

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 **3/10/2015**.

Cover Period: 10/1/2014 – 3/10/2015

| NTC Funded Project Information (Round/Year 1, 2013-2014) | |
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| University Name | The University of Maryland, College Park |
| Project Title | DESIGN AND IMPLEMENTATION OF A DETECTION, CONTROL, AND WARNING SYSTEM (DCWS) FOR DILEMMA ZONE APPLICATIONS |
| Principal Investigator | Dr. Gang-Len Chang, Professor |
| PI Contact Information | gang@umd.edu |

The form includes the following six parts:

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

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

Part I – 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

10/1/2014 – 3/10/2015

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.

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| <p>2. What was accomplished under these goals?</p> | <p>This project has produced an innovative system for protection of intersection dilemma zone. The proposed system, after extensive simulation experiments, has been adopted by Maryland State Highway administration (MSHA) and in the process of deploying at two high-speed intersections. Through the promising results produced from this study, the research team has convinced SHA engineers of the potential of integrating traditional engineering work with advanced technologies to significantly improve traffic safety. The proposed system after proving its effectiveness from two field demonstrations will be extensively deployed at most hazardous intersection in MD.</p> |
| <p>3. How have the results been disseminated?</p> | <p>The results are disseminated through the following paths: (1) making technical presentations at annual TRB conference; (2) teaching the key system design concepts at MSHA internal workshop, and (3) transferring the knowledge to local consultants and assist them in deploying the proposed system at local hazardous intersections.</p> |
| <p>4. What do you plan to do during the next reporting period to accomplish the goals? (10/1/2014 – 3/10/2015)</p> | <p>1. work with field design contractors to complete the two proposed dilemma zone protection systems; (2) design an effective short-term and a long-term performance functions to monitoring the effectiveness of the deployed system over time; and (3) identify the potential of extending the safety protection system to mobility advancement with information from connected vehicles.</p> |

Part II – 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.

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| Reporting Period | 10/1/2014 – 3/10/2015 |
| 1. Journal publications: | Not yet |
| 2. Books or other non-periodical, one-time publications | none |
| 3. Other publications, conference papers and presentations | Park, S. and g. L. Chang, “Design and Evaluation of an Advanced Dilemma Zone Protection System: Advanced Warning Sign and All-red Extension,” Proceedings of Transportation Research Board Annual Conference, 2014. |
| 4. Website(s) or other Internet site(s) | ATTAP.umd.edu |
| 5. Technologies or techniques | <p>This project has yielded two products: Type-1 Intelligent Dilemma zone protection system which consists of a dynamic all-red extension module, a wide-range traffic monitor sensor, and a advanced signal warning module.</p> <p>Type-2: Integrated safety and mobility system for high-speed intersections which include a dynamic all-red extension module, a wide-range traffic monitor sensor, and dynamic variable-speed advisory module.</p> |

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| 6. Outreach activities | Organizing two internal training sessions to educate MSHA engineers and local contractors on the design and deployment of the proposed system. |
| 7. Courses and workshops | no |
| 8. Inventions, patent applications, and/or licenses | [|
| 9. Other products | <p>Three sets of field data are available from this project:</p> <ul style="list-style-type: none"> - Drivers response to an advanced signal warning signs; - Temporal and spatial distributions of dilemma zones for drivers approaching a high-speed intersection at different speeds. - Drivers' responses to an encountered signal yellow phase. - A well-calibrated arterial network simulator for investigating critical issues associated with intersection dynamic dilemma zone. |

Part III – 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.

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| Reporting Period | 10/1/2014 – 3/10/2015 |
| 1. What organizations have been involved as partners? | Maryland state Highway administration |
| 2. Have other collaborators or contacts been involved? | <ul style="list-style-type: none">• no |

Part IV – 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.

