

2009 OTC Student of the Year

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Each year, the U.S. Department of Transportation (USDOT) honors an outstanding student from each UTC at a special ceremony. This awards ceremony is held in conjunction with the annual Transportation Research Board conference in Washington, DC. Awardees are nominated based upon a demonstrated dedication to innovation in transportation research through course work, research and outreach. The Ohio Transportation Consortium is proud to announce that Jonathon Fagert has been chosen as the 2009 Student of the Year (SOY).

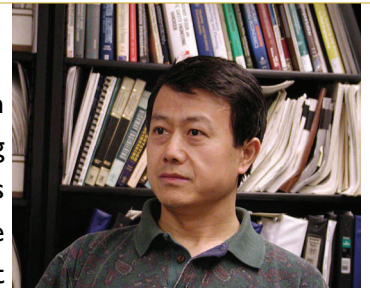
Jonathon is a graduate Civil Engineering student currently in pursuit of a M.S. in Structural Engineering at

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A Message from the Director

One of the OTC's goals is to promote transportation education through teaching, research, and outreaching activities. We are committed to preparing tomorrow's transportation workforce because we realize that the graduate and undergraduate students in the different education programs throughout the nation today will be those whom we entrust to and rely on to face the increasingly more difficult social, economic, and technical challenges of transportation tomorrow. The UTC programs nationwide provide a unique opportunity for the students to learn and practice transportation through UTC sponsored research projects, training programs, and professional conferences.

For years, OTC has involved students from eight universities in Ohio in various activities in support of the Center's theme. Accountability and coordination have been and will remain to be our focus when it comes to the measurement of effectiveness in student education.



Ping Yi

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On-Road Mobile Source Pollutant Emissions: Identifying Hotspots and Ranking Roads

By: Ramanitharan Kandiah, Central State University



Air pollution is attributed to a number of health effects, environmental effects and also economical effects. A considerable amount of pollution to the air in the forms of Hydrocarbons, Carbon Monoxide, nitrogen oxides, particulate matter and air toxics comes from on-road mobile sources. Estimation of these emissions and quantification of the pollutants released are the most important initial steps in the process of controlling the air pollution. Emitted quantity from an on-road vehicle depends on various factors; type of the vehicle, condition of the vehicle, type of the powering fuel, speed the vehicle runs and the distance it travels. Further, the total quantity of On-Road Mobile Source Air Pollutant (ORMSAP) present at a time in air is also a function of number of vehicle travels, the time of the day and the surrounding environment.

Objectives and Methodology

In this study, a methodology is proposed (1) to account the ORMSAP emission, (2) to identify and delineate ORMSAP hotspots, and (3) to rank the roads based on the presence of ORMSAP.

The methodology includes following the tasks: (1) identification of vital ORMSAPs, (2) derivation of emission matrix of vital ORMSAPs, (3) quantification of available vital ORMSAPs, (4) ORMSAP analyses, and (5) road ranking based on ORMSAPs.

Vital ORMSAPs are decided based on the type of

fuel used to power the vehicle, thus by the type of the vehicle. Once the vital ORMSAPs for a road network are identified, ORMSAP emissions from each type of vehicle are obtained from the available data. If the emission data is not available, emission values can be estimated using models. Total quantity of each ORMSAP released for a defined time period is then calculated using the estimated emissions and the traffic count data. These point-ORMSAP quantities are used in the modified Thiessen polygon method to compute the countywide average of the ORMSAP quantities. These point-ORMSAP values are also used as the inputs in the Self Organizing Maps (SOMs) to rank the roads based on the ORMSAP emission.

In the case study, this methodology is currently implemented with country level data (Ohio State) and the regional level data (counties in Miami Valley Region of Ohio).

County Level Traffic and ORMSAP Emission Data

Datasets obtained from *Ohio Department of Transportation (ODOT)* were used in the first part of the study. These data sets include average annual traffic counts of light duty vehicles and the heavy trucks on interstate routes, US-state routes and the state routes. (This data does not include the rural roads.) Although the on-road vehicles are categorized into thirteen groups, the county-scale data is available only for two-type classifications.

These data sets were mapped on GIS, and these routes were classified according to the traffic counts of light duty vehicles, heavy trucks and both types of vehicles. The polyline route traffic count map of each

vehicle type reflects the relative magnitude of the ORAMSAP by that type. As an example, truck traffic count by route is shown in Figure 1. The average traffic count by vehicle type (thus the ORAMSAP magnitude by vehicle type) was computed by the weighted average of traffic counts on routes. Total length of each route type within a county was used as the weight in the computation of count average. The estimated county ORAMSAP emission averages will be used in SOMs to classify the counties based on the ORAMSAP emission.

