DISSEMINATOR

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

January - February 2018



DRIVER ASSISTED TRUCK PLATOONING

FLORIDA DEPARTMENT OF TRANSPORTATION'S TRAFFIC ENGINEERING AND OPERATIONS PUBLICATION





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FDOT TRAFFIC **ENGINEERING AND OPERATIONS MISSION AND VISION STATEMENTS**

MISSION

Provide leadership and serve as a catalyst in becoming the national leader in mobility.

VISION

Provide support and expertise in the application of Traffic Engineering principles and practices to improve safety and mobility.

LOOKING TO BE A CONTRIBUTOR FOR THE **NEXT ISSUE OF THE TSM&O DISSEMINATOR?**

Email Jennifer Rich (Jennifer.Rich@dot.state.fl.us) with your story subject and title.

We'd love to have your contribution be a part of the next edition.

Photo credits: FDOT, TAPCO

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SunGuide 7.1.0 Enhancements

By Derek Vollmer, P.E., State ITS Software Engineer

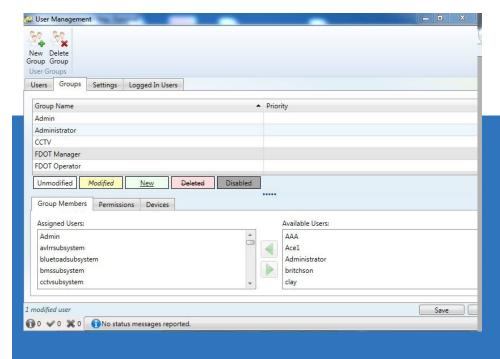
SunGuide® software version 7.1.0 is about to be released. This version will complete the transition from internet explorer graphical user interfaces (GUI) to windows presentation foundation (WPF) GUIs. The WPF GUIs provide more features and functionality, especially when it comes to sorting and filtering information. As part of the transition from internet explorer to WPF, configuration is being moved from the SunGuide software administrator editor into configuration dialogs accessible from the SunGuide software operator map. These configuration dialogs make it easier to edit multiple items, and the dialogs allow multiple users to make changes. In addition to the GUI transition from internet explorer to WPF, the SunGuide software supports the ramp meter National Transportation for Intelligent Transportation System (ITS) protocol (NTCIP), receiving wrong way driving alerts from TAPCO devices, and device/group permissions.

In Florida, the original ramp metering deployment used type 170 traffic controllers with specialized firmware. The type 170 controllers will eventually sunset, so the Department looked at newer controllers and a standardized way to communicate with these controllers. Having success with NTCIP for Dynamic Message Signs (DMS) and Closed Circuit Television Cameras, the Department researched how the currently implemented protocol for the type 170 controllers mapped to the ramp meter NTCIP standard. There was enough functionality overlap that the Department chose to implement the ramp meter NTCIP standard in the SunGuide software. When testing the ramp meter protocol, it was determined that some functionality in the SunGuide software required some additional information from detectors that could not be obtained from ramp meter NTCIP standard. The information could be obtained from the transportation sensor systems (TSS) NTCIP standard, so additional objects from the TSS NTCIP standard were implemented. Between the two NTCIP standards, communications with controllers that support the standards provide the same ramp metering functionality of the existing ramp meter system in the SunGuide software. The standards based approach, by providing interoperability, gives the Department more product options within the system.

As a District works closer with local agencies or if a District needs to control a few devices from another deployment, it became clear the SunGuide software permission structure needed a change. Release 7.1 introduces the concept of permission groups. A permission group can be created to include access to a subset of devices. For instance, a group could be created with access to cameras and DMS on a major arterial highway. Someone at a local agency could be given access to that group. The local agency staff would be able to control the cameras and post messages on the DMS on that roadway, but they could not control or post messages on an interstate DMS. By doing this all through the District's deployment of the SunGuide software, the District can maintain and support the

software deployment, and the local agency can have access to help with traffic and incident management on state roadways within their agency boundaries. Similar groups could be setup for Districts with a lot of road miles and multiple Transportation Management Centers (TMC). The main software deployment can reside within one TMC and provide access to the area the other TMCs need to manage.

