Quarterly Report 2

Partial Automation for Truck Platooning Heavy Truck Cooperative Adaptive Cruise Control: Evaluation, Testing, and Stakeholder Engagement for Near Term Deployment

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Contents

I. Introduction

The objective of this research is to perform the necessary technical work, evaluation, and industry engagement to identify the key questions that must be answered prior to market introduction of heavy truck Cooperative Adaptive Cruise Control (CACC), and to answer those questions. These questions must address industry needs as well as the needs of other highway travelers relating to traffic flow and safety. To complete this research, Auburn University is working in conjunction with several organizations including the American Transportation Research Institute (ATRI), Peloton Technology, Peterbilt Trucks, and Meritor WABCO. The partnership is organized with Auburn as the prime and the other organizations as subcontractors.

a. Auburn University

The primary groups within Auburn on the project are the GPS and Vehicle Dynamics Laboratory (GAVLAB); the Wireless Engineering Research and Education, within the Computer Sciences and Software Engineering Department (CSSE); the Occupational Safety and Ergonomics Laboratory (OSE); the Industrial and Systems Engineering Department (ISE-MW); and the Numerical System Simulation & Aerodynamic Modeling Research Work Group (ARG).

1. GPS and Vehicle Dynamics Laboratory (GAVLAB)

The GAVLAB is composed of mechanical and electrical engineers, and it focuses on the control and navigation of vehicles using GPS in conjunction with other sensors, such as Internal Navigation System (INS) sensors. The GAVLAB is undertaking several tasks, including developing simulations of the sensory technology using TruckSim, writing algorithms for sensor fusion for robust positioning, estimation of truck properties including mass and engine torque, and live implementation of the system. The GAVLAB is also supported by Bishop Consulting, which provides project management, system engineering and stakeholder liaison.

2. Wireless Engineering Research and Education Center (CSSE)

The main objectives of the CSSE group are design, implementation, and evaluation of vehicle-vehicle (V2V) communication for CACC, in which critical requirements for wireless networks that support for automated truck platooning are satisfied by providing high reliability in the transmission of control information, security against various forms of attacks and high data rates for rapid delivery of large amount of control and driver feedback data.

3. Occupational Safety and Ergonomics Laboratory (OSE)

Auburn's Occupational Safety and Ergonomics Laboratory (OSE) is responsible for the human-machine interface (HMI) as well as guidance on safety related issues. The OSE department members currently working on this project are Dr. Richard Sesek and graduate student Nick Smith. These responsibilities will be completed through collaboration with ATRI, Battelle, online resources, pre-existing knowledge, and hands-on experience with trucks installed with platooning technology.

4. Industrial Systems and Engineering Department, Murray & Woodruff (ISE-MW)

The ISE-MW group is responsible for analyzing current trucking traffic to identify critical freight corridors in which platooning operations are likely to be viable as a result of CACC. This analysis requires the determination of estimated expected platoon sizes, impacts to delivery schedules, and waiting times for trucks to join a platoon. The ISE-MW group is also charged with supporting Task 1.5 (Examine Business Case for Near-Term CACC Trucking Operations).

5. Numerical System Simulation & Aerodynamic Modeling Research Work Group (ARG)

ARG is responsible for developing an aerodynamic model of the two truck leader-follower configuration. The primary purpose of the model is to determine the decrease in drag coefficient that is achieved through platooning and develop a correlation between leader-follower separation distance and the absolute drag reduction. The drag-separation model will ultimately will be used to estimate vehicle fuel savings.

b. American Transportation Research Institute (ATRI)

ATRI maintains one of the world's largest databases of real-time and near-real time truck GPS data. The Freight Performance Measures (FPM) program is partially sponsored by the FHWA to provide average travel times, speeds and reliability measures on the Interstate system. Beyond these activities, ATRI has successfully developed processes and algorithms for monitoring and managing truck travel throughout North America. The FPM database includes more than 500,000 large trucks that operate throughout North America. The data has been used by MPOs, State DOTs and the U.S. DOT to support multiple freight transportation objectives. ATRI will apply this FPM data to the project.

