

## NTC Program Progress Performance Report (PPPR) Information Form

### For P.I.'s Use

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**

NTC Funded Project Information (Round/Year 1, 2013-2014)	
University Name	Louisiana State University
Project Title	Development of a Simulation Test Bed for Connected Vehicles using the LSU Driving Simulator
Principal Investigator	Sherif Ishak, Ph.D., P.E.
PI Contact Information	Phone: (225) 578-4467 / Fax: (225) 578-4945 sishak@lsu.edu

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.*

<b>Part I – Performance Indicators</b>	
<b>Reporting Period</b>	<b>4/1/2014 – 9/15/2014</b>
<b>1. Transportation-related courses offered during the reporting period that were taught by faculty and/or teaching assistants who are associated with the UTC</b>	N/A
Undergraduate courses	CE 3600 Principles of Highway and Traffic Engineering
Graduate courses	None at this time
<b>2. Students supported by this grant</b>	N/A
Undergraduate students	None at this time
Masters students	Raju Thapa
Doctoral students	Osama Osman Julius Codjoe
<b>3. Students participating in transportation research projects funded by this grant (but not supported by this grant)</b>	N/A
Undergraduate students	None at this time
Graduate students	None at this time
<b>4. Students supported by this grant who received degrees</b>	N/A
Undergraduate degrees	None at this time
Masters degrees	None at this time
Doctoral degrees	None at this time

**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 primary goal of this study is to develop a driving simulator-based test bed for connected vehicles research in the areas of operation and safety. This includes testing real time data capture applications as well as integration and interoperability of connected vehicles and highway infrastructure.  
To accomplish this goal, the following specific objectives or tasks will be achieved:

Task 1. The research team will search for studies, in published reports and journal manuscripts, with the purpose of gaining the state of the art knowledge on the subject matter. Target date for completion is end August, 2014

Task 2. The research team will develop a simplistic, yet realistic, network using the flexible scenario creation interface of the driving simulator. For instance, this may involve a simple two-route corridor from an origin to a destination. Target date for completion is end October, 2014.

Task 3. The research team will use the SimCreator proprietary software to: (i) manipulate the properties of the ambient traffic; (ii) create a new vehicle type to represent connected vehicles; and (iii) identify the traffic parameters that can be transmitted from the connected vehicles. Target date for completion is end March, 2015.

Task 4. The research team will explore the means to gather data from the connected vehicles in the ambient traffic, and synthesize information to be relayed to the driver of the driving simulator. The first part of this task, which relates to retrieving data, will address what information can be derived from the connected vehicles data. The second part, which relates to presentation of information, will involve producing a simple sketch of the graphical layout of the information that could be presented to the driver. Target date for completion is end June 2015.

Task 5. Final Report to be submitted. Target date is end June 2015 but draft to be submitted end March 2015.

<p><b>2. What was accomplished under these goals?</b></p>	<p>Task 1: This task is 100% complete  Task 2: This task is 70% complete and on schedule.  Task 3: This task is 10% complete and on schedule.  Task 4: This task has not begun yet and on schedule.  Task 5: This task has not begun yet and on schedule.</p>
<p><b>3. How have the results been disseminated?</b></p>	<p>Preliminary study effort and results have been documented and submitted for presentation and publication at the 94th Transportation Research Board Annual Meeting, Washington DC.</p>
<p><b>4. What do you plan to do during the next reporting period to accomplish the goals? (10/1/2014 – 3/31/2015)</b></p>	<p>Task 2: Complete this task.  Task 3: Complete this task.  Task 4: Complete this task  Task 5: Issue a draft Report to the Louisiana Transportation Research Center (LTRC) for comments.</p>