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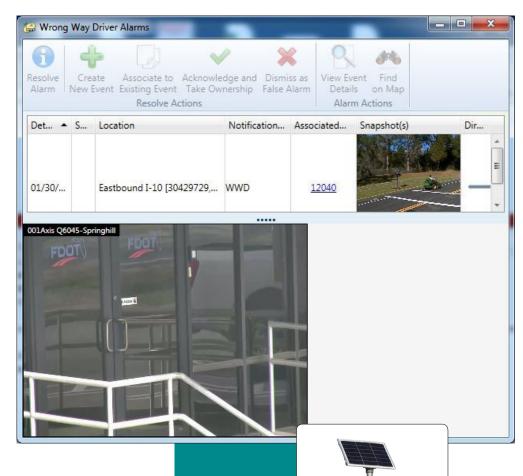


Lastly, release 7.1.0 includes a protocol driver to receive wrong way driver alerts from the TAPCO wrong way driver detection system. The TAPCO devices have multiple radar detectors and cameras to detect and help verify if there is a wrong way driver on a ramp leading to the interstate. An alert is immediately pushed from the TAPCO device and received by the SunGuide software. This will produce a wrong way driver alert in the SunGuide software which will include a sequence of camera images that can show

a vehicle passing by the sign. The alert window also includes a directional arrow indicating which way vehicles should be traveling. This helps operators quickly identify if there is a wrong way driver. The nearest cameras can also be available in the alert to help operators quickly scan the interstate for the wrong way driver. Having the ability to quickly detect and verify a wrong way driver will hopefully save lives in the future.

These seemingly simple enhancements in SunGuide software release 7.1.0 will provide big benefits for Florida. New enhancements are being discussed all the time, and some exciting changes for the SunGuide software are just around the corner.

For more information please contact Derek Vollmer at (850) 410-5615 or by email at Derek.Vollmer@dot.state.fl.us.





Driver Assisted Truck Platooning

By Dr. Carl Crane, Mechanical Engineering, University of Florida, Ed Hutchinson, Florida Department of Transportation, Richard Bishop, Principal, Bishop Consulting

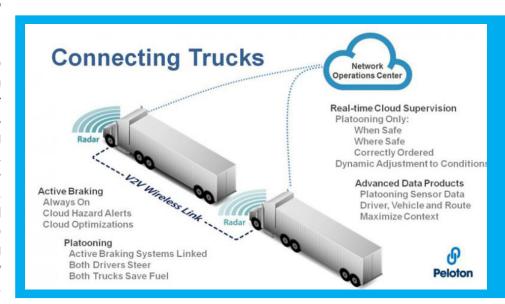
In 2016, the Florida Legislature passed House Bill 7027 that required the Florida Department of Transportation (FDOT), in conjunction with the Florida Department of Highway Safety and Motor Vehicle (DHSMV), to conduct a study of the use and safe operation of Driver Assisted Truck Platooning (DATP) technology for developing a pilot project to test vehicles that are equipped to operate using DATP technology. The University of Florida and Bishop Consulting were selected to work with FDOT, DHSMV and FHP to conduct the study.

Project Objectives

The objective of this study was to assist the FDOT and DHSMV in conducting research of DATP in Florida and developing guidelines for implementation. Specifically, the study provides coordination and communication, research, investigation, and reporting on DATP in support of legislative requirements. The intent of the DATP research was to address issues related to DATP from a State Government perspective and to identify the need for further analysis through a pilot project. Specific focus was given to those issues that are relevant to creating a Florida DATP policy. A significant amount of work has been done over the past few years regarding the underlying technologies associated with DATP and its benefits to the trucking industry. However, no literature could

be found that addresses the impacts of DATP on State Governments or the traveling public.

