# UTC Project Information

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| Project Title | MPC-517 – Route Planning for Enhanced Transportation Network Utilization: A System Optimization Approach for Route Planning in Advanced Traveler Information Systems |
| University | University of Colorado Denver |
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| Funding Agencies | USDOT, Research and Innovative Technology Administration |
| Agency ID or Contract Number | DTRT13-G-UTC38 |
| Project Cost | $99,015.50 |
| Start and End Dates | October 1, 2016 to December 31, 2017 |
| Project Duration | 1 Year |
| Brief Description of Research Project | Motivation: In 1991, the U.S. Department of Transportation (USDOT) initiated a new program to address the needs of the emerging field of Intelligent Transportation Systems (ITS). In this program, computing the "optimal" route (or path) for a traveler to commute from a designated source to a destination in a transportation network[1] was identified as one of the main requirements of any Advanced Traveler Information System (ATIS). Subsequently, numerous route planning solutions were introduced by the research community and adopted by industry products (e.g., vehicle navigation devices, and online map services such as Google Maps®) to address this need. Nowadays, such products have become hallmark of ITS in the general public's view. |
| Describe Implementation of Research Outcomes (or why not implemented)<br><br>Place Any Photos Here | As part of our research the following four objectives have been achieved as presented in the Main Body of the report:<br><br>1. Introduce a transportation network utility function that captures utilization of the network based on throughput-of/mobility-through of the transportation network (other network utilization criteria such as overall travel quality, safety, environmental impact, etc., can be studied as part of future work)<br><br>2. Design a multi-criteria route planning solution that uses the introduced utility function as the primary criterion and an exemplary traveler interest (e.g., fastest route) as the secondary criterion to generate optimal routes for travelers in a transportation network |

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| | 3. Develop a data-driven simulation testbed (based on realistic road network and traffic data) to evaluate the designed route planning solution and compare its performance versus state-of- the-art route planning solutions |
| | 4. Advance knowledge by carrying out comparative analyses to answer our research questions |
| | In addition to the aforementioned research tasks, we pursued and achieved three other objectives in this project as follows: |
| | 1. Advance policy and practice with respect to transportation network utilization: Toward this end, in multiple occasions we presented our results a Colorado Department of Transportation (CDOT) and National Renewable Energy Laboratory (NREL) as well as MS2 user group. |
| | 2. Advance education through the training of students: To pursue this objective, we included numerus assignments and course projects in both undergraduate level and graduate level courses offered over a period of three years at the Department of Computer Science and Engineering, University of Colorado Denver. Sample assignments as well as sample student work are included in the Appendix. |
| | 3. Build an evidence base by disseminating findings through publications and presentations: We have published results of our studies in the 20th International Conference on Mobile Data Management (MDM 2019), which is a premier venue for presentation of data-driven methodologies for transportation management. |
| Impacts/Benefits of Implementation (actual, not anticipated) | Students involved in this project (one PhD student and one MS student) will be trained in conducting research related to the field of transportation. These students will gain valuable research experience and have the opportunity to author publications and presentations emanating from this work.<br><br>We are motivated by the realistic scenario in which our proposed route guidance solution is implemented as a mobile and/or desktop application (perhaps sponsored by regional USDOT agencies, and/or city and state partners which are interested in such "smart-cities" capabilities) and offered to general public for their daily use. While such an application will not necessarily provide the optimal (but perhaps near-optimal) route for each individual traveler, the public can be incentivized to use this application (instead of the existing commercial route planning applications that merely focus on traveler interests) for improved network utilization. |
| Web Links<br>• Reports<br>• Project Website | https://www.ugpti.org/resources/reports/details.php?id=979 |