These young minds get top tech paper honors

Congratulations to the four winners of the 2020 Student/Young Professional Tech Paper Competition! The top two young-professional authors are Dhaval Lodaya, Senior Project Engineer at Gamma Technologies LLC, and Dario Lopez-Pintor, post-doctoral researcher with Sandia National Laboratories. The top two student authors are Erika Ziraldo, Ph.D. student at University of Guelph, and George Koutsakis, Ph.D. student at University of Wisconsin.

Each winner will receive a $500 gift. They were scheduled to present their papers at WCX, but that event has been cancelled because of coronavirus. Contest judging was by WCX tech session organizes.

Update conducted written interview with the four winners. Here's what they had to say.

Dhaval Lodaya

2020-01-1007 "Optimization of Fuel Economy Using Optimal Controls on Regulatory and Real-World Driving Cycles"

At Gamma Technologies, Lodaya is Senior Project Engineer in Electrified Vehicle Applications.

How satisfying is it for you to have been named winner of SAE's tech paper competition?

It is very satisfying for me to achieve this

Dhaval Lodaya

Young Professional Best Tech Paper Award as it reaffirms the efforts put not just into writing this paper but also developing the technical solutions like Optimal Controls and Real-World Driving (GT-RealDrive) with the whole team at Gamma Technologies.

What is the paper's most important finding or conclusion?

We felt the topic of our paper was important because fuel economy norms are getting stricter, while vehicle complexity is also increasing. There is a need for a tool in the market that can capture best-case scenarios using optimal controls for any vehicle architecture without significant development efforts. Solutions like Dynamic Programming (DP) in GT-SUITE provides

Dr. Dario Lopez-Pintor

seamless interface between physics and controls and is applicable to any vehicle architecture. Moreover, Real World Driving (or "off-cycle driving") is gaining importance and is now a part of standard test procedure for European Certification. A general computational methodology involving the Dynamic Programming Control Algorithm was developed that is applicable to any vehicle/powertrain architecture including conventional and hybrid electric vehicles. In this study, the simulated P0/P4 parallel hybrid electric vehicle was simulated through several driving cycles including regulatory city and highway. as well as a real-world driving cycle. The objective of the study was to assess variation in optimal controls trajectories generated using DP algorithm and their impact on fuel economy. One of the novel features of this study was ability to apply the computational methodology and DP algorithm generally not only to any possible vehicle architecture, but also to be able to execute as fast as possible over any test cycle. This was achieved by a parallelization technique, capable of reducing computation time by up to 91%.

Dr. Dario Lopez-Pintor

2020-01-1136 "Experimental Evaluation of a Custom Gasoline-Like Blend Designed to Simultaneously Improve-Sensitivity, RON and Octane Sensitivity"

At Sandia National Laboratory, Lopez-Pintor is a post-doctoral appointee of the Department of Engine Research, Combustion Research Facility, Low-Temperature Gasoline Combustion Laboratory.

How satisfying is it for you to have been named winner of SAE's tech paper competition?

It is an honor to receive a recognition from SAE. To have been named winner of SAE technical paper competition for young professionals is an amazing way to recognize my work and, in my opinion, this is also an opportunity to share my work with other researchers and give a little boost to my career.

What is the paper's most important finding or conclusion?

The topic of my technical paper is developing and testing custom gasoline-like fuel blends that are suitable for both advanced compression-ignition engines and modern spark-ignition engines. Why is this interesting? Because the properties of the fuel directly affect the performance of the engine. More specifically, my technical paper shows a custom gasoline with enhanced phi-sensitivity (or ϕ-sensitivity), a fuel property that has important benefits for the operation and control of advanced compression-ignition engines. This work experimentally demonstrates that it is possible to design a regulation-compliant gasoline-like fuel blend that increases phi-sensitivity, the octane number, and the octane sensitivity.

Erika Ziraldo

2020-01-0886 "Driver Response to Left Incurring Path Intrusions at Sign-Controlled Intersections"

At the School of Engineering, University of Guelph, Ziraldo's doctoral research involves investigates patterns in human driving behaviour for applications in accident reconstruction and decision-making for autonomous vehicles.

How satisfying is it for you to have been named winner of SAE's tech paper competition?

Erika Ziraldo

Being named as a winner of SAE's tech paper competition was unexpected, but very satisfying. This was my first time through the academic publishing process, and it feels wonderful to know I'm on the right track. I feel especially grateful to my co-authors and our reviewers who steered the paper in an impactful direction.

What is the paper's most important finding or conclusion?

A common convention in the perception-response time literature is to start timing a driver's response to an intersection hazard when the hazard crosses into the intersection, and that any braking or steering that occurs before this point is not a legitimate response to the hazard. In this paper, we decided to keep these 'negative' response times in the data and found that

George Koutsakis

many drivers (~30%) were able to anticipate and begin responding to the hazard before it had even entered their path. This was particularly true if the hazard provided a cue or precursor to its future behaviour, for example, if it was already moving when the participant driver noticed it for the first time. We hope this finding encourages other researchers to report their "negative" response times rather than remove them in the data cleaning process. This will improve response time estimates for hazards that are commonly anticipated, but require an emergency response to avoid a collision.

George Koutsakis

2020-01-0160 - "An Analytical Approach for Calculating Instantaneous Multilayer-Coated Wall Surface Temperature in an Engine"

The focus of Koutsakis's work as Research Assistant at the Engine Research Center (ERC) of University of Wisconsin-Madison is the in-cylinder multilayer wall heat transfer in internal combustion engines.

How satisfying is it for you to have been named winner of SAE's tech paper competition?

It is very important to see your work being recognized. Definitely a great honor for me to win an SAE technical paper award!

What is the paper's most important finding or conclusion?

The problem of unsteady heat transfer between the working gases and the walls of the reciprocating internal-combustion engine is a very complex problem. I find it very interesting because it is a multi-disciplinary problem in the sense that it combines different fields of engineering —i.e.. heat transfer, material science, manufacturing processes, and fundamentals of internal-combustion engines. This work provides a methodology to calculate long-duration transient wall temperatures of combustion surfaces very simply with high accuracy and low computational cost. It is an important finding because it enables new research paths to evaluate use of thermal insulation coatings to increase engine efficiency by maintaining low emission pollutants. ■