Current Florida statute (F.S. 316.0895) prohibits trucks from following closer than 300 feet. It is based on an assessment, prior to 1994, that following at shorter distances is unsafe given the nature of truck braking systems and reaction times for human drivers. Truck platooning technology builds upon bestin-class safety systems such as air disc brakes, Adaptive Cruise Control (ACC) and Forward Collision Avoidance and Mitigation (FCAM) systems to safely achieve shorter following distances. If current law is revised to allow shorter following distances while platooning, Florida can expect to see improved safety,



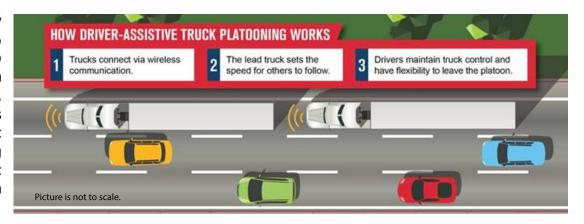
reduced environmental impacts of trucking (lower emissions and energy use) and maintain its standing as a tech-forward state. At the same time, the cost of goods movement will be reduced for freight carriers, with savings potentially passed on to consumers in Florida.

Truck platooning is not new to the engineering community and is considered a low-level automation (SAE Level 1). Initial tests of truck platooning on public roads occurred in Germany (1999), and publicly sponsored Research and Development (R&D) platooning occurred during ensuing years funded by governments in Germany and Japan, the state of California, and the Federal Highway Administration.

Platooning depends fundamentally on "connected braking" which is enabled by secure vehicle-to-vehicle (V2V) communications between a leader truck and follower truck to match the speed of the two trucks. Communication between trucks occur at least 10 times every second, reducing brake reaction time from about 1.5 seconds (conventionally driven trucks) to about 0.1 seconds (DATP equipped trucks).

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Significant fuel economy benefits (approximately 7.5% improvement for the truck pair) have been documented through extensive test track evaluations, motivating major trucking fleets to adopt DATP technologies. First generation systems now being commercialized will consist of two trucks operating at a separation distance



The driver in the leader truck drives normally, controlling throttle, brakes, and steering. The driver in the follower truck allows the system to control throttle and brakes while he or she retains responsibility for steering and monitoring/responding to the driving environment; the human driver continues to play an essential role in the driving task.

Implications for State Agencies

DATP has the potential to increase safety, lower the cost of freight transport and reduce the footprint of trucks on the road. But important questions need to be addressed:

- 1. Will DATP trucks be more likely to crash?
- 2. Will DATP trucks impede other traffic, particularly at interchanges?
- 3. Will DATP trucks damage infrastructure due to intensified loading?

Therefore, this study addressed the implications of DATP across three core dimensions which fall under the purview of Florida state agencies:

- Safe operation (DHSMV/FHP)
- Unimpeded traffic operations (FDOT)
- Infrastructure integrity (FDOT)

Safe Operation

In 2012, for all vehicle types, there were over 1.7 million rear-end crashes in the United States, representing almost half of all two-vehicle crashes. These crashes resulted in 1,705 fatalities and over 500,000 injuries. A National Transportation Safety Board (NTSB) study of class 8 trucks found that FCAM systems, operating on 12,600 tractors, provided a 71% reduction in rear-end collisions, along with a 63% improvement in unsafe following behavior. As of 2015, less than 20% of new Class 8 trucks sold in the U.S. are equipped with FCAM systems (US Truck Safety Coalition, 2015). Payback from non-events is difficult to measure for fleets, and the current system upfront cost (between two and three thousand dollars) is an impediment. However, during 2016 and 2017 most OEMs have made FCAM standard on their highway trucks (OEMOffHighway.com, 2016; Transport Topics, 2017). With new truck sales strong in 2017 and expected to remain so in 2018, market penetration of FCAM is rising. Ryder, Penske, and UPS are examples of major truck fleets which purchase all new trucks with FCAM capability (Trucks.com, 2017).