c. Peloton Technology

Peloton technology was founded expressly for the purpose of commercializing truck CACC. Based in Menlo Park, California, the company has a primary prototype on a box truck. This system has been developed to explore the user experience of truck platooning, and for this purpose a simple CACC system has been implemented. This includes radar, V2V communication, and a linked video display between the vehicles. Peloton uses rapid prototyping and data analysis tools which will be applied to this project. Peloton will provide technology leadership based on their work in exploring technical approaches with fleets.

d. Peterbilt Trucks

Peterbilt Trucks is headquartered in Denton, Texas, where they produce trucks and also perform advanced engineering. This facility will be leveraged for preparatory work on the trucks before delivery to the project team.

e. Meritor WABCO

Meritor WABCO is a 50/50 Joint Venture between Meritor and WABCO, established in 1990. The company, a leader in the integration of safety and efficiency technology for the commercial vehicle industry in North America, is a major supplier of Anti-Lock Braking and Electronic Stability Control systems for Class 8 tractors and has offered its OnGuard™ Collision Mitigation System (CMS) since 2007.

II. Overall Progress

The following three tables summarize the progress of the project. Table 1 shows a Gantt chart highlighting the major tasks, and their timeline for completion. Table 2 shows the deliverables and the due dates. Table 3 gives a status report for each of the major tasks.

Table 1: Schedule

Near Term Deployment of Heavy Truck Cooperative Adaptive Cruise Control -- PHASE ONE												
	FY2014											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Task 1.1: Project Mgmt												
Task 1.2: Develop ConOp			M1.1									
Task 1.3: Sensor/RF Assess												
Task 1.4: Define Rqmts							M1.2 D1.1					
Task 1.5: Ex. Business Case												
Task 1.6: Evaluate Impacts											M1.3	
Task 1.7: Phase One Report												D1.2

Table 2: Deliverables

	Due Dates
Phase One	
D1.1: Concept of Operations and Requirements Definition Summary	7 months from effective date of contract
D1.2: Phase One Results Summary	12 months from effective date of contract

Table 3: Work Breakdown Structure – PHASE ONE

Near Term Deployment of Heavy Truck Cooperative Adaptive Cruise Control **Work Breakdown Structure – PHASE ONE** **Reporting Period: January – March 2014**				
Task	**Activity During Reporting Period**	**Key Results**	**Plans for Next Reporting Period**	**Result / Deliverable**
Task 1.1: Project Management	General project coordination, team meetings.	Project remains on-schedule.	General project coordination, team meetings.	Tracking of progress, products, deliverables; ensuring good team and sponsor communications.
Task 1.2: Develop Concept of Operations	Auburn/ATRI/Peloton completed and submitted the 2nd draft of the Concept of Operations.	Concept of Operations 2nd draft complete.	Revisions based on any FHWA comments.	Concept of Operations nearing completion.
Task 1.3: Instrument NCAT Trucks to Perform Sensor/RF Level Assessments	Auburn prepared the NCAT trucks for data collection	Task is in progress	Auburn will collect RF sensor data for analysis by the end of May	Data collected re sensor/radio level performance, which will be used in requirements definition
Task 1.4: Define Requirements	Task not yet active.			D1.1: Concept of Operations and Requirements Definition Summary
Task 1.5: Examine Business Case for Near-Term CACC Trucking Operations	Task not yet active.			Analysis of fleet-level business case, including feedback from Industry Operations Panel
Task 1.6: Perform Preliminary Evaluation of Impacts	Task not yet active.			Analysis of CACC mobility and safety impacts based on traffic simulation and other analyses
Task 1.7: Prepare Phase One Report	Task not yet active.			D1.2: Phase One Results Summary

III. Auburn University

a. GPS and Vehicle Dynamics Laboratory (GAVLAB)

1. Current Progress

i. Instrumenting NCAT Trucks for Sensor Assessments

The first step in instrumenting with the NCAT trucks is to interface with their J1939 CAN bus. The J1939 CAN bus provides measurements and status messages from the truck's internal sensors. These messages (engine speed, steer angle, wheel speed, etc.) will be used for estimating vehicle parameters such as mass, road friction, and engine torque. The J1939 CAN bus will also be used as the medium for actuating the vehicle. The structure of the J1939 messages is a standard protocol used in the trucking industry. This allows for the software to be developed on the NCAT trucks and implemented when the Peterbilt trucks arrive.

