NTC Program Progress Performance Report (PPPR) Information Form

<p style="text-align:center">**For P.I.'s Use**</p>

On a semi-annual basis the NTC sponsored P.I. must report Program Progress Performance Report (PPPR) using the format specified in this PPPR Information Form. The form must be submitted electronically to the corresponding NTC Associate Director by 9/15/2014.

Cover Period: 4/1/2014 – 9/15/2014
Project Reporting Period: 5/15/2014 – 9/15/2014

NTC Funded Project Information (Round/Year 1, 2013-2014)	
University Name	North Carolina State University
Project Title	Vehicle Trajectory Tool (VTT): Application Pilot for AMS Test Bed
Principal Investigator	Nagui M. Rouphail, PhD, Director, ITRE, NC State University
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The form includes the following six parts:

- Part I – Performance Indicators
- Part II – Accomplishments: What was done? What was learned?
- Part III – Products: What has the program produced?
- Part IV – Participants & Collaborating Organizations: Who has been involved?
- Part V – Impact: What is the impact of the program? How has it contributed to transportation education, research and technology transfer?
- Part VI – Changes/Problems

Supplementary documents/materials can be attached to this form with the submission.

Part I – Performance Indicators	
Reporting Period	**4/1/2014 – 9/15/2014**
1. Transportation-related courses offered during the reporting period that were taught by faculty and/or teaching assistants who are associated with the UTC	N/A
Undergraduate courses	N/A
Graduate courses	N/A
2. Students supported by this grant	
Undergraduate students	N/A
Masters students	N/A
Doctoral students	Sangkey Kim, PhD candidate
3. Students participating in transportation research projects funded by this grant (but not supported by this grant)	N/A
Undergraduate students	N/A
Graduate students	N/A
4. Students supported by this grant who received degrees	N/A
Undergraduate degrees	N/A
Masters degrees	N/A
Doctoral degrees	N/A

Part II – Accomplishments: What was done? What was learned?
The information provided in this section allows the OST-R grants official to assess whether satisfactory progress has been made during the reporting period.

Reporting Period	4/1/2014 – 9/15/2014
1. What are the major goals of the program?	The National UTC aims to promote strategic transportation policies, investment, and decisions that bring lasting and equitable economic benefits to the U.S. and its citizens. The Center is concerned with the integrated operations and planning of all modes serving the nation's passenger and freight transportation system, including the institutional issues associated with their management and investments. A balanced multi-modal approach will be used that considers freight and passenger travel mobility, reliability, and sustainability, as well as system operations during periods of both recurring and non-recurring incidents, including response to major emergencies. The modes in this theme include highway, transit, rail, and inter-modal interfaces including ports, terminals and airports. In particular, the center focuses on research, education, and technology transfer activities that can lead to (1) Freight efficiency for domestic shipping and for our international land, air, and sea ports; (2) Highway congestion mitigation with multi-modal strategies; and (3) Smart investments in intercity passenger travel facilities such as high speed rail. Major center activities are as following: • **Advanced & Applied Research Promoting Economic Competitiveness:** Our research activities are multimodal/intermodal and multidisciplinary in scope, with the aims of addressing nationally and regionally significant transportation issues pertinent to economic competitiveness and providing practice-ready solutions. • **Education, Workforce Development, Technology Transfer, & Diversity** The consortium is committed to providing high-quality transportation education and workforce development programs for a broad and diverse audience. Center's efforts will support the development of a critical transportation knowledge base and a transportation workforce that is prepared to design, deploy, operate, and maintain the complex transportation systems of the future.

2. What was accomplished under these goals?	Major Activities: 1. Development of high resolution driving behavior functional system requirements (Task 1) 2. Experimental design plan (Task 2) Specific Objectives: The key objective of this research is to upgrade and pilot-test an existing vehicle trajectory collection tool (VTT) for testing the feasibility of a V-I-V system in communicating timely and spatially sensitive messages to vehicles upstream of a recurring or non-recurring bottleneck queue. Significant Results: 1. Estimating the correlation between hazardous freeway sections and microscopic driving behavior *(Please see attached paper submitted to TRB annual meeting)* 2. Develop data collection framework and fleet 3. Collection of more than 10 million second by second high resolution vehicles trajectory
3. How have the results been disseminated?	Through a paper submitted for consideration for publication and presentation at the 2015 TRB Annual Meeting. *15-4991: Exploring the Association of Crash Propensity and Micro-scale Driver Behavior*
4. What do you plan to do during the next reporting period to accomplish the goals? (10/1/2014 – 3/31/2015)	1. Conduct and analyze off-line Database Experiments (Task 3) 2. Develop and Test V-I-V capabilities (Task 4)

Part III – Products: What has the program produced?