Most trucks on the road today are equipped with drum brakes. Air disk brakes have superior stopping distances because of automated brake adjustments and greater predictability/reliability due to reduced overheating and associated wear effects. However, due to a higher cost, air disc brakes can be found on less than 15% of Class 8 trucks.

It is estimated that less than 10% of trucks on the road are equipped with a combination of FCAM and air disc brakes. Since platooning technologies are predicted to be adopted quickly, due to improved fuel economy, market penetration of these underlying safety systems will likely accelerate.

Unimpeded Traffic Operations

DATP, being limited to two trucks, is expected to be a benign presence on the road in general. Surrounding traffic will find it preferable to pass two closely spaced trucks rather than two trucks with today's typical spacing.

However, merging traffic must not be impeded by DATP trucks at freeway interchanges. This is addressed by proper share-the-road behavior on the part of today's truck drivers, and the same applies to DATP operations. When traffic is merging, the leader truck driver assesses the situation, keeping in mind the overall length of the two-truck platoon and judges whether to brake for merging traffic or to maintain speed so that traffic can merge behind the platoon.

While limited evaluation of platooning traffic effects has been conducted via simulation, no public road data has been published to date. As DATP comes into use, empirical data should be collected to understand potential impacts more thoroughly.

Infrastructure Integrity

Truck weights and axle spacings are key components in bridge design. Physics dictate that legally-loaded trucks operating at very close following distances will create stresses on today's bridges that shorten the structure's lifespan. But at what following distance does this have an appreciable effect?

The Florida Department of Transportation's Office of Maintenance was tasked with identifying specific bridges on Florida's interstate and turnpike roadways whose strength may be insufficient for truck platooning. For inter-vehicle spacing of 30 feet with each truck running at 80,000 lbs., results showed that only 6 of 2,467 structures were not suitable. Further if truck spacing is increased to 60 feet, all structures are suitable for 80,000 lbs. two-truck platoons.

Paths Forward

The best practices for DATP safety are evident, but State agencies have an interest to put them in place for everyday operations. These practices concern the "what" (equipment) and "how" (operations). Given that specifications of on-board equipment are a Federal responsibility, two options have been adopted by other states that may serve as a model for Florida.

The first approach extends the current paradigm of the operator being responsible for safe operations; thus, the system developer/ operator self-certifies that the system can safely platoon and will only be used under acceptable conditions. The second approach requires a "Platooning Plan" to document factors such as the system design, system limitations, test and validation, and how the system will be used on public roads. Based on this information, state authorities can decide the appropriateness of either approach.

When relaxing following distance laws for platooning, there may be a temptation to set a new minimum following distance specifically for platooning. However, just as the original minimum following distances were set based on an assessment of the technology of the time, the proper following distance for DATP depends on the system abilities. The determination of a safe gap distance can only be made by the system developer, based on their choices of sensors, communication protocols, and many other factors.



Conclusion

FDOT, with cooperation from trucking fleets and technology providers, has recently conducted a pilot test of DATP along the Florida Turnpike. A two-truck platoon spaced 66 feet apart made short and long-haul runs with empty trailers for a total of just over 1,100 miles of demonstration. It allowed FDOT, DHSMV and FHP, as well as researchers from the University of Florida, to observe operations and gather data that provided significant insights into the nature of platooning technology. As a result, FHP noted that decals indicating a platooning capable truck may be needed to reduce the potential of unnecessary traffic stops for following too closely. The final report will be available in early 2018 from the FDOT website.

For more information please contact Ed Hutchinson at (850) 414-4910 or by email at Ed.Hutchinson@dot.state.fl.us.

Colombian Chamber of Infrastructure Visits District Four RTMC

By Dong Chen, District Four ITS Program Manager

On Thursday, November 9, 2017, District Four ITS Program Manager and 15 established members of the Colombian Chamber of Infrastructure visited the District Four Regional Transportation Management Center (RTMC) in hopes of learning about unique P3 Projects and Freeway Operations within the South Florida area.