After initial assessment of the NCAT trucks, it was found that only two trucks within the fleet publish messages from the CAN bus. Of the messages being published, only a few of them are relevant for performing tasks associated with this project. Because the messages published from the NCAT trucks are sparse, data retrieved from Lockheed trucks in Colorado was used for verifying the parsing of the other relevant messages. Currently, the software has been developed for parsing all J1939 messages needed for parameter estimation.

ii. Vehicle Simulation

The leader-follower environment developed in the previous quarter using a combination of TruckSim and Simulink can be used to validate the aerodynamic drag models developed by ARG using fuel consumption data. TruckSim has preloaded engine and fuel consumption models which were used for proof of concept. Figure 1 below shows the leader and follower fuel consumption rate based on a simple linear aerodynamic drag reduction model.

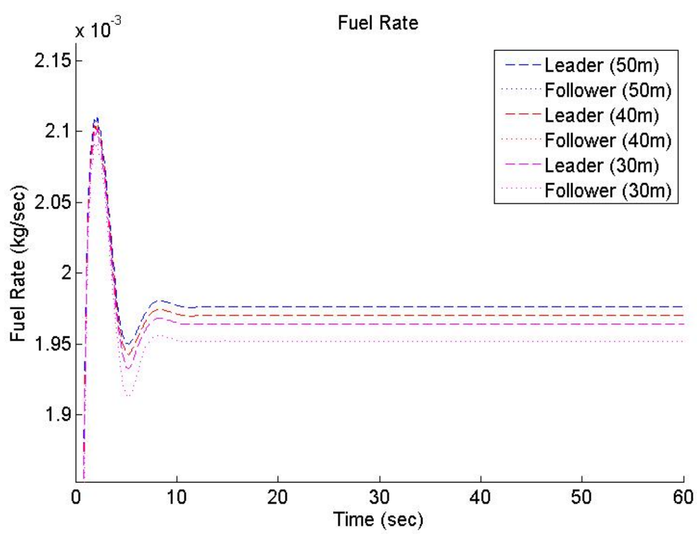

Figure 1: TruckSim Fuel Rate Simulation

The TruckSim fuel rate models are defined from three parameters: engine rpm, throttle position and the fuel rate at idle. Each of these parameters are easily accessible measurements on the J1929 CAN bus. When the Peterbilt trucks arrive simple baseline fuel consumption test will be performed. Using data from these tests the TruckSim engine model can be tuned to better match the trucks in use. The ARG drag models can then be validated by replacing the current drag model Simulink block and comparing the simulation results to the data collected on the J1939 CAN bus.

2. Next Quarter

i. Simultaneous Data Collection for Sensor/RF Level Assessment

Now that the means of collecting J1939 data has been established, simultaneous data collection can begin. This will include:

- CAN data from the lead and follower trucks
- Inertial measurements from the lead and follower trucks
- RADAR data from the follower truck
- DRTK-GPS between the two vehicles using V2V communication

Initially, the V2V communication for passing low level GPS information will be performed using a 900 MHz MaxStream radio. This type of radio has been used many times by GAVLAB members for performing carrier phase differential GPS techniques such as DRTK. This data collection will allow for the assessment of sensor accuracies and robustness as well as for developing sensor fusion algorithms. Upon the availability of DSRC radios, the MaxStream radios will be replaced and the DSRC performance can be evaluated.

ii. Instrumenting Peterbilt Trucks for Data Collection

When the Peterbilts trucks become available, the initial step will be to instrument the vehicles in the same manner as the NCAT trucks for data collection and sensor/RF level assessment. This will include the physical mounting of GPS Equipment, inertial measurement units, DSRC radios, and RADAR system.

iii. Vehicle Control Simulation

Using the leader-follower TruckSim interface a simple adaptive cruise controller will be developed to give a better understanding of the challenges involved in the platooning controller. This knowledge will be useful when supporting Peloton's platooning controller development.

b. Wireless Engineering Research and Education Center (CSSE)

1. Current Progress

i. Setting Up Linux Box for Developing

Last quarter the CSSE group was planning on using OpenWRT driven RouterStation Pro as their communication device. However, when they tried to port DSRC drivers to it, they realized that OpenWRT is not as easily configurable as a normal Linux Box. For example, they need to debug custom Linux kernel, which may result in an unbootable version. This is easily fixable with a standard Linux PC setup but can be problematic for embedded system like OpenWRT because of the way the operating system is installed.