Regional Level Traffic and ORAMSAP Emission Data

Traffic count datasets obtained from *Miami Valley Regional Planning Commission (MVRPC)* and emission datasets obtained from *Regional Air Pollution Control Agency (RAPCA)* are used in the second part of the study for ranking of roads based on the methodology.

Point traffic data from three counties in Miami

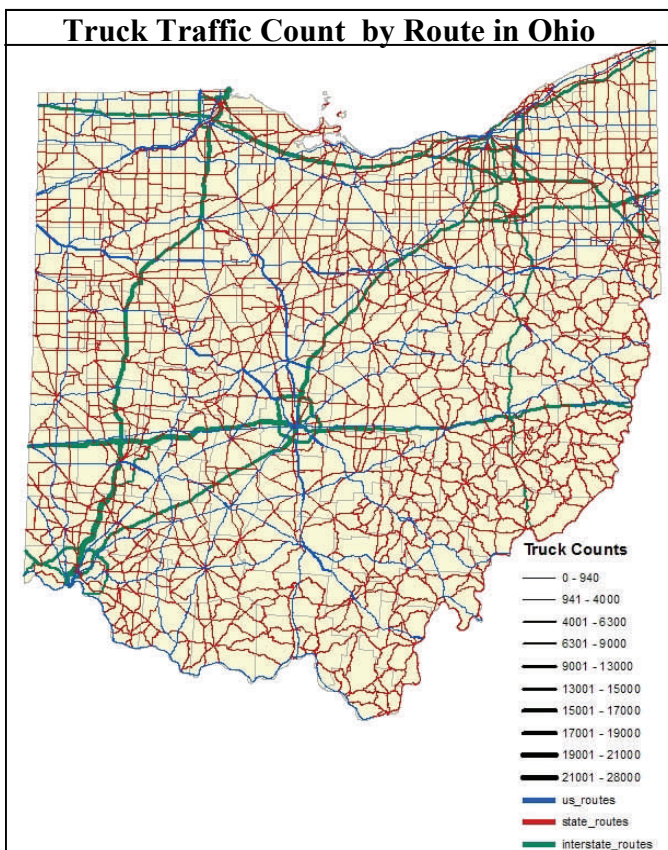


Figure 1



Miami University graduate student William Meade & CSU undergraduate student Dante Dorsey working with Multi RAE Plus

Valley, Greene, Miami and Montgomery are available for the period between 1997 and 2008. Data for each year will be used in developing modified Thiessen polygons. The total road length within a small polygon that a traffic count gathering location represents will be used as the weight in computing the county average. Traffic counts at these locations will be used in SOM for clustering the locations according to the ORAMSAP severity. This study also looks into how the ORAMSAP emission changed in the period of 1997 and 2008.

Two small-scale field data gathering operations for traffic count and ORAMSAP emission measurements are planned in the late spring and in the early summer of 2010. Collected data will be corroborated with the model based emission estimation.

Three undergraduate students from International Center for Water Resources Management and a graduate student from Miami University are currently involved in this study. A presentation on the ongoing study, "A Methodology to Estimate the Annual Average Daily On-Road Mobile Source Pollutant Emissions" was presented at the 5th Annual Dayton Engineering Sciences Symposium in November 2009.

Determination of Traffic Control Device Selection for Nighttime Maintenance of Traffic

By: *Deborah McAvoy, Ohio University*



The following abstract was taken from the final report for Dr. Deborah McAvoy's OTC-funded research project. The complete report can be found online at <http://www.otc.uakron.edu/publications.php>

Each year more than 700 fatalities occur nationally due to vehicular accidents within work zones. [15] New developments and technologies have paved the way for the creation of diamond grade sheeting, a new, more retroreflective sheeting. Research has shown that diamond grade sheeting is 6 to 14 times brighter than engineering grade sheeting and is already widely required for use on work zone signs. However, the diamond grade sheeting is not widely required for use on channelizing drums due largely to the increased cost and the speculation that the increased retroreflectivity of the sheeting would decrease the safety of the work zone when placed on drums spaced approximately two times the speed limit. A comparative parallel study was performed to compare the safety impacts of the diamond grade sheeting with high intensity sheeting, the current MUTCD standard, using driver behavior within the work zone as the parameter. Lane placement and traveled speed with respect to the posted speed limit data were collected and analyzed statistically. A current practices survey was also distributed to each

state department of transportation to determine the extent to which diamond grade sheeting is being used. With 78% of states responding to the current practices survey, approximately 66.7% of them do not require diamond grade sheeting for use in