Becoming more and more prevalent in transportation ventures, P3 projects also known as Public-Private Partnerships, are unique agreements that involve public sector and private entities to work collectively in completing, maintaining and managing construction projects. A few examples of this type of agreement can be seen in the daily operations of I-595 Express and the Port Miami Tunnel. Chamber members first began their visit with the Florida Department of Transportation's (FDOT) District Four Secretary to understand the future of South Florida's Express Lanes Network, while highlighting the successful operation of I-595 and I-95 Express Lanes. Discussions covering the P3/Design-Build Procurement procedure, FDOT's structure and ITS operations within the District Four RTMC were also presented to the chamber members.

District Four's Deputy Maintenance Engineer, Kelley Hall, lead the discussions. "It was important for us to highlight the dynamic nature of South Florida's P3 projects, while applying them in simplified format for Colombia's smaller highway infrastructure." she explained.

To visually assist in the explanation of P3 Projects, chamber members were invited inside the District Four RTMC Control Room to watch I-595 operators initiate the lane reversal process of the I-595 Express Lanes. A personal drive-along tour was also offered to chamber members during their commute on the I-595 Express en-route to the airport.

For more information about the Colombian Chamber's visit please contact Daniel Smith at (954) 847-2633 or email to Daniel.Smith@ dot.state.fl.us.

ITS 5C Summit

Go to your calendars and circle October 7 to 10, 2018. These are the dates for the largest transportation conference in the southeast for the year and you're going to want to be there. For four days in Jacksonville, over 600 transportation professionals will be attending the ITS 5C Summit to discuss issues, attend classes and technical sessions, and network with industry vendors

and their peers. This Summit, with the theme of "Coming Together to Address the Challenges of Connecting Cars, Communities, and Citizens, is being sponsored by ITS Florida, ITS Georgia, GRITS, ITS Carolinas, and ITS Tennessee, five state chapters covering eight states. This will provide an amazing opportunity to learn how other states address the issues you are encountering.

The conference will begin Sunday evening with a Welcome Reception along the St. Johns River. This will be an excellent opportunity to greet old friends and meet new ones.

Monday will be a full day, starting with an Opening Session featuring state and national leaders in the ITS industry. The afternoon will begin the Technical



Sessions, with speakers from eight states discussing processes and projects in five tracks that will cover every aspect of ITS, from planning and design through operation and maintenance. While Florida is a national leader in ITS, this will allow you to learn how things are done in seven other states.

Monday evening will bring a special event. The ITS 5C Summit will take over the Intuition Ale Works. This will be a great place to grab dinner, talk with friends and colleagues, take a tour of the brewery, and try a small-batch of handcrafted ale.

Tuesday morning, the technical tracks will continue. Tuesday afternoon will provide you several opportunities to improve your skills. You can attend a class put on by FHWA; it is anticipated a choice of two will be provided. Or you can go on a tour of several transportation facilities in Jacksonville. Or you can participate in the conference golf outing, to be held at one of Jacksonville's beautiful golf courses.

Tuesday evening, you can take a water taxi across the river and attend the event at the Jacksonville Museum of Science & History. The facility will be ours, so you can eat dinner while learning about the whales, dolphins, and manatees of northeast Florida. You can check out the stars at the Bryan-Gooding Planetarium. And you can visit the Hall of Heroes, where you can enter the world of superheroes. When you're done, you can take the water taxi back to Jacksonville Landing, home to restaurants, bars, shopping, and special events.

Wednesday's Closing Sessions will feature industry leaders and policy setters that shape ITS and transportation on a national level. The Summit will close at noon on Wednesday.

All of this activity will be supplemented by an Exhibit Hall that will include vendors displaying the latest in transportation technology. This Hall will allow you to play with all the newest toys, including automated vehicle technology.