The CSSE group decided to build some Linux PC boxes for developing DSRC communication protocols. They chose a Nano-ITX architecture board (EPIA N800-13) with 1.3 GHz VIA x86 processor and installed with a Unex DSRC mini-PCI adapter. Archlinux was installed on two such boxes because of its flexibility on customization of software packages and Linux kernel.

ii. Understanding and Porting 802.11p Driver to Recent Linux Kernel Tree

The open source driver released by Componentality is based on an old ath5k driver. The kernel that is compatible with such driver is therefore too old. This makes it impossible to use it in a recent Linux distribution. To use the driver in recent Linux, and to better understand what modifications need to be done to traditional 802.11 drivers in order to support 802.11p, the CSSE group made an effort to port the driver to a recent Linux kernel, 3.13.

The process of port the driver to Linux Kernel 3.13 was more than several simple code merges. The Linux kernel wireless APIs have changed since the point where the driver was branched, and source directory structure has changed quite a bit. Most importantly, the introduction of regdb formalized regulatory domain settings, making old methods insufficient to enable 5.9 GHz in the driver. In addition to addressing these issues, the CSSE group also found a logical bug in the driver and fixed.

Fortunately, the CSSE group was able to successfully port the driver to Linux Kernel 3.13 and enabled 5.9 GHz with Unex DSRC adapter.

iii. Performance Testing

The CSSE group used two Linux boxes to do some simple tests. The two Linux boxes use mini-PCI 802.11p adapters (DCMA-86P2) and 5.9 GHz 5 dBi antennas (Ex-15) from Unex. The two Linux boxes were placed close to each other in an indoor environment. The CSSE group used ad-hoc mode, running on channel 176 on 5.9 GHz band, with 20 MHz channel width. The iperf test showed a UDP throughput at around 28 Mbps.

The CSSE group thinks the result is very positive. It is higher than a 2.4 GHz ad-hoc network because 5.9 GHz channels are much more clear and free from interference and collisions. However, they are yet to determine its performance in outdoor environments, especially the performance degradation when the distance of the two nodes increases.

iv. Exploring Kapsch and Denso DSRC devices

In addition to developing the CSSE group's own DSRC communication boxes, the CSSE group explored commercial options. They tested some road side units from Kapsch. It is able to work at 5.9 GHz with 10 MHz channel width and the SDK that comes with it provide some support for WSMP (Wave Short Messaging Protocol), which is considered preferred transport protocol for safety messages in DSRC protocol suites. Although DSRC supports IPv6 running on top of 802.11p, the CSSE group believes it is important to compare the two implementations.

Unfortunately Kapsch has shut down their office and there is no way to get support from them. The SDK is closed source so the CSSE group could not make modification to it. However, another company, Denso, provides similar products. The CSSE group is looking into using Denso's DSRC communication boxes and tunnel it with vehicle's control in an efficient and reliable way.

v. Progress on Data Diff Transfer Protocol

The CSSE group continued working on details of the Data Diff Transfer Protocol proposed in last quarterly report. They have defined format for each type of datagrams, including Data Datagram, Differential Data Datagram, Acknowledgement Data Datagram, and Sync Request Datagram, and have a rough design on the protocol behaviors.

Following the datagram designs, the CSSE group has finished implementing datagram encoding and decoding process in Go.

2. Next Quarter

i. More Comprehensive Test With 802.11p

The CSSE group will study the performance of the Unex 802.11p adapters and 5.9 GHz antennas in outdoor environment. Specifically, when mounted on trucks, communication peers can be far from each other depending the safety distance between trucks, and the truck itself can weaken wireless signals when it enters a curve or is turning.

Thus, the CSSE group plans to do more performance tests with configurations where two communication peers are far away from each other, and when there are obstacles in between. The CSSE group will be measuring throughput, packet loss, and delay and evaluate whether they can provide upper layer protocols and application with enough communication capabilities. In addition to measurement, the CSSE group will find the weak spot of the configuration and improve it, to meet application requirements on communication.

ii. Full 802.11p Support in OpenSource Driver

The driver the CSSE group ported and is using in their Linux boxes does not have full support for 802.11p yet. For example, the 10 MHz channel width does not work, although the 20 MHz channel (which can be thought of as operating with channel bonding) works fine. Furthermore, there is no support for OCB (outside the context of a BSS) communication. The CSSE group will try to resolve these issues in the next quarter.

