



Delft University of Technology

Simulation of an Automated Public Transportation System

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TRAVISIONS 2016

contest book



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TRAVISIONS 2016

contest book

This book includes the abstracts of all the project ideas submitted for evaluation to TRAVISIONS 2016 competitions. TRAVISIONS 2016 winners were awarded in April 2016 during the TRA 2016 conference in Warsaw.

The book was prepared by **TRAVISIONS 2016** consortium and was designed and directed by Prof. Ezio Spessa, Associate Professor at Politecnico di Torino, Ms. Micol Biscotto, research fellow at the same university and by Mr. George Smyrnakis, Secretary General of WEGEMT.

TRAVISIONS 2016 is a Coordinated Support Action financed by the European Commission within the Horizon 2020 research and innovation programme (MG-9.7-2014; Grant Agreement N. 640213; <http://www.travisions.eu/TRAVisions/index.xhtml>). Its aim is to carry out two competitions in the field of surface transport. In particular, the **ACADEMIC STUDENT COMPETITION** which obviously targets students and early stage researchers (BSc, MSc and PhD) has the aim to approach junior researchers to the transport sector, to stimulate their minds and give them the chance to interact with a strong scientific community on transport research and to show their ideas. The **EU CHAMPIONS OF RESEARCH COMPETITION** on the other hand

is addressed to senior researchers from EU projects and has the goal to acknowledge the excellence of the already existing research in the field of transport. Although the two competitions have separate evaluation procedures and different rules, they are aimed at reaching a common goal which is the creation of a scientific community made of young and senior researchers in the field of transport. Indeed the interaction between different generations of researchers and different transport modes (road, rail, waterborne, cross modality) will allow for the achievement of the overall objective of **TRAVISIONS 2016**, that is the development and deployment of innovative and cross-cutting transport solutions. In this framework we would like to thank the students and the researchers that participated in the competitions and put their enthusiasm and effort in the preparation of their works. Thanks to them **TRAVISIONS 2016** has been a great success!

2ND PRIZE

N. project: LI-28

Members: Konstanz Winter

RA3

category: Road

University: Delft University of Technology

Urban and Long-Distance People Mobility – Systems and Services

Key Characteristics: Simulation of a new mobility service for urban and regional public transportation operated by automated vehicles • The simulation tool determines for a certain demand the required fleet size and the overall driven kilometers while constraining the maximum passenger waiting time • The simulation output allows to estimate the operational and passenger costs and consequently to determine the optimum fleet size for obtaining minimum overall costs

Simulation of an Automated Public Transportation System

It is a challenge to improve public transportation in both densely populated cities and rural areas in terms of service, sustainability and financial feasibility. A solution approach are flexible demand-responsive transportation services.

They can increase the comfort of public transportation for the urban population and be efficiently employed in sparsely populated areas. However, traditional demand-responsive transport systems are costly and need to be subsidized when employed for public transport. With fully automated vehicles (AV) becoming operational, the question raises how they can be employed for efficient and effective mobility solutions integrated in transport systems. In this study the operation of a new mobility service for urban and regional public transportation operated by AV is simulated. The proposed transport system is defined as an Automated Demand Responsive Transport System (ADRTS), a demand responsive AV public transportation minimum overall costs.

service providing individualized rides without fixed routes or timetables. Depending on vehicle capacity, requests for the ADRTS are combined in case they share the same pick-up and drop-off locations and are launched within a certain time window without inducing detours. Two case studies are simulated for the proposed ADRTS: a one-to-one case for approximately 3,700 requests and a many-to-many case consisting of 26 nodes for approximately 32,400 requests. The simulation tool determines for a certain demand the required fleet size and the overall driven kilometers while constraining the maximum passenger waiting time, which represents the customer service level. The passenger arrival process is considered to be stochastic and demand patterns for three node categories (station node, campus node and residential node) are specifically defined. The simulation output allows to estimate the operational and passenger costs and consequently to determine the optimum fleet size for obtaining minimum overall costs.

