

Title: Improving Traffic Light Control using Fuzzy Logic

Abstract: To optimally use the existing urban transport infrastructure today various services, which include traffic control systems, from the domain of Intelligent Transport Systems (ITS) are applied. The ITS service related to traffic control enables an increase of the urban road network throughput and decrease of vehicle emissions. One category of the application of this control service is traffic light control related to isolated signalized intersections in urban environments. Traffic light control changes the signal program of a particular intersection. Signal programs have to be adapted according to the current traffic demand due to significant changes in traffic demand during the day. This can be done by changing the phase duration and the phase sequence. One approach is related to the application of fuzzy logic based inference systems. This lecture will cover the application of fuzzy logic for adaptive change of phase duration and phase sequence for an isolated signalized intersection. To alleviate the adaptation process, the signal program is created using the NEMA ring structure with two decision points regarding the adaptation of the phase sequence. Improvements obtained using a fuzzy logic based inference system for adaptive change of phase duration and phase sequence for an isolated signalized intersection in Zagreb, Croatia will be presented and compared to a fixed signal program. Additionally, the application of fuzzy logic for improving preemptive traffic light control for an isolated intersection will be discussed also.

Short CV: Edouard Ivanjko is an Associate Professor at the Department of intelligent transport systems on the Faculty of Transport and Traffic Sciences University of Zagreb. His research interests are related to ITS, modelling and simulation of road traffic, road traffic control systems based on machine learning, forecast of road traffic parameters, autonomous vehicles and the application of computer vision in road traffic. He participated as a senior researcher on various national and international projects like: IPA project Computer Vision Innovations for Safe Traffic (VISTA), FP7 project Intelligent Cooperative Sensing for improved traffic Efficiency (ICSI), MZOS project Development Methodology of Integrated Adaptive Transport-logistic Systems, COST action TU1102 Towards Autonomic Road Transport Support Systems (ARTS), and EU structural fund project System for route optimization in a dynamic transport environment (SORDITO). Currently, he is participating in the COST action IC1406 High-Performance Modelling and Simulation for Big Data Applications (cHiPSet), and in the Croatian Centre of Research Excellence for Data Science and Advanced Cooperative Systems including the corresponding project Advanced methods and technologies in Data Science and Cooperative Systems (DATACROSS). He is a member of ITS Croatia, IEEE, and KOREMA.