Supporting this can make the 802.11p on our Linux boxes more compliant with the DSRC standard suit. The CSSE group plans to look into possibilities of implementing these features in the OpenSource driver.

iii. Implementing Data Diff Transfer Protocol

Currently the CSSE group only has different datagrams encoding and decoding logic implemented. They plan to work on the full implementation of the proposed protocol. This includes session manager that synchronizes newest data on both side, and interfacing with TCP and UDP transport protocols.

In addition, the CSSE group will revise the proposed design to make it work for broadcast scenarios. This is rather useful and hopefully more efficient when there are more than two vehicles running the protocol.

c. Occupational Safety and Ergonomics Laboratory (OSE)

1. Current Progress

The OSE team has reviewed literature on topics necessary for performing quality inspection reviewing current platooning technology and for performing evaluations of new technologies. These topics include human factors research of in-vehicle display systems, warning systems, technology acceptance, and human response times, amongst others. Suggestions from this literature review can be found in the 1^{st} quarterly report.

The OSE team has also consulted ATRI's driver and company CACC technology acceptance surveys. The survey data has been collected and reviewed. We are now putting in an IRB application to survey the drivers at Auburn University's Asphalt Technology Track facility.

The graduate students and professors that will be working with the truck drivers have begun working on CITI training. This will help ensure that researchers comply with human subjects requirements while collecting data from experimental subjects.

The OSE team has been tasked with programming the interface for the platooning technology. Literature review has been done on the colors, text size, monitor placement, etc. of such an interface, and we will now begin study of the programming required. We will work with others from the group, mainly the Computer Science and Mechanical Engineering graduate students to build a software that communicates correctly with the hardware.

The OSE team is still awaiting the arrival of the test trucks. Dr. Bevly hopes this will occur in the first part of the summer.

2. Next Quarter

The OSE team plans on acquiring hands-on experience with the trucks installed with current platooning technology. This will facilitate a review of the current technology with the previously mentioned literature review as guidance. An information needs assessment will take place to help construct the interface. Flowcharting of the interface will begin with the help of fellow group members. Blind-spot sensor systems will be considered in this interface. Also, tolerance of drivercontrolled/automated gap will be determined based on literature derived reaction times and driver-reported minimum safe following distances. A mock-up of a driver training program will be initiated to coincide with the interface draft. The team will survey the test-track drivers for comfort and technology acceptance statistics. Also, the team will continue literature review on required programming and safety considerations, such as lane changes, current multiple-trailer trucking procedures, unexpected lane divergences, and human-machine interface/technology acceptance.

d. Industrial & Systems Engineering, Murray & Woodruff (ISE-MW)

1. Current Progress

The ISE-MW group has achieved the ability to analyze and visualize trucking data. Given minimal fields of input data, we are now able to deduce platooning opportunities using geographic information system (GIS) software and mathematical programming heuristics. We started our research by noting dense trucking roadways with the assumption that these will allow rich platooning opportunities. For such roadways, we are now able to calculate important metrics such as the number of platoons that may be formed on the roadway in a given time window, and the average number of trucks in a platoon.

In order to calculate such metrics, we coded a competitive heuristic that decides which trucks can feasibly join a platoon, and which trucks should join into a platoon in order to afford large savings. The heuristic uses data fields of the form shown in the following table, which describe individual truck locations and speeds at periodic times.

Table 4: Latitude/Longitude Readings

1	id	speed	readdate	latitude	longitude
2	1	65	10:36 AM	48.71334	-101.299
3	1	65	10:58 AM	48.51579	-101.299
4	1	67	11:11 AM	48.29003	-101.296
5	1	67	11:11 AM	48.29003	-101.296
6	1	67	11:11 AM	48.29003	-101.296
7	1	67	12:18 PM	48.07671	-101.296
8	1	0	10:00 AM	48.01806	-101.241
9	2	63	10:41 AM	48.84402	-101.3
10	2	63	10:54 AM	48.62115	-101.299
11	2	63	10:59 AM	48.54011	-101.299
12	2	63	10:59 AM	48.54011	-101.299
13	2	63	11:05 AM	48.45414	-101.299
14	2	63	11:05 AM	48.45414	-101.299
15	2	0	11:24 AM	48.23669	-101.249
16	3	67	10:27 AM	48.72303	-101.3
17	3	67	10:39 AM	48.58121	-101.299
18	3	67	10:51 AM	48.47295	-101.299
19	3	67	10:57 AM	48.36152	-101.296

From this data, we use GIS software and MATLAB code to identify the particular road on which these trucks are traveling, and also their heading. This data may be visualized in maps, such as the one below, where squares represent individual trucks and the diamond represents a truck platoon. This map is a snapshot of truck locations at 10:42 am.

