

# Antonis F. Lentzakis, PhD

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## Education

Nanyang Technological University

Singapore South West, Singapore

PhD Degree from the school of EEE

July 2018

Thesis title: Region-based Urban Traffic Management

Thesis advisors: Assoc. Prof. Rong Su (supervisor), Prof. Changyun Wen (co-supervisor)

Technical University of Crete

Chania, Greece

Master's Degree in Operations Research

February 2009

Thesis title: Off-line Application of the Motorway Traffic Surveillance Tool

RENAISSANCE to a Motorway Network around Antwerp, Belgium

Thesis advisor: Markos Papageorgiou (supervisor)

Technical University of Crete

Chania, Greece

Diploma in Production Engineering & Management (equivalent to BSc & MSc) October 2006

Thesis title: Comparison of Lagrangean Relaxation Algorithms applied to a single constraint Quadratic Knapsack Problem subject to lower bounds

Thesis advisor: Athanasios Migdalas (supervisor)

## Research Interests

Game Theory, Mechanism Design, Bayesian Optimization, Kalman Filters, Optimal Control, Multilevel Programming, Reinforcement Learning, Hierarchical Density-based Clustering, Sparse Subspace Clustering

## Research and Work Experience

Research Scientist in NEXT Gen Tech, NCS Group

July 2021 – Present

Co-PI (Principal Investigator) for SCALE lab projects HEMS (Home Energy Management System) and EchoLoc & EMR (Location sensing using EchoLocation and Powerline-induced Alternating Magnetic Fields), contributing Researcher for SCALE lab project New Systems for Supporting Spatiotemporal Data Analytics on Telco Data and Social Media Data, with particular focus on carpark availability prediction and personalized discount pricing, Scientist for NCS-NUS-AISG project for Data Center Energy Usage Optimization

Senior Data Scientist (Under Contract To) DataSpark      January 2022 – May 2022

RAN Investment Optimizer Module (Contract: M100003552) for Telkomsel (Indonesian Wireless Network Provider). Explored Anomaly Detection approaches for outlier detection, implemented hyperparameter tuning for Demand forecasting model refinement, performed validation of Demand forecasting performance, participated in development of hierarchical time series forecasting model and participated in the design & implementation of capacity prioritization engine

Postdoctoral Research Associate in SMART-FM IRG      November 2018 – July 2021

Extension and enhancement of DynaMIT2.0, a system that employs simulation-based Dynamic Traffic Assignment (DTA), for traffic estimation, prediction, and control, developed by the MIT Intelligent Transportation Systems Lab.

Research Associate in NTU-NXP project      December 2017 – November 2018

Participation in NTU-NXP Smart Mobility project supported by the Singapore Economic Development Board, responsible for developing a Route Planning module for a Smart Mobility Test Bed

Research Associate in ANTREOFF project      January 2008 – February 2009

Participation in project ANTREOFF funded by the European Union which implemented an off-line application of the motorway traffic surveillance tool RENAISSANCE to a motorway network around Antwerp, Belgium

Research Associate in EPEAEK II project      January 2008 – August 2008

Participation in project EPEAEK II financed by the Technical University of Crete and the Greek Ministry of Education which implemented a restructuring of the undergraduate study program using genetic and evolutionary algorithms

RoboCup Team “Kouretes”      January 2007 – July 2007 Member

of the Technical University of Crete RoboCup team

Professional Mechanical Engineer      December 2006 – 2012

Member of the Technical Chamber of Greece (TEE). Implementation of technical reports (electrical, HVAC) in Rethymno, Greece

## **Publications / Technical Reports**

- “*Evaluating congestion pricing schemes using agent-based passenger and freight microsimulation*”, Jing, P., Seshadri, R., Sakai, T., Shamshiripour, A., Alho, A.R., Lentzakis, A.F. and Ben-Akiva, M., submitted for publication to Transportation Research Part A: Policy and Transport
- “*SSTGDN: A scalable spatiotemporal graph diffusional network for multivariate time series forecasting*”, Yue Jiang, Xiucheng Li, Yile Chen, Shuai Liu, Weilong Kong, Antonis F. Lentzakis and Gao Cong, submitted for publication to the Proceedings of the VLDB Endowment

