*Málaga, October 2013*

# Executive Summary

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| TITLE: | D5.6.2: Optimal scheduling of traffic lights with metaheuristics |
| PAPERS RELATED: | J. García-Nieto, A. C. Olivera, E. Alba. **Optimal Cycle Program of Traffic Lights with Particle Swarm Optimization**. IEEE Transaction of Evolutionary Computation (TEC). 17(6):823-839, December 2013. DOI: http://dx.doi.org/10.1109/TEVC.2013.2260755 |
| | J. García-Nieto, E. Alba, A. C. Olivera. **Swarm intelligence for traffic light scheduling: Application to real urban areas**. Engineering Applications of Artificial Intelligence. 25(2):274-283, March 2012. DOI: http://dx.doi.org/10.1016/j.engappai.2011.04.011 |

ABSTRACT: Optimal staging of traffic lights, and in particular optimal light cycle programs, is a crucial task in present day cities with potential benefits in terms of energy consumption, traffic flow management, pedestrian safety, and environmental issues. Nevertheless, very few publications in the current literature tackle this problem by means of automatic intelligent systems, and, when they do, they focus on limited areas with elementary traffic light schedules [SGR08]. In this project, an optimization approach has been developed, in which a particle swarm optimizer (PSO) is able to find successful traffic light cycle programs. The solutions obtained are simulated with simulator of urban mobility, a well-known microscopic traffic simulator. Several large and heterogeneous metropolitan areas have been tested with hundreds of traffic lights located in the cities of Bahia Blanca in Argentina (American style), Malaga, Seville, and Cordoba in Spain (European style). Our algorithm is shown to obtain efficient traffic light cycle programs for both kinds of cities. In comparison with expertly predefined cycle programs (close to real ones), our PSO achieved quantitative improvements for the two main objectives: the number of vehicles that reach their destination and the overall journey time.

GOALS:

1. Optimization strategy for traffic lights scheduling in large realistic urban areas

2. PSO-TL algorithm outperforms other compared algorithms, as well as human experts solutions

CONCLUSIONS:

1. PSO-Tl is able to optimally schedule hundred of traffic lights in realistic scenarios.

2. Validation experiments have been performed on real city case studies: Malaga, Cordoba, Seville, and Bahia Blanca.

RELATION WITH PAST DELIVERABLES:

PRE: D3.7.1-2012 (advisable reading)

OTHERS: [SGR08] J. Sanchez-Medina , M. Galan and E. Rubio. Applying a traffic lights evolutionary optimization technique to a real case: Las Ramblas area in Santa Cruz de Tenerife, IEEE Trans. Evol.Comput., vol. 12, pp.25 -40 2008