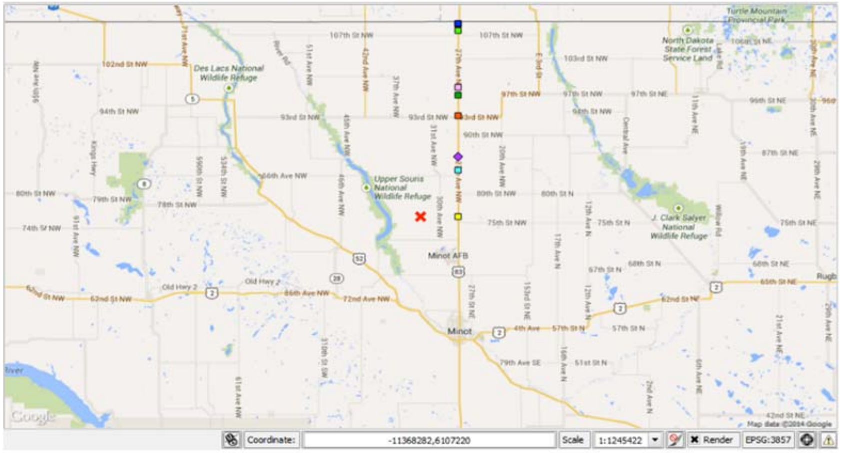

Figure 2: Truck Locations (10:42am)

Using the current location of each truck, our heuristic determines the trucks that are within sufficient proximity to form platoons. Platoons are formed by requiring "lead" trucks to reduce speed, thus allowing "trailing" trucks to close the gap without accelerating. The following map, showing updated truck locations at 10:48 am, indicates that two platoons have been formed. The diamond at the top of the map indicates that another set of trucks has been joined into a platoon of size three.

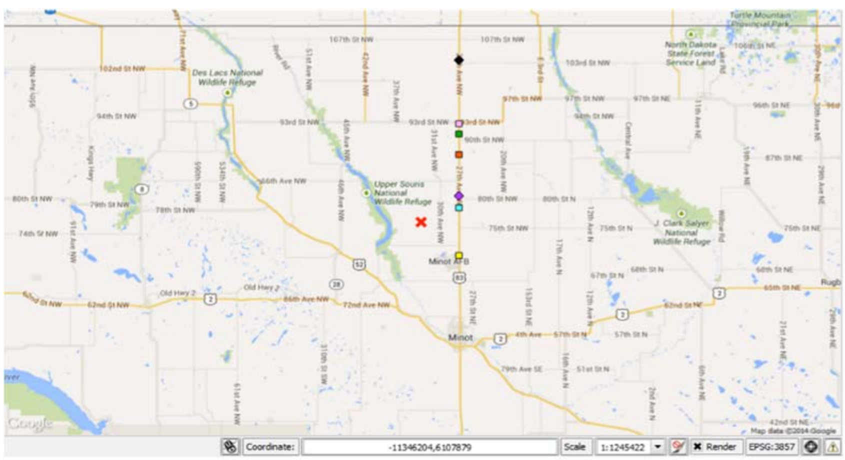

Figure 3: Truck Locations (10:48am)

Furthermore, we now have the capability of visualizing the platoons on an aggregate level. Thus, in addition to viewing the individual truck locations on a map, we can visualize how many platoons were on a given road segment. The following map shows the platooning on an aggregate level, where the blue line segment (top) shows that one platoon was present on that segment of the road, while the orange line segment (bottom) shows that two platoons were present on that road. This capability will facilitate analysis of expected platoon volumes over heavily-traveled road segments.