Something new this year will be on-phone registration. No standing in line. Just pass your phone in front of a kiosk and you're done. Your program will also be on your phone. And, if you are a sponsor, your firm's name will be posted on electronic boards throughout the conference and sent to attendees' phones all day.

A call for speakers will be going out shortly, so look for your chance to be one of our experts. Sponsoring the Summit or being an exhibitor will get your firm's name or product in front of hundreds of potential buyers. Go to the ITS Florida website and click on the Summit link for all the details. And keep checking the website as new information is being posted continuously.

For more information please visit www.its5csummit.com or email info@its5csummit.com.

District Six Looks Ahead to 2018

By Javier Rodriguez, P.E., District Six TSM&O Engineer

The District Six Transportation Systems Management and Operations (TSM&O) program is looking ahead to 2018 with several largescale projects scheduled to be completed or launched in the coming months. These projects include 75 Express, Palmetto Express, and Express Lanes Emergency Stopping Sites on 95 Express.

75 Express in Broward County and north Miami-Dade County is scheduled to open to the public in February. District Six will be supporting incident management activities for the portion in Miami-Dade County with expanded Road Ranger and Incident Response Vehicle coverage. The portion of 75 Express from the Palmetto Expressway to NW 170 Street will open as part of the Palmetto Express project.

The Palmetto Express is scheduled to open in Summer 2018. The project will introduce two express lanes along SR 826/Palmetto

Expressway from West Flagler Street to NW 154 Street as well as one express lane on I-75 (75 Express) from the Palmetto Expressway to NW 170 Street. The project will also add 16 ramp signals at the on-ramps along the Palmetto Expressway from NW 25 Street to NW 154 Street. District Six will manage the toll operations of the Palmetto Express and 75 Express from the Palmetto Expressway to NW 170 Street.



Along Interstate 95 in Miami-Dade County, District Six is constructing five Emergency Stopping Sites (ESS) from NW 62 Street to NW 131 Street. All five ESSs will be constructed in the median; three northbound and two southbound. The new ESSs will allow drivers and law enforcement to pull over safely and allow traffic in the express lanes to flow in case of a minor incident. This project is anticipated to be completed in Spring 2018.

In addition to these large-scale roadway projects, the TSM&O program will continue to manage the Advanced Signal Control Technology (ASCT) pilot project along SW 8 Street and will begin operations and maintenance of traffic signals in the Florida Keys along US-1 from Key Largo to Key West.

2018 is already shaping up to be a busy year and the District Six TSM&O program is ready and willing to meet the challenges and improvements in this upcoming year.

For more information please contact Javier Rodriguez at (305) 640-7307 or by email at Javier.Rodriguez2@dot.state.fl.us.



New State Connected Vehicles and Arterial Management Engineer

By Trey Tillander, P.E., State Traffic Operations Engineer, Director, Traffic Engineering and Operations Office

I am pleased to announce Raj Ponnaluri, PhD, P.E., PTOE, PMP as the State Connected Vehicles and Arterial Management Engineer. Raj will continue to work in the State Traffic Engineering and Operations Office and report directly to Trey Tillander.

In his new role Raj will lead efforts to:

 Lead and manage the concept development, design and implementation of Connected and Automated Vehicle (CAV) systems. The position will help accelerate and sustain a statewide approach to FDOT's CAV program and will focus on deployments while working closely with key stakeholders within FDOT, other Florida agencies and local jurisdictions to develop, implement and maintain Florida's CAV program.



- Lead and manage the planning, design and implementation of the Statewide Arterial Management Program (STAMP) including the development of STAMP Action Plan consistent with the Transportation Systems Management and Operations (TSM&O) Strategic Plan.
- Serve as a CAV program Champion by promoting the program on a local level through outreach, education and support. Represent FDOT in committees and working groups that support CAV initiatives and deployments. Work with research entities, universities, other divisions and work units to identify processes to mainstream CAV with an aim to improve safety and mobility.
- Oversee the advancement of FDOT's arterial systems including guidance on Advanced Signal Control Technologies, Automated Traffic Signal Performance Measures, pilot projects to advance traffic signals systems, and guidance on adopting technologies to promote the safety and mobility of all road users.

