SEMINAR

Young Researchers in Mechanical Engineering

How Connectivity Can Transform Efficiency and Safety of Autonomous Vehicles

SPEAKER

Anıl Alan, Postdoctoral Researcher

Delft Center for Systems and Control at TU Delft, Netherlands.

ABSTRACT

The rapid advancement of technology is accelerating the deployment of autonomous vehicles on our roads. With their ability to make faster and more informed decisions, autonomous systems offer the potential for safer and more efficient transportation, reducing both traffic congestion and energy consumption. However, when vehicle controllers operate using only short-sighted or purely local information, they may inadvertently cause increased energy use, introduce phantom traffic jams, or even create unsafe situations. Vehicle-to-vehicle (V2V) and, more broadly, vehicle-to-everything (V2X) connectivity provide a promising pathway to overcome these limitations. By leveraging beyond-line-of-sight information, connected autonomous vehicles can make proactive decisions that anticipate upcoming conditions rather than merely reacting to local measurements. This capability enables significant benefits, including improved energy efficiency on hilly roads, effective mitigation of phantom jams, and enhanced safety through earlier and more coordinated responses to disturbances in the upstream traffic. In this talk, I will discuss the role of connectivity in advancing autonomous driving performance, focusing on three key aspects: energy-efficient control strategies for varying terrain, suppression of phantom traffic jams, and more effective enforcement of safety constraints.

ABOUT THE SPEAKER

Anil Alan is a Postdoctoral Researcher at the Delft Center for Systems and Control at TU Delft. He completed his PhD in Mechanical Engineering at the University of Michigan, where he was awarded the Rackham Predoctoral Fellowship, and holds an MSc from Bilkent University. At TU Delft, he works on an ERC Advanced Grant project focusing on learning-based control strategies for large scale systems. His research centers on optimization-based and constrained control methods for energy-efficient and safety-critical systems, with applications to connected autonomous vehicles. He is the recipient of the Professor Pierre T. Kabamba Award and ASME's Best Student Paper Award at the American Control Conference

CONTACT

Yildiray Yildiz, Mechanical Engineering Department, Bilkent University, Email

DECEMBER · 5 · 2025

FRIDAY 13:30

ONLINE

joining instructions