This group consists of children of all genders and age groups, approximately 100 members.
- Currently, I prepare program for the unit only twice a year and I don't have any official position.

Film Clubs

Six Feet Under Film Club

Prague

Organizer — *2021–PRESENT*

Film Club of the Scout Institute in Prague

Prague

Organizer — *2017–2018*

Pilsen Scout Film Club

Pilsen

Organizer — *2013–2017*