

Smart mobility

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Abstract - Together with smart cities, a new field emerged in the domain of mobility called smart mobility. However, literature lacks clear definition of smart mobility and clarification of its relationship with the already existing Intelligent Transport Systems. In this paper, we aim to give systematic overview of smart cities and smart mobility. To do so, we start from the Intelligent Transport Systems and look towards the context in which smart mobility aroused together with its reflection on sustainable mobility, autonomous vehicles and possibility to extract big data driven insights on mobility that were not available ever before.

Keywords – Smart City; Smart Mobility; Intelligent Transport Systems

REFERENCES

- [1] United Nations, “2018 Revision of World Urbanization Prospects,” 2018.
- [2] J. H. Lee, R. Phaal, and S. H. Lee, “An integrated service-device-technology roadmap for smart city development,” *Technol. Forecast. Soc. Change*, vol. 80, no. 2, pp. 286–306, 2013.
- [3] T. Kobayashi and S. Ikaruga, “Development of a smart city planning support tool using the cooperative method,” *Front. Archit. Res.*, vol. 4, no. 4, pp. 277–284, Dec. 2015.
- [4] I. Šemanjski and S. Gautama, “Smart City Mobility Application—Gradient Boosting Trees for Mobility Prediction and Analysis Based on Crowdsourced Data,” *Sensors*, vol. 15, no. 7, pp. 15974–15987, 2015.
- [5] G. C. Lazaroiu and M. Roscia, “Definition methodology for the smart cities model,” *Energy*, vol. 47, no. 1, pp. 326–332, 2012.
- [6] M. Angelidou, “Smart city policies: A spatial approach,” *Cities*, vol. 41, pp. S3–S11, 2014.
- [7] G. C. Lazaroiu and M. Roscia, “Definition methodology for the smart cities model,” *Energy*, vol. 47, no. 1, pp. 326–332, Nov. 2012.
- [8] A. Picon, *Smart cities : a spatialised intelligence*. 2015.
- [9] European Commission, “European Initiative on Smart Cities,” *Strateg. Energy Technol. Inf. Syst.*, 2016.
- [10] R. Khatoun and S. Zeadally, “Smart cities: concepts, architectures, research opportunities,” *Communications of the ACM*, vol. 59, pp. 46–57, 2016.
- [11] K. Vidović, S. Mandžuka and D. Brčić, “Estimation of urban mobility using public mobile network,” 2017 International Symposium ELMAR, Zadar, pp. 21–24, 2017.
- [12] J. Li-min and Wang Zhou, *The Theory and Method of Design and Optimization for Railway Intelligent Transportation Systems (RITS)*. 2012.
- [13] S. Mandžuka, Ž. Marijan, B. Horvat, D. Bicanic, E. Mitsakis, “Directives of the European Union on Intelligent Transport Systems and their Impact on the Republic of Croatia”, *Promet - Traffic & Transportation*, vol. 25, pp. 273–283, 2013.
- [14] O. Kaan and K. Pushkin, *Incident management in intelligent transportation systems*, Artech House, 1999.
- [15] E. Mimbela, Y. Luz, L. A. Klein, P. Kent, J. Hamrick, K. Lucas, and S. Herrera, “Summary of Vehicle Detection and Surveillance Technologies Used in Intelligent Transportation Systems,” no. November 2000, 2000.
- [16] European Commission, “eCall in all new cars from April 2018,” 2018. [Online]. Available: <https://ec.europa.eu/digital-single-market/en/news/ecall-all-new-cars-april-2018>. [Accessed: 13-Jan-2018].
- [17] R. Elvik, “Effects on Accidents of Automatic Speed Enforcement in Norway,” *Transp. Res. Rec. J. Transp. Res. Board*, vol. 1595, pp. 14–19, 1997.
- [18] T. Bjørnskau and R. Elvik, “Can road traffic law enforcement permanently reduce the number of accidents?,” *Accid. Anal. Prev.*, vol. 24, no. 5, pp. 507–520, 1992.
- [19] J. C. Tai, S. T. Tseng, C. P. Lin, and K. T. Song, “Real-time image tracking for automatic traffic monitoring and enforcement applications,” *Image Vis. Comput.*, vol. 22, no. 6, pp. 485–501, 2004.