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| Reporting Period | 10/1/2014 – 3/10/2015 |
| 1. What is the impact on the development of the principal discipline(s) of the program? | The propose dilemma zone protection system, after proving its effectiveness through two on-going piloting tests, will fundamentally change MSHA’s design in improving intersection safety, especially on preventing the accidents caused by the existence of dilemma zones. |
| 2. What is the impact on other disciplines? | The propose dilemma zone protection system, Type-II, offers the potential to integrating traffic safety with mobility which are often in completion of priority on selection of field deployment projects for arterial traffic improvement. |
| 3. What is the impact on the development of transportation workforce development? | : <ul style="list-style-type: none"> • Provided opportunities for research and teaching in transportation and related disciplines; • Improved the performance, skills, or attitudes of members of underrepresented groups that will improve their access to or retention in transportation research, teaching, or other related professions; • Developed and disseminated new educational materials or provided scholarships; or provided exposure to transportation, |

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| | <p>science and technology for practitioners, teachers, young people, or other members of the public?]</p> |
| <p>4. What is the impact on physical, institutional, and information resources at the university or other partner institutions?</p> | <p>Not yet</p> |
| <p>5. What is the impact on technology transfer?</p> | <p>The success of the proposed dilemma zone protection system will offer the opportunity MSHA and the traffic community to adoption of new practices for improving intersection traffic safety.</p> |
| <p>6. What is the impact on society beyond science and technology?</p> | <ul style="list-style-type: none"> • Improving public knowledge and attitudes in preventing intersection crashes caused by dilemma zones.; • Potentially changing the behavior, practices, decision making of drivers when encountering a yellow phase at high-speed intersections. • Expect to significantly reduce the rear-end collisions an dangled-crashes at high-speed rural intersections. |
| <p>7. Additional impacts</p> | <p>[NTC encourages to consider identifying program results by outcomes or impacts, as suggested by the examples below. Impacts should be linked to National goals expressed in the Secretary’s Strategic Goals.]</p> <p>[Outcomes are broader changes that are expected to result from the products, such as:</p> |

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| | <ul style="list-style-type: none">• Increased understanding and awareness of transportation issues;• Improved body of knowledge;• Improved processes, techniques and skills in addressing transportation issues;• Enlarged pool of trained transportation professionals;• Greater adoption of new technology;• Other impacts. <p>Impacts are the longer-term, fundamental changes intended as a result of your activities, such as:</p> <ul style="list-style-type: none">• Safer driver behavior;• Increased travel time reliability;• Increased intermodal transportation operations;• Reduction in carbon and other harmful emissions from transportation sources;• Other impacts.] |
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| Part V – Changes/Problems | |
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| 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 | 10/1/2014 – 3/10/2015 |
| 1. Changes in approach and reasons for change | <p>[If there is nothing significant to report during this reporting period, state “Nothing to Report.”]</p> <p>[Describe any changes in approach during the reporting period and reasons for these changes. Remember that significant changes in objectives and scope require prior approval of the OST-R grant administrator.]</p> |
| 2. Actual or anticipated problems or delays and actions or plans to resolve them | <p>[If there is nothing significant to report during this reporting period, state “Nothing to Report.”]</p> <p>[Describe problems or delays encountered during the reporting period and actions or plans to resolve them.]</p> |
| 3. Changes that have a significant impact on expenditures | <p>[If there is nothing significant to report during this reporting period, state “Nothing to Report.”]</p> <p>[Describe changes during the reporting period that may have a significant impact on expenditures, for example, delays in hiring staff or favorable developments that enable meeting objectives at less cost than anticipated.]</p> |
| 4. Significant changes in | [If there is nothing significant to report during this reporting period, |

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| <p>use or care of human subjects, vertebrate animals, and/or biohazards</p> | <p>state “Nothing to Report.”]</p> <p>[Describe significant deviations, unexpected outcomes, or changes in approved protocols for the use or care of human subjects, vertebrate animals, and/or biohazards during the reporting period. If required, were these changes approved by the applicable institution committee and reported to the agency? Also specify the applicable Institutional Review Board/Institutional Animal Care and Use Committee approval dates.]</p> |
| <p>5. Change of primary performance site location from that originally proposed</p> | <p>[If there is nothing significant to report during this reporting period, state “Nothing to Report.”]</p> <p>[Identify any change to the primary performance site location identified in the proposal, as originally submitted.]</p> |