

Intelligent Urgent Stop for Autonomous Vehicles

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Abstract

As the presence of autonomous vehicles grows in the world, so does the need for an automated intelligent system that can safely stop these vehicles in any setting. To ensure a reliable and consistent emergency stop for autonomous systems across various vehicles and platforms, USU researchers developed an algorithm that incorporates vehicle characteristics, terrain quality, nearby obstacles, and travel state to find a safe stopping point. This algorithm is designed to quickly analyze terrain characteristics, identifying surface conditions within a few seconds. Based on this analysis, it determines the most appropriate braking procedure required for safe and consistent stopping, tailored to the terrain and operational context. This allows for rapid, real-time decision-making, making it versatile across all autonomous systems and environments.

Problem

When a vehicle is traveling at high speeds across uneven terrain with inconsistent traction, stopping on a whim can be dangerous, especially when operating heavy vehicles.

Solution

By using information from several different sensors, the algorithm incorporates the vehicle's dimensions, speed, trajectory, the terrain grade, any obstacles in the path of vehicle, and more, to create a consistent, safe stop mechanism.

Value Proposition

This technology is usable in any rolling vehicle, but especially necessary with equipment and vehicles in construction, mining, and farming, as these industries often require driving on uneven, low-traction terrain.

Benefit

Many current autonomous vehicles have urgent stop reactions, but these reactions often just slam on the brakes, skidding to a stop. This usually works fine in situations where the terrain is predictable (i.e., an asphalt freeway), but when the vehicle is much larger and traveling across uneven terrain with inconsistent traction, the algorithm needs to incorporate other aspects of the vehicles travel path.

Rather than just personal commuter vehicles, a system is needed that can safely guide any type of rolling equipment to a stop in an emergency; mining vehicles, construction equipment, tractors, and many other types of vehicles need a consistent, reliable, and safe stop in such a case.

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Market Application

Useful for all rolling vehicles, this technology is most directly applicable in industries with heavy equipment and uneven terrain. Construction, farming, and mining can all benefit from this ingenious method for a reliable, intelligent, urgent stop.

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