- “*Predictive distance-based road pricing — Designing tolling zones through unsupervised learning*”, Lentzakis, A.F., Seshadri, R. and Ben-Akiva, M., Transportation Research Part A: Policy and Transport Vol. 170 (2023), p. 103611
- “*Design and Evaluation of Future Urban Congestion Pricing Schemes with Agent-based Microsimulation*”, Jing P., Sakai T., Romano Alho A., Lentzakis, A.F., Seshadri, R., Shamshiripour A. and Ben-Akiva M., presented in Transportation Research Board 102nd Annual Meeting, Washington, DC, 2023
- “*A safe reinforcement learning approach for multi-energy management of smart home*”, Ding H., Xu Y., Hao B.C.S., Li Q and Lentzakis, A.F., Electric Power Systems Research Vol. 210 (2022), p.108120
- “*Sparse Subspace Clustering Methods for Tolling Zone Definition within Distance-based Toll Optimization*”, Lentzakis, A.F., Seshadri, R. and Ben-Akiva M., presented in Transportation Research Board 101st Annual Meeting, Washington, DC, 2022
- “*Impacts of Automated Mobility-on-Demand on traffic dynamics, energy and emissions: A case study of Singapore*”, Oh S., Lentzakis, A.F., Seshadri, R. and Ben-Akiva, M., Simulation Modelling Practice and Theory Vol. 110 (2021), p. 102327
- “*Affinity Matrix Learning through Subspace Clustering for Tolling Zone Definition*”, Lentzakis, A.F., Seshadri, R. and Ben-Akiva, M., 7th International IEEE Conference on Models and Technologies for Intelligent Transportation Systems, Virtual, June 2021
- “*Network Impacts of Automated Mobility-on-Demand: A Macroscopic Fundamental Diagram Perspective*”, Oh S., Lentzakis, A.F., Seshadri, R. and Ben-Akiva, M., arXiv eprints (2020): arXiv-2011.
- “*Hierarchical density-based clustering methods for tolling zone definition and their impact on distance-based toll optimization*”, Lentzakis, A.F., Seshadri, R., Akkinapally A.P., Vu, V. and Ben-Akiva, M., Transportation Research Part C: Emerging Technologies Vol. 118 (2020), p. 102685
- “*Feature-variant clustering methods for tolling zone definition and their impact on distance-based toll optimization*”, Lentzakis A.F., Seshadri R., Akkinapally A.P., Vu V. and Ben-Akiva M., Transportation Research Board 99th Annual Meeting, Washington, DC, 2020
- “*A Simulation Modeling Framework with Autonomous Vehicle Region-based Routing and Public Transit Diversion Integration*”, Simon I. Ware, Antonis F. Lentzakis, Rong Su, in 22<sup>nd</sup> IEEE Intelligent Transportation Systems Conference (ITSC 2019), Auckland, NZ, October 2019
- “*Predictive Distance-based Toll Optimization Under Varying Demand Levels*”, Vu, V., Lentzakis, A.F., Seshadri, R., Tan, G., Ben-Akiva, M., 26th ITS World Congress, Singapore, October 2019
- “*Region-based prescriptive route guidance for travellers of multiple classes*”, Lentzakis, A.F., Ware, S.I., Su R. and Wen C., Transportation Research Part C: Emerging Technologies Vol. 87 (2018), pp. 138-158
- “*Jaya, WCA and HS methods for solving large-scale real-life urban traffic light scheduling problem*”, Gao, K., Sadollah, A., Zhang, Y., Lentzakis, A.F., Su, R., Swarm and Evolutionary Computation Vol. 37, (2017), pp. 58-72.
- “*Region-based dynamic forecast routing for autonomous vehicles*”, Antonis F. Lentzakis, Simon I. Ware, Rong Su, in 19<sup>th</sup> IEEE Intelligent Transportation Systems Conference (ITSC 2016), Rio de Janeiro, Brazil, November 2016