TABLE 1 Reasoning of those requiring Diamond Grade Sheeting

Reasoning	Frequency	Percentage
Visibility	1	7.7%
Improved Work Zone Delineation	1	7.7%
Safety, Visibility, and Delineation	9	69.2%
Visibility and Delineation	2	15.4%

TABLE 2 Reasoning of those not requiring Diamond Grade Sheeting

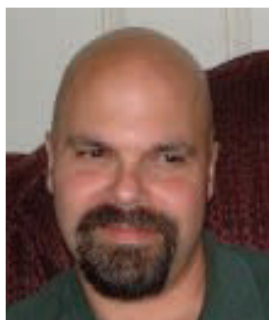
Reasoning	Frequency	Percentage
Cost	11	57.9%
Glare	1	5.3%
Other	5	26.3%
All the Above	2	10.5%

construction zones in their states with cost being the most widely selected reason (table 1). Those states that do require diamond grade sheeting for use on drums in their work zones listed safety, improved work zone delineation, and improved work zone visibility as outweighing the cost of the sheeting (table 2). Based on the statistical analysis performed on the lane placement and speed deviation data, drivers traveling through work zones with diamond grade sheeting position their vehicle further away from the work zone and abide closer to the posted speed limits when compared to those

traveling through work zones with high intensity sheeting on the construction drums

Linking Sustainable Transportation in a University Community

By: Dave Kaplan, Kent State University



The research project, “Linking Sustainable Transportation in a University Community” is going well. The research team has started to inventory various infrastructure and facilities in downtown Kent

that pertain to sustainable transportation including sidewalks, bicycle lanes, bicycle racks, crosswalks, and other similar items. These are being added to an enhanced spatial database that was first developed in the earlier funded OTC project, *Kent State University’s Sustainable Transportation Initiative*, that looked at the Kent State campus. Counts of pedestrian and bicycle traffic for key intersections within the city have already been completed. Finally, the team is ready to commence a large mail survey to a random sample of

Kent households to better understand community attitudes and behavior in relation to sustainable transportation. Sustainable transportation in Kent just received a major boost with Kent’s acquisition of a \$20 million federal grant to build a multimodal facility linking downtown to the campus. This OTC funded research should prove to be immediately useful in helping to shape the development of this facility.

Check the OTC website at www.otc.uakron.edu for future details regarding this and other OTC-funded research projects.

2010 OTC Student Paper Competition

Submission deadline is June 15, 2010. Contest winners will be announced July 15, 2010

Two Separate Competitions: Undergraduate and Graduate

Each winner will receive the following: \$300.00, a certificate, an abstract of the awarded article in the OTC newsletter, and the awarded paper published on the OTC website.

Multiple winners may be awarded in each competition.

Undergraduate Paper Guidelines:

1. The undergraduate student competition will be based on an essay that can involve either primary or secondary research. It can be a paper reporting on some research conducted by the student or a critical analysis of some transportation issue. Papers based on results from OTC-supported projects are encouraged.
2. The essay should not exceed 4000 words (not including references, tables, and graphics).
3. Each essay must be related to some aspect of transportation: planning, system analysis and control, infrastructure, policy, etc. which are compatible with the OTC theme.
4. Essays will be judged on strength of argument, scholarship, and quality of writing.
5. The work can be from a project done with others, including a faculty member or as part of a funded research opportunity, and the ideas can be discussed with others. However, writing should be that of the student.

Graduate Paper Guidelines

1. The graduate student competition will be a research article. Our preference is for a study that used primary data, although a synthesis of existing literature will be considered. Papers based on results from OTC-supported projects are encouraged.
2. The article should not exceed 5000 words (not including references, tables, and graphics).
3. Each article must be related to some aspect of transportation: planning, system analysis and control, infrastructure, policy, etc. which are compatible with the OTC theme.
4. Articles will be judged on strength of argument, analysis of empirical evidence, scholarship, and quality of writing.
5. The work can be from a project done with others, including a faculty member or as part of a funded research opportunity, and the ideas can be discussed with others. However, writing should be that of the student.

There is no limit on submissions from any one school.