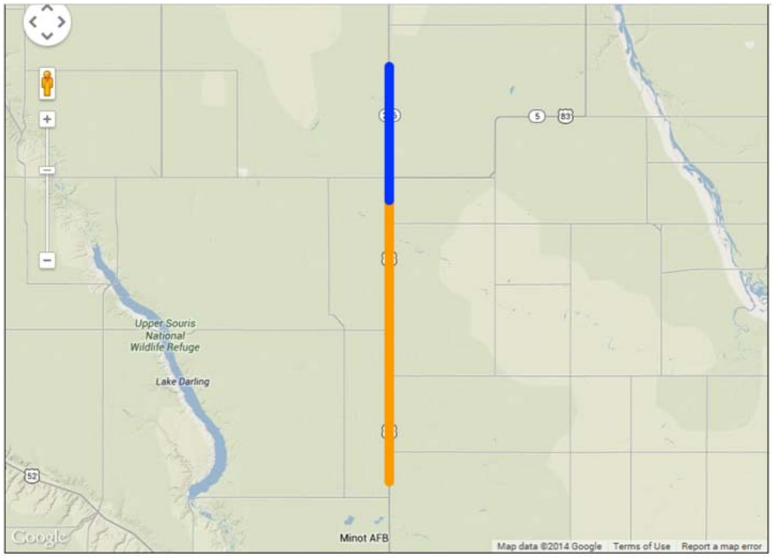

Figure 4: Road Segments for Truck Platooning – The blue segment is a portion of the route where one platoon was present, while the orange segment was a portion of the route where two platoons were present.

In summary, we have a developed and tested (on a small-scale test data set) a competitive heuristic that nominates trucks to form platoons. Furthermore, we have developed visualization tools to enable the analysis of expected benefits as a result of platooning operations.

2. Next Quarter

In the next quarter, the ISE-MW group plans to refine the platoon nomination heuristic, making it more efficient at selecting platoons that will afford the most savings. Calculations of fuel savings will be augmented with results from the aerodynamic analysis currently being conducted by other members of the research team. As our procedure has been successfully validated on a small-scale test data set, we will use real data collected by ATRI for our analysis. Analysis will be conducted to identify expected delays to vehicles traveling in platoons (recall that the lead truck(s) must slow down to enable a platoon to form). This analysis will be critical in assessing the impacts of CACC.

e. Numerical System Simulation & Aerodynamic Modeling Research Group (ARG)

1. Current Progress

The ARG has been involved with the project since early March. ARG initially acquired and installed software and licenses of commercial ANSYS software, primarily the Fluent solver and ICEM grid generator Linux distribution packages. Since, the ARG work group has been learning and familiarizing itself with the software and developing preliminary test models and meshes. The ARG is in the process of developing a high-fidelity Ahmed body mesh, a diagram of which is shown below in Figure 5. The Ahmed body is a standard bluff body for which there an abundance of research and wind tunnel test data and is thus a prime candidate for initial aerodynamic model validation.

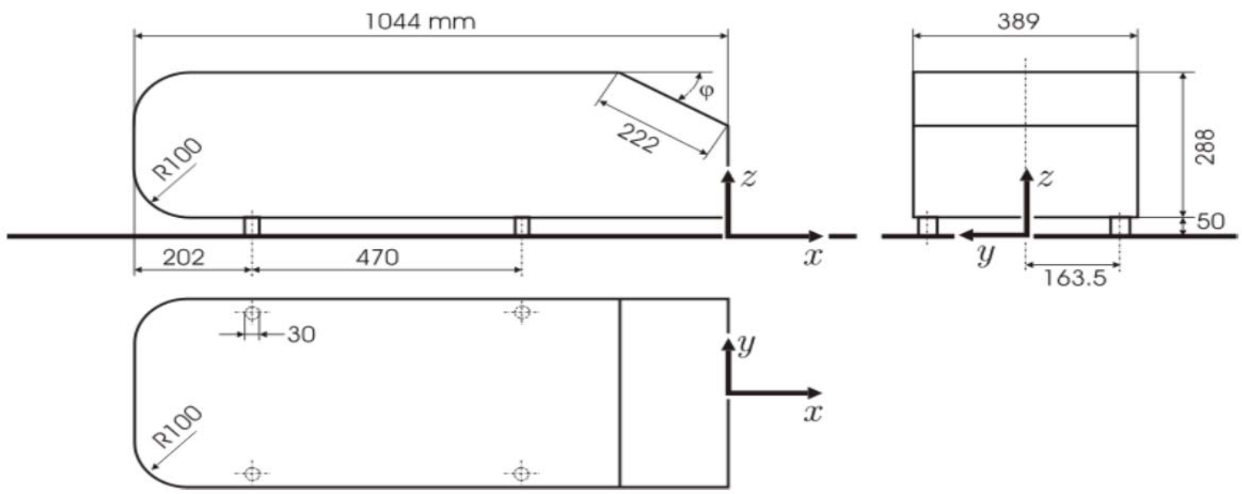

Figure 5: Ahmed Body (http://www.cfd-online.com/W/images/7/76/Ahmed.gif)

