Mohamed A. Abdel-Aty

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A pioneer in real-time safety research and proactive traffic management, transportation safety planning, connected vehicles, and technology implementation, **Mohamed Abdel-Aty** is the chair of the Department of Civil, Environmental, and Construction Engineering at the University of Central Florida (UCF). He also leads UCF's top-ranked transportation group and is the founder and director of its Future City Initiative and new master's degree program in Smart Cities.

During his time as a civil engineering undergraduate student at Alexandria University in Egypt, Aty gravitated toward transportation, even though focusing on areas of study other than structures was somewhat nontraditional at the time. But civil engineering encompasses so much more, Aty notes: "Once the infrastructure has been well-developed—particularly in the United States—it becomes more about maintaining and managing it all." He completed his master's degree work in railroad simulation at Alexandria University and came to the United States to attend a Ph.D. program at the University of California (UC), Davis.

Once at UC Davis, Aty began working in travel demand analysis research and, after completing his dissertation, joined the faculty at UCF. As a young assistant professor, it was key that he find a research niche. Aty had taken courses in safety during his Ph.D. studies; though safety was a relatively new branch of traffic engineering, it was well on its way to becoming its own science.

Aty's research in safety proved productive. Soon, the field of safety analytics began to expand with the growth in subdisciplines and ever-evolving technologies. Aty and his students started to broaden their research, particularly into how real-time big data—along with artificial intelligence and machine learning—could be leveraged for safety.

"Start from an idea, then persevere and work on it very hard, and it becomes reality," Aty comments. "When you can prove it, then you can build it and improve on it. Then it becomes a system."

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Among the new concepts Aty has introduced over the past 20 years—that are now well-accepted in practice—are proactive traffic management, real-time safety risk prediction, and transportation safety planning at the macroscopic level. Many have been emulated and implemented throughout the world, and some are to be included in the *Highway Safety Manual*.

In November 2019, Aty and his student team won the U.S. Department of Transportation (DOT) Solving for Safety Visualization Challenge. Their research on real-time crash risk visualization using integrated tools for traffic safety evaluation and management has been implemented in Florida and now is included in a U.S. DOT funding opportunity to be implemented by other jurisdictions.

"This is the ultimate objective for an engineer," Aty observes. "Researchers are happy to generate ideas and get excitement, but the ultimate interest of an engineer is to see the difference in reality."

Aty's work on innovative intersection designs contributed to Florida's *Manual on Safety Performance for Intersection Control Evaluation*. He invented and evaluated a new intersection design to accommodate high traffic volumes while reducing conflicts, as well as extensive work on interchange safety, including diverging diamond interchanges (DDI), supporting the Florida DOT conversion of 35 interchanges throughout the state to DDI. In addition to numerous safety solutions, Aty's computer vision and machine learning systems are used by Florida DOT in several applications.

Aty has been active on TRB committees since the late 1990s, when he joined what is now the Standing Committee on Safety Performance and Analysis. He chaired the Second Strategic Highway Research Program Expert Task Group on Roadway Measurement System Evaluation. For the past 11 years, he has coauthored the yearly *Synthesis Report on Safety-Related Papers*. Outside of TRB, Aty chairs the American Society Civil Engineers Transportation Safety Committee and served as editor-in-chief of the journal *Accident Analysis and Prevention*.

Aty brings his entire research team—around 25 students—to TRB's Annual Meeting each year, ensuring that they attend meetings and sessions and present their research. Now, many of both his current and former Ph.D. and master's students are active on various TRB committees. "One of the truly rewarding experiences as a professor is to work with a lot of students and to really see how this work affects them and their careers and how they develop," Aty muses.

In 2019, Aty's paper, "Understanding the Highway Safety Benefits of Different Approaches of Connected Vehicles in Reduced Visibility Conditions," was one of the five most cited papers in the *Transportation Research Record*. He also received the 2020 Roy W. Crum Distinguished Service Award from TRB.