Mail entries to:

Student Paper Competition
The Ohio Transportation Consortium
The University of Akron
Akron, Ohio 44325-6106



Email entries to:

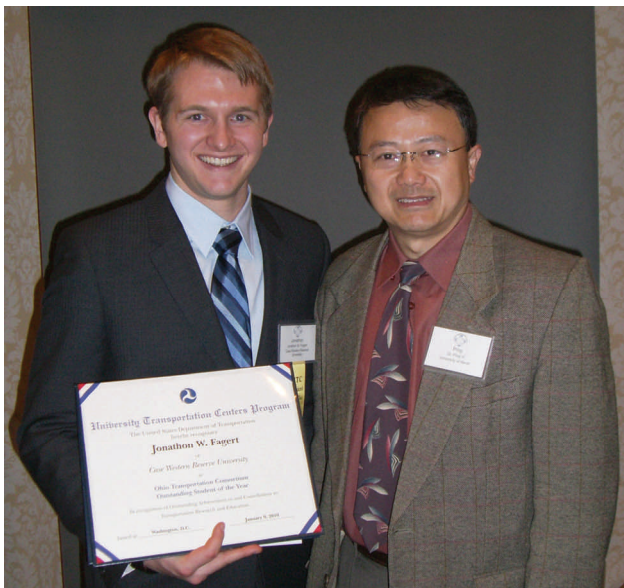
otc@uakron.edu
Please indicate *Student Paper Competition* in the subject line

TRB Conference: A Student's Experience

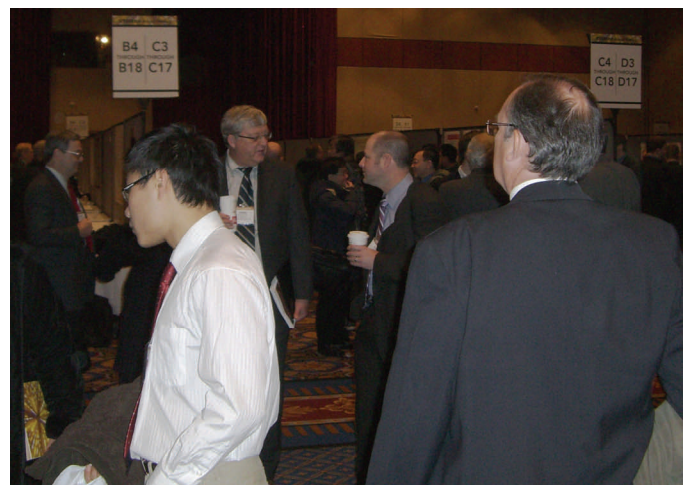
By: Jonathon Fagert, OTC Student of the Year

Every year, The Transportation Research Board holds a meeting that serves to showcase all of the innovations and anticipated research foci of both professionals and academics across the nation and worldwide. Through the grace of the Ohio Transportation Consortium, I had the opportunity to attend this annual event. To be perfectly honest, prior to attending the conference, I did not fully understand the sheer magnitude of the conference. Upon arriving, I was at first overwhelmed by the number of seminars, poster sessions, meetings and presentations available to all attendees. Thankfully, with the help of TRB's online utility, I was able to narrow the choices to those applicable to my interest and research areas. Although initially I had set myself a full schedule for each of the days of the conference, I quickly discovered how exhausting such an approach really is. Ultimately, I chose to attend primarily workshops and seminars, as I felt that they would have the greatest

impact on me given my experience level. As a structures student with additional interests in roadway design, I visited seminars with topics ranging from safety concerns in geometric design to bridge design. Overall, I most enjoyed a workshop that considered aesthetic features of light to medium use bridges. One of the best things about this particular workshop was that each attendee was given the opportunity to apply some of the techniques they had learned via a group exercise. Personally, I felt that this approach to the seminars at TRB was most helpful for younger attendees, such as myself, who may not have as much experience as others at the conference. In summary, I am grateful that I had the opportunity to attend TRB as a student and would recommend that any student who is interested in pursuing a career in transportation attend. I can't wait to attend again in the future!



Jonathon Fagert and Dr. Yi, OTC Director



A glimpse into a poster session

SOY continued from front page

Case Western Reserve University in Cleveland, Ohio. He has demonstrated outstanding academic performance, leadership skills, and great promise to advance the transportation profession. He achieved a near perfect 4.0 as an undergraduate and a perfect 4.0 as a graduate student. Jonathon was recognized with the Kenneth M. Haber award for an outstanding senior in Civil Engineering from his department.

In addition to his studies, Jonathon recently participated in a research project on health monitoring of highway bridges under the supervision of Professor Xiong (Bill) Yu. He developed and evaluated the potential of an innovative guided electromagnetic wave radar technology for real time monitoring of structural performances and the results are very promising.

Following graduation, Jonathon plans to enter the industry as a Structural Engineering designer. His future plans also include pursuing a Ph.D. in Civil Engineering and embarking on educating the next generation of Civil Engineers.



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