The ARG is also simultaneously in the process of acquiring a Class 8 Generic Conventional Model (GCM) Tractor-Trailer mesh (similar to the Peterbilt trucks that are to be tested by the GAVLAB). A model/mesh that is already developed and verified significantly reduces the legwork required and increases the reliability of the computational fluid dynamics (CFD) results.

2. Next Quarter

Immediate future work will be to complete the Ahmed body mesh and used ANSYS Fluent to simulate a Reynolds-averaged Navier-Stokes (RANS) based approach and turbulence model. Once the incremental aerodynamic model results are validated, the GCM mesh will be inserted into the RANS-based model tested and validated using wind tunnel data from experiments conducted by NASA AMES on a 1/8th scale Class 8 GCM model. It is expected that absolute drag will be poorly predicted by the RANS-based model, but incremental drag and baseline validation are verifiable from a RANS approach. From this point the leader-follower mesh will be developed and tested, using the now validated RANS model.

Future work beyond initial model development and grid validation is a to update the fluid model to an approach that is more accurate for modeling drag on bluff bodies. The model to be used is Detached Eddy Simulation (DES), which is a combination Large Eddy Simulation (LES) and RANS model and is a proven tool for modeling drag on bluff bodies. The LES model is much more accurate at modeling turbulence than RANS, though computationally much more expensive. The DES approach uses an LES model away from solid boundaries and a RANS approach near a solid surface. This provides an overall more accurate approach for aerodynamic modeling, particularly on bluff bodies.

IV. American Transportation Research Institute (ATRI)

a. Current Progress

ATRI worked with the team to develop sections of the ConOps based on previous work as well as drafting new text. This included incorporating survey findings throughout the document, drafting key operational scenarios, and collaborating with the team to address various FHWA comments and edits. ATRI participated extensively in the revision and proofing of the final ConOps document.

ATRI also lead the team's industry outreach activities at the American Trucking Associations Technology and Maintenance Council (TMC) conference in Nashville. This outreach included survey work, presentation and group discussion during the DSRC Task Force Meeting, and a short presentation to the entire conference audience during the Motor Carrier Town Hall meeting about the FHWA project and the survey.

b. Future Work

Planned work for the next quarter includes continued industry outreach and recruitment of carriers and drivers for the IOP and assistance with FPM data development as needed.

V. Peloton Technology

a. Current Progress

Peloton has helped develop sections of the ConOps based on our previous work. We also assisted fleet outreach by ATRI, including the survey work, and the outreach at the American Trucking Association Technology and Maintenance Council meeting in Nashville. In the DSRC task force at this meeting, Peloton discussed the technical side of driver-assistive truck platooning (DATP) with over 75 fleet representatives in attendance as well as key leadership of TMC and the ATA team (notably Karl Kirk and Ted Scott).

b. Future Work

Further fleet and truck industry outreach. Assist ATRI as needed on industry outreach and recruitment of carriers and drivers for the IOP. Collaborate with ATRI on FPM data development as needed. Collaborate with ATRI on analysis of some of their key data on trucks and fleets to determine more on those fleets best suited to DATP, patterns of truck concentration on key highway routes, etc. Collaborate with Auburn on equipping of and project activities with the two Peterbilt trucks once they arrive at Auburn.

V. Conclusions

The project is moving forward. Auburn is currently instrumenting the NCAT trucks for sensor testing, as well as examining potential communications options, studying the safety of the concept, examining potential platooning route options, and modeling and simulating the concept. The ATRI and Peloton looked at key scenarios and assisted in the editing of the ConOps final draft. Auburn will continue the preparation of the truck design implementation, while ATRI and Peloton will continue with industry outreach and data development.