- “*Strategic Learning approach to Region-based Dynamic Route Guidance*”, Antonis F. Lentzakis, Rong Su, Changyun Wen, in 12<sup>th</sup> IEEE International Conference on Control and Automation (ICCA 2016), Kathmandu, Nepal, June 2016
- “*Discrete Harmony Search Algorithm for Solving Urban Traffic Light Scheduling Problem*”, Kaizhou Gao, Yicheng Zhang, Rong Su, Antonis F. Lentzakis, IEEE proceedings of 2016 American Control Conference (ACC 2016), Boston, USA, July 2016
- “*Time-dependent Partitioning of Urban Traffic Network into Homogeneous Regions*”, Antonis F. Lentzakis, Rong Su, Changyun Wen, in 13th International Conference on Control, Automation, Robotics and Vision (ICARCV 2014), pp. elec-proc. 2014.
- “*Real-time merging traffic control with applications to toll plaza and work zone management*”, Markos Papageorgiou, Ioannis Papamichail, Anastasia Dimitriou Spiliopoulou and Antonis Fanouriou Lentzakis, in Modélisation du Trafic – Actes du Groupe de Travail 2007, Actes INRETS No. 123, Paris, France, 2009, pp. 101-128
- “*Off-line Application of the Motorway Traffic Surveillance Tool RENAISSANCE to the Motorway Network Around Antwerp*”, C.M.J. Tampère, A.F. Lentzakis, M. Papageorgiou & I. Papamichail, Report for Ministerie van het Vlaams Gewest, Department Mobiliteit en Openbare Werken, Vlaams Verkeerscentrum, Belgium, February 2009
- “*Real-time merging traffic control with applications to toll plaza and work zone management*”, Papageorgiou M., Papamichail I., Spiliopoulou A.D. and Lentzakis A.F., Transportation Research Part C: Emerging Technologies, Vol. 16, 5 (2008), pp. 535-553
- “*Real-Time Work Zone Management for Throughput Maximization*”, Lentzakis A. F., Spiliopoulou A. D., Papamichail I., Papageorgiou M. and Wang Y., Proceedings of the Transportation Research Board 87th Annual Meeting (Paper CD-ROM), Washington, DC, 2008.

## Invited Talks

- Predictive Distance-based Toll Optimization, TS 42: Road pricing as an effective tool to manage travel demand, 26<sup>th</sup> ITS World Congress, Singapore, October 2019
- Feature-variant clustering methods for tolling zone definition and their impact on distance-based toll optimization, Future Urban Mobility IRG Lunch Seminar, SMART, Singapore, October 2019
- Real-time Predictive Toll Optimization, Session 3: Real Time Mobility Control Strategies, SMART Future Urban Mobility Symposium, Singapore, January 2019
- Time-dependent Partitioning of Urban Traffic Network into Homogeneous Regions, Dynamic Systems and Simulation Laboratory, Technical University of Crete, Greece, July 2014
- Application of the Motorway Traffic Surveillance Tool RENAISSANCE to a Motorway Network Around Antwerp: Preliminary Results, Vlaams Verkeerscentrum, Belgium, April 2008

## Participations Meetings / Seminars

- Participation to the Winter School on Intelligent Transportation, co-sponsored by Centre of INFINITUS, SMEL@NTU, and IEEE CSS Technical Committee on Smart Cities, in conjunction with NTU-NXP Smart Mobility Test Bed Industry Partnership Showcase 2017, Nanyang Technological University, on January 2017 which took place in Singapore.

- Participation to the kick-off meeting of action TU0702 of the COST project titled “Real-time Monitoring, Surveillance and Control of Road Networks under Adverse Weather Conditions” in April 2008 which took place in Brussels, Belgium.

## **Competitions**

- 2<sup>nd</sup> Place in international MSRS Simulation Challenge in RoboCup 2007, as part of the T.U.C. Kouretes Four-Legged Simulation Team, Atlanta, U.S.A., July 2007

## **Computer Skills**

### **Programming Languages:**

High Expertise: C, C++, MATLAB, Python

Medium Expertise: C#, FORTRAN, Rustlang

Working Knowledge: Lua, R, PostgreSQL

### **Operating Systems:**

GNU/Linux, Windows

### **Software Applications:**

DynaMIT2.0 traffic surveillance, estimation, prediction and control system, SimMobility agent-based urban traffic simulation platform, Aimsun microscopic simulation software, PTV Vissim microscopic simulation software, FET timetabling software, ESRI ArcView GIS, Google OR-Tools, PuLP, Apache Spark, Keras, Tensorflow, Pytorch, Streamlit, Docker

### **Language Skills**

- Greek  
Mother tongue
- English  
Proficiency in English by University of Cambridge
- German  
Goethe Institute Mittelstufe Certificate

### **Hobbies and Activities**

Fair knowledge of French (written and oral)

Amateur musician (a Greek traditional instrument named 'Cretan Lyra')

Amateur Weiqi/Go player, Swimming, Running, Judo, Rubik's Cube Enthusiast

### **References** (Available upon request)