# GEOMOB: Geospatial Technologies for Urban Mobility

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*Abstract***— A variety of applications have been developed to drive geospatial technologies for urban mobility. Many challenges, related to data collection, analytics and access, infrastructure and work force, emerged through these developments. A special track on geospatial technologies for urban mobility is included in the GEOProcessing 2017 and The Ninth International Conference on Advanced Geographic Information Systems, Applications, and Service. Three papers address these challenges by developing and applying new geospatial decision making systems and analytical and visualization methods.**

***Keywords-Geospatial technologies; urban mobility; bicycle path planning; bicycle motor vehicle crash; incidence induced traffic congestion .***

## I. Introduction

Geospatial technologies have been used extensively for improving urban mobility recently [1]. The major trends of applying geospatial technologies in urban mobility studies includes: 1) Impact of traffic safety on human wellbeing; 2) integrated transportation management using location based services; 3) Transport system efficiency and equity; 4) Advancing geospatial technologies in sustainable urban mobility planning, monitoring and evaluation; 5) Volunteer geographic information and citizen science in improving urban mobility; 6) Geospatial technologies in improving mobility and accessibility for aging population; 7) Geospatial technologies for smart urban mobility infrastructure development and 8) Economic benefits and cost of sustainable urban mobility.

These applications have advanced geospatial technologies in five areas of data collection, analytics and access, infrastructure and workforce [2]: 1) Real-time spatiotemporal data creation and interaction; 2) Miniaturization of technologies; 3) Proliferation of new mobile geospatial sensor platforms; 4) Expanding wireless and web networks; 5) Advances in computing speed and capacity for geospatial research and applications. However, as geospatial technologies develop, many new challenges are emerging, such as, big spatial datasets, data confidentiality and privacy, real-time data generation and analytics, dissemination of geotagged data, ethical challenge in dealing geospatial data, limited commercial cloud storage, cyberGIS infrastructure and paradigm shift from traditional 'geospatial' to emerging one in spatial education sector.

Although some techniques, infrastructure and policies have been developed all over the world, there is still a long way for industries, education sectors and societies to address these challenges. Therefore, collective and interdisciplinary approaches are needed for the future development.

## II. Track Structure

Three papers have contributed to this track. They cover two application areas of geospatial technologies in improving urban mobility: 1) Impact of traffic safety on human wellbeing, 2) integrated transportation management using location based services and 3) Volunteer geographic information and citizen science in improving urban mobility.

Machado *et al.* [3] propose a decision support to help planning the expansion of bicycle path network coverage, prioritizing the connectivity between existing bicycle paths by using concepts of clustering, centrality and shortest path from graph theory. The research problem this study identified is issues related connectivity between bicycle paths inside the network. A prototype of a decision support system was developed to plan new paths to increase the connectivity between existing bicycle paths. The limitation of the study is that network connectivity was prioritized to be one the major factors in new bicycle path planning. Many other geographical, social and economic factors, such as, direction, inclination and width can be considered in the future.

Coniglio *et al.* [4] developed a study to compare the characteristics of bicycle motor vehicle crashes (BMVC) on frequently and infrequently used bicycle routes within the Perth metropolitan region. This study addresses questions that the BMVC and the characteristics of cyclists, drivers and vehicles associated with BMVC are spatial specific. These characteristics on popular bicycle routes might be different from the ones on unpopular bicycle routes. Data mining methods, EM algorithms, were used to identified these characteristics. This study also defined popular or unpopular bicycle routes based on social media, volunteer geographic information, collected by the Run and Cycling Tracking on the Social Network for Athletes (Strava). The major limitation of the study is the methodology in defining popular and unpopular routes. Strava is mainly for recreation purpose. Many bicycle trips, with other purposes, such as work, haven't been considered. In the future, other social media tool, such as Bikemap, can be used for understanding bike travel behavior in Perth in a more holistic way.

Najnin et al. [5] analyzed and visualized the spatio-temporal pattern of travel time variation induced by incidents using a case study of Fremantle South, Western Australia. This study addressed real-time spatio-temporal data collection and analytic challenge by exploring traffic congestions triggered by random incidences, such as vehicle crashes and road works based on volunteer geographic information: TOMTOM GPS tracking. A variety of geovisualization methods have been adopted by this paper, for example, Geographic information systems were used to map spatial distribution of travel time and incidence patterns. This paper also analyzed temporal distribution of travel time variation and incidence frequency and impact of incidences on travel time over space and time. The major limitation of the study is sample size. Authors suggested that to get robust results on incidents at least one-year data should be used. Further research needs to develop an integrated approach by incorporating more than one measure together to identify the spatial temporal dynamics of non-recurrent congestion (IITC) to ensure sustainable transport planning.

## III. CONCLUSION

Everything occurs somewhere. Geospatial technologies are essential for improving urban mobility. This track has addressed a few challenges of urban mobility, for example, developing a decision making system for effective bicycle path planning [3], investigating characteristics of cyclists, drivers and vehicle involving bicycle motor vehicle crashes on popular and unpopular routes to reduce bicycle crash risk on roads [4], and analyzing and visualizing incidence induced traffic congestion to develop congestion mitigation strategies for better traffic management and planning [5]. Many challenges related to emerging geospatial technologies for urban mobility are still needed to be addressed in the future.

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