**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.

<b>Reporting Period</b>	<b>4/1/2014 – 9/15/2014</b>
<b>1. Journal publications :</b>	None at this time
<b>2. Books or other non-periodical, one-time publications</b>	<p>Authors: Osama Osman, Julius Codjoe and Sherif Ishak</p> <p>Title: Impact of Time-to-Collision Information on Driving Behavior in Connected Vehicles Environments Using A Driving Simulator Test Bed</p> <p>Journal: Transportation Research Record (one-time publication)</p> <p>Date submitted: July 30, 2014</p> <p>Acknowledgement of federal support: Yes</p> <p>Status of publication: Under review</p>
<b>3. Other publications , conference papers and presentations</b>	None at this time
<b>4. Website(s) or other Internet site(s)</b>	None at this time
<b>5. Technologies or techniques</b>	This study aims to develop a preliminary driving simulator test bed by developing JavaScript coding that will enable a lead vehicle in a driving simulator generated scenario to communicate alert messages to the simulator when certain time-to-collision thresholds are reached. The successful development of the preliminary driving simulator test bed will enable benefits of the Connected Vehicles technology to be explored under controlled experimental conditions.

<b>6. Outreach activities</b>	<p>The study effort has also received local media support and has been covered by the LSU's College of Engineering (<a href="https://www.eng.lsu.edu/news/2014/8/lsu-driving-simulators-v2v-communication-to-transform-traffic-safety/">https://www.eng.lsu.edu/news/2014/8/lsu-driving-simulators-v2v-communication-to-transform-traffic-safety/</a>); Business Report (<a href="http://www.businessreport.com/article/20140811/BUSINESSREPORT0112/140819982">http://www.businessreport.com/article/20140811/BUSINESSREPORT0112/140819982</a>); NBC33 News Station (<a href="http://www.nbc33tv.com/news/tech-corner/future-of-driving-technol">http://www.nbc33tv.com/news/tech-corner/future-of-driving-technol</a>); and the LSU newspaper, The Daily Reveille (<a href="http://www.lsureveille.com/news/university-uses-driving-simulator-for-vehicle-to-vehicle-research/article_30a69c1e-8234-11e3-aba8-001a4bcf6878.html">http://www.lsureveille.com/news/university-uses-driving-simulator-for-vehicle-to-vehicle-research/article_30a69c1e-8234-11e3-aba8-001a4bcf6878.html</a>);</p>
<b>7. Courses and workshops</b>	<p>None at this time</p>
<b>8. Inventions, patent applications, and/or licenses</b>	<p>None at this time</p>
<b>9. Other products</b>	<p>None at this time</p>

**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.

<b>Reporting Period</b>	<b>4/1/2014 – 9/15/2014</b>
<b>1. What organizations have been involved as partners?</b>	Organization Name: <b>Louisiana State University</b> Location of Organization: <b>Baton Rouge, Louisiana</b> Partner’s contribution to the project (identify one or more) Financial support: \$25,248
<b>2. Have other collaborators or contacts been involved?</b>	None at this time

**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.

<b>Reporting Period</b>	<b>4/1/2014 – 9/15/2014</b>
<b>1. What is the impact on the development of the principal discipline(s) of the program?</b>	<p>Connected vehicles technology has been acknowledged to have operational benefits in terms of reducing travel times and delays for the traveling public, as well as lessening the environmental impact in terms of reducing vehicle emissions and air pollution. The deployment of such technology offers an opportunity for economic development by targeting improvements in the areas of traffic operation, safety, and environmental impacts. However, to be able to fully assess its reliability and potential benefits, it requires the use of test beds which will additionally address unforeseen and potential issues associated with the development and deployment of the technology. Simulation-based test beds, harnessing a driving simulator platform, can be utilized to achieve the benefits of a physical test bed and if successful, will provide a cheaper alternative that can be easier controlled for desired effects. For this study, a preliminary driving simulator test bed will be developed using the LSU driving simulator and through manipulation of appropriate proprietary software. If successful, the impact of this research on the Transportation Engineering discipline is that a cheaper alternative to physical test beds will become available and the connected vehicles technology can now be tested vigorously and under more controlled experimental conditions.</p>
<b>2. What is the impact on other disciplines?</b>	None at this time



<b>3. What is the impact on the development of transportation workforce development?</b>	None at this time
<b>4. What is the impact on physical, institutional, and information resources at the university or other partner institutions?</b>	None at this time
<b>5. What is the impact on technology transfer?</b>	None at this time
<b>6. What is the impact on society beyond science and technology?</b>	None at this time
<b>7. Additional impacts</b>	None at this time

**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:

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