Raj received his Bachelor's and Master's degree in Civil Engineering, PhD in Transportation and MBA. He has over 22 years of experience in Traffic Engineering and Operations, Intelligent Transportation Systems, Transportation Systems Management & Operations (TSM&O), and Public Transportation. In addition to leading the State Arterial Management Program and assisting with TSM&O, Raj has been leading the state's wrong-way driving initiative, an effort that won the Department the ITE and Road Safety Foundation national awards in 2017. He has published works with the ITE Journal, TRB's Transportation Research Record, and Elsevier's Accident Analysis & Prevention and Transport Policy.



Raj will begin his new duties immediately. Please join me in welcoming Raj in his new role.

ITS America awards Florida Chapter with 2017 Outstanding State Chapter Award

ITS Florida was awarded the 2017 Outstanding State Chapter Award by ITS America.

This award is the highest honor awarded by ITS America to ITS State Chapters in Division 2. It represents ITS Florida's continued commitment to our members.

- Strong and Engaging Chapter Governance Board of Directors
- Providing well-planned and executed educational programs such as Transpo.
- Collaborating with other professional organization
- Networking with other professionals
- Organizational and Professional Development
- Strong Scholarship Program for both college students and continuing education/ certification/training for transportation industry specialists.

We are looking forward to another great year!



From left to right: Jason Goldman and Jonathan Tursky

Break Time



"MR. SMITH, CARS USED TO HAVE STEERING WHEELS, RIGHT?!"

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ITS Florida Scholarships and Awards

ITS Florida Scholarships

The Board of Directors approved three recipients of the Anne Brewer Scholarship program. It awarded:

- Samaneh Khazraeian, Florida International University (FIU) was awarded first place for her research work in ITS as she works to complete her PhD program in civil engineering. She has published seven papers and is a former president of the FIU Women in Transportation Society (WTS) and is currently leading the Transportation You program.
- Leila Azizi is currently studying and performing research at FIU (Lehman Center for Transportation Research). She is interested in a wide variety of transportation research including "Platooning" and using Automated and Connected Vehicle Data for research. Ms. Azizi is active in several National and International Transportation Organizations.



 Adekunle Adebisi is currently enrolled in the Florida State University our master's degree program Florida A&M (FAMU) - (FSU) College of Engineering. He has excellent grades and performed very well in a research project. He also has broad skills in the use of many Transportation Computer programs and models.

ITS Florida Awards

ITS Florida presented its awards at the ITS Florida/Florida Section ITE meeting November 2nd in Orlando. We are pleased to announce the following:

The Florida Turnpike Enterprise was awarded the ITS Florida Member of the Year. This award recognizes outstanding achievement as an organization. It was for the development of statewide and national importance in safety, operational efficiency and increased mobility

Jeremy Dilmore, FDOT District 5 TSM&O Engineer was awarded ITS Professional of the Year. This was in recognition of his work on Florida's first ICM Project concurrent with the new TMC building and leading the I-75 FRAME Project.

Charles John Robbins was posthumously awarded with the ITS Florida President's Award. This award was in recognition of his vast accomplishments in the ITS industry and Florida FDOT districts.

Charles Robbins was also inducted into the ITS Florida Honor Roll for his significant contributions and support of ITS.

Four Certificate of Outstanding Achievement were awarded:

- Tushar Patel In recognition of his management of the D5 RTMC construction project.
- FDOT Traffic Engineering And Operations Office In recognition of implementing Emergency Shoulder Use during Hurricane IRMA.
- FDOT District Four in recognition of transformation of 'video wall' into 'information wall'.
- FDOT District Six in recognition of expansion of the Operations Task Manager (OTM) software.

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