

Dr. Halil Ceylan Recipient of the 2024 Roy W. Crum Award



Named for Roy W. Crum, who served as the Board's director from 1928 until his death in 1951, the Crum Award recognizes outstanding achievement in the field of transportation research. Dr. Halil Ceylan, Pitt-Des Moines, Inc. Endowed Professor, Civil, Construction, and Environmental Engineering Department, Iowa State University, is the 2024 recipient of the Roy W. Crum Award. He is recognized for his distinguished career in civil, transportation, and pavement engineering marked by exemplary leadership, numerous outstanding achievements, and significant contributions to the performance and production of fundamental

and developmental transportation-related research.

The award will be presented on Wednesday, January 8, 2025, during the Chair's Plenary Session portion of the Transportation Research Board's (TRB) Annual Meeting, January 5-9, 2025, at the Walter E. Washington Convention Center in Washington, D.C.

Dr. Ceylan's research portfolio is notable for its diversity and innovation, encompassing groundbreaking geomaterial stabilization solutions such as nontraditional stabilizers and 3D-printed geosynthetics using recycled plastics. He has pioneered continuous realtime health monitoring of infrastructure systems using smart sensors and systems, including uncrewed aircraft systems/drones. His work includes developing next-generation electrically conductive concrete and asphalt for self-heating and applying artificial intelligence to transportation infrastructure system performance modeling and design optimization. He has also conducted lifecycle cost and environmental analysis of transportation infrastructure systems and developed guidelines and specifications to support transportation infrastructure system innovations.

Dr. Ceylan's research has significantly advanced transportation infrastructure systems. His work has been implemented in national design guides/systems like AASHTOWare Pavement Mechanistic-Empirical Design Software and the U.S. Federal Aviation Administration's Airfield Pavement Analysis and Design tool. Dr. Ceylan's pioneering efforts in artificial intelligence (AI) and machine learning (ML) began over 25 years ago when he introduced artificial neural networks for use in analyzing and designing airfield and highway pavement systems, as well as predicting the reflective cracking on composite pavement systems.

His early contributions have significantly promoted the use of AI and ML in the pavement/transportation infrastructure engineering field. Since 2013, Dr. Ceylan has led major advancements and innovations in heated pavement systems, addressing winter weather challenges that cause icy runways and roadways, leading to traffic delays, incidents, accidents, and closure of transportation systems. His research aims to keep airports and other transportation infrastructure systems such as rest areas, bridge



decks, sidewalks, and parking areas safe, open, and accessible during winter conditions.

In addition to his work on advanced materials and systems, Dr. Ceylan and his research team have also explored the use of Otta seal surfacing for maintaining unpaved gravel roads, a low-cost solution widely used in northern Europe and Africa but previously untested in the United States. Since constructing the first Otta seal in Iowa in 2017 as a sustainable solution, over 50 sites have been developed, demonstrating the technology's feasibility, cost-effectiveness, and attractiveness to the transportation community. Otta seal uses locally available and recycled aggregates, reducing construction costs and making it a sustainable alternative to similar technologies. Throughout his career, Dr. Ceylan has been involved in more than 140 funded research projects, totaling more than \$26 million in project funds, while serving either as the principal or co-principal investigator. He has authored and co-authored more than 430 peer-reviewed publications, including journal articles, conference papers, edited books, invited book chapters, and technical reports that have received over 8,200 citations as of July 2024.

A dedicated member of the TRB community for over two decades, Dr. Ceylan has contributed significantly through his involvement in various committees. He is a former member of the Standing Technical Committees on Modeling for Design, Construction, and Management of Geosystems; Design and Rehabilitation of Concrete Pavements; Pavement Structural Modeling and Evaluation; and on Road Weather. He currently services on the Standing Technical Committee on Quality Assurance Management and Subcommittee on Design and Construction of Roller Compacted Concrete Pavements, as well as on the Airport Cooperative Research Program's Panel on Automated Pavement Conditions Survey Practices at Airports. Dr. Ceylan has chaired sessions at multiple TRB Annual Meetings on diverse topics, including inclement weather effects on driving behavior, weather impacts on surface transportation, track support assessment, and efficiency in geotechnical design using neural networks. He has organized workshops and sessions at the 13th TRB International Conference on Low Volume Roads, and sessions on modeling erosion and foundation support in concrete pavements and neural network applications in geotechnics. He also serves as the chair of the American Society of Civil Engineers (ASCE) Geo-Institute Pavements Committee and the ASCE Transportation and Development Institute Uncrewed Aircraft Systems Committee, and associate editor, topic editor-in-chief, and editor of many journals, and member of many associations and societies.

He is a prolific technical presenter, having delivered over 460 presentations, including more than 160 invited talks and several keynote lectures. He has taught and organized more than 15 short courses and workshops, presided over 45 technical sessions, tracks, and conferences, and served as the organizing or conference chair for three national-level conferences.

As a committed mentor, Dr. Ceylan has supervised or co-supervised more than 70 graduate students and over 15 postdoctoral research associates, research scientists,

and visiting scholars from diverse backgrounds at Iowa State University. More than 55 of his graduate students have completed their degrees and are now impacting academic institutions, transportation infrastructure engineering firms, and government agencies.

He has been on the faculty of the Department of Civil, Construction and Environmental Engineering at Iowa State University (ISU) since 2002, where he has taught graduate and undergraduate courses in pavement analysis and design, design of concretes covering portland cement concrete and asphalt cement concrete, geotechnical engineering, and senior design. Dr. Ceylan serves as the Founding Director of the Program for Sustainable Pavement Engineering and Research (PROSPER) at Institute for Transportation and the Site Director for Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS), Federal Aviation Administration Center of Excellence on General Aviation at ISU.

He is a Distinguished Member of the ASCE and has received numerous accolades, including the 2023 ASCE Robert Horonjeff Award, the 2021 ASCE James Laurie Prize, and the 2022 University of Illinois Alumni Achievement Award, among more than 25 other awards and honors.

Dr. Ceylan holds a Bachelor's of Science degree (Dokuz Eylul University 1989), a Master's of Science degree (University of Illinois at Urbana Champaign 1995), and a doctorate (University of Illinois at Urbana-Champaign 2002), all in civil engineering.