Publications are the characteristic product of research projects funded by the UTC Program. OST-R may evaluate what the publications demonstrate about the excellence and significance of the research and the efficacy with which the results are being communicated to colleagues, potential users, and the public, not the number of publications. Many research projects (though not all) develop significant products other than publications. OST-R may assess and report both publications and other products to Congress, communities of interest, and the public.

Reporting Period	4/1/2014 – 9/15/2014
1. Journal publications:	1. Song, T., S. Kim, **N. Rouphail**, B. Aghdashi, A. Amaro and G. Goncalves, *"Exploring the Association of Crash Propensity and Micro-Scale Driver Behavior"*, submitted for consideration for publication and presentation at the 94th Annual Meeting of TRB, August 2014.
2. Books or other non-periodical, one-time publications	N/A
3. Other publications, conference papers and presentations	N/A
4. Website(s) or other Internet site(s)	N/A
5. Technologies or techniques	N/A
6. Outreach activities	N/A
7. Courses and workshops	N/A
8. Inventions, patent applications, and/or licenses	N/A
9. Other products	1. High resolution driving behavior database *(with over 7 million second-by-second records)*

Part IV – Participants & Collaborating Organizations: Who has been involved?	
OST-R needs to know who has worked on the project to gauge and report performance in promoting partnerships and collaborations.	
Reporting Period	**4/1/2014 – 9/15/2014 *(The actual project start date was May 15 2014)***
1. What organizations have been involved as partners?	• Institute for Transportation Research and Education (ITRE), North Carolina State University, Raleigh, NC • Idmec, Technical University of Lisbon • iTds, Lisbon, Portugal
2. Have other collaborators or contacts been involved?	No others.

Part V – Impact: What is the impact of the program? How has it contributed to transportation education, research and technology transfer?
DOT uses this information to assess how the research and education programs: • increase the body of knowledge and techniques; • enlarge the pool of people trained to develop that knowledge and techniques or • put it to use; and, • improve the physical, institutional, and information resources that enable those people to get their training and perform their functions.

Reporting Period Project Period	4/1/2014 – 9/15/2014 5/15/2014-9/15/2014
1. What is the impact on the development of the principal discipline(s) of the program?	This work is critical as we move into the Connected Vehicle Environment, as the i2d system will produce high resolution data that can be transmitted from one equipped vehicle to another, depending on the event to be transmitted,
2. What is the impact on other disciplines?	It has impact on both computing (given the scale of the collected data—millions of data points per month); GIS representation and of course communications capacity
3. What is the impact on the development of transportation workforce development?	We hope and intend to acquire units for use in classroom instruction, as the trajectory-based data are the most detailed and fundamental mobility data. Those data will be essential to be understood and analyzed by the next generation of transportation engineers and planners.
4. What is the impact on physical, institutional, and information resources at the university or other partner institutions?	1- An extensive database of second by second equipped vehicle trajectories synchronized in time and space as they traverse freeway/arterial facilities over a period of six months. 2- This database will be used to understand fundamental traffic flow phenomenon at a resolution and scale that is unprecedented. It will also deliver key driver behavioral data. 3- A demonstration of V-I-V concepts and messages in near real time, and an assessment of their effectiveness
5. What is the impact on technology transfer?	Technology currently developed overseas exclusively. No comparable system produced in the USA.
6. What is the impact on society beyond science and technology?	One aspect that will impact end users is the issue of privacy and how to ensure that the data cannot be used to track individual drivers. This is something that will likely require some technological solution.
7. Additional impacts	[

Part VI – Changes/Problems

If not previously reported in writing to OST-R through other mechanisms, provide the following additional information or state, "Nothing to Report, if applicable:

Reporting Period	4/1/2014 – 9/15/2014
1. Changes in approach and reasons for change	Nothing to Report.
2. Actual or anticipated problems or delays and actions or plans to resolve them	Nothing to Report.
3. Changes that have a significant impact on expenditures	Nothing to Report.
4. Significant changes in use or care of human subjects, vertebrate animals, and/or biohazards	Nothing to Report.
5. Change of primary performance site location from that originally proposed	Nothing to Report.