- [20] M. Wardman, P. W. Bonsall, and J. D. Shires, “Driver response to variable message signs: A stated preference investigation,” *Transp. Res. Part C Emerg. Technol.*, vol. 5, no. 6, pp. 389–405, 1997.
- [21] S. Peeta, J. Ramos, and R. Pasupathy, “Content of Variable Message Signs and On-Line Driver Behavior,” *Transp. Res. Rec. J. Transp. Res. Board*, vol. 1725, pp. 102–108, 2000.
- [22] S. Mandžuka, “Cooperative Systems in Traffic Technology and Transport,” *New Technologies, Development and Applications*, in *Lecture Notes in Networks and Systems book series*, vol. 42, Springer, pp. 299–308, 2018.
- [23] M. Vujić, S. Mandžuka, and M. Gregurić, “Pilot implementation of public transport priority in the city of Zagreb”, *Promet-Traffic&Transportation*, vol. 27, pp. 257–265, 2015.
- [24] P. Škorput, S. Mandžuka, and N. Jelušić, “Real-time detection of road traffic incidents,” *Promet - Traffic & Transportation*, vol. 22, pp. 273–283, 2010.
- [25] S. Mandžuka, Z. Kljaić, P. Škorput, “The use of mobile communication in traffic incident management process”, *Journal of Green Engineering*, vol. 4, pp. 413–429, 2011.
- [26] I. Čavar, D. Barić, and Z. Kavran, “Assessment of proposed business plans of on-trip and pre-trip information in the LRT system (public urban transit) of the city of Zagreb,” in *WIT Transactions on the Built Environment*, 2008, vol. 101.
- [27] M. Rahmani and H. N. Koutsopoulos, “Path inference from sparse floating car data for urban networks,” *Transp. Res. Part C Emerg. Technol.*, vol. 30, pp. 41–54, 2013.
- [28] B. Y. Chen, H. Yuan, Q. Li, W. H. K. Lam, S.-L. Shaw, and K. Yan, “Map-matching algorithm for large-scale low-frequency floating car data,” *Int. J. Geogr. Inf. Sci.*, vol. 28, no. 1, pp. 22–38, 2014.
- [29] S. Turner, W. Eisele, R. Benz, and D. Holdener, *Travel Time Data Collection Handbook*. Arlington: Texas Transportation Institute, 1998.
- [30] C. Benevolo, R. P. Dameri, and B. D’Auria, “Smart Mobility in Smart City,” in *Empowering Organizations*, vol. 11, no. 1, 2016, pp. 13–28.
- [31] S. Mirri, C. Prandi, P. Salomoni, F. Callegati, A. Melis, and M. Prandini, “A Service-Oriented Approach to Crowdsensing for Accessible Smart Mobility Scenarios,” *Mob. Inf. Syst.*, vol. 2016, 2016.
- [32] C. Garau, F. Masala, and F. Pinna, “Cagliari and smart urban mobility: Analysis and comparison,” *Cities*, vol. 56, pp. 35–46, 2016.
- [33] I. Šemanjski, A. J. L. Aguirre, J. De Mol, and S. Gautama, “Policy 2.0 platform for mobile sensing and incentivized targeted shifts in mobility behavior,” *Sensors (Switzerland)*, vol. 16, no. 7, 2016.
- [34] I. Šemanjski, R. Bellens, S. Gautama, and F. Witlox, “Integrating big data into a sustainable mobility policy 2.0 planning support system,” *Sustain.*, vol. 8, no. 11, pp. 1–19, 2016.
- [35] S. Mandžuka, P. Škorput, and M. Vujić, “Architecture of cooperative systems in traffic and transportation”, 23th Telecommunications Forum (TELFOR), pp. 25–28, 2015.
- [36] S. Mandžuka, M. Gregurić, and Z. Kljaić, “Cooperative environment for E-mobility infrastructure”, 24th Telecommunications Forum (TELFOR), pp. 1–4, 2016.
- [37] P. Škorput, S. Mandžuka and M. Schatten, “Ontologies in the area of cooperative intelligent transport system,” 21st Telecommunications Forum Telfor (TELFOR), Belgrade, pp. 42–45, 2013.
- [38] P. Škorput, S. Mandžuka and M. Schatten, “Terminology Extraction to Build an Ontology of Intelligent Transport Systems,” In *International Conference New Technologies, Development and Applications*, in *Lecture Notes in Networks and Systems book series*, vol. 42, Springer, pp. 338–344, 2018.