
EMBARGOED UNTIL 10:00 A.M. ET, THURSDAY, JULY 1, 2021

July 1, 2021

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Curves pose a bump in the road for driving automation

ARLINGTON, Va. — Curves in the road are posing a challenge to advanced driver assistance features like adaptive cruise control (ACC) and more sophisticated partial automation systems, limiting their potential safety benefits, a new study from the Insurance Institute for Highway Safety found.

ACC and more advanced partial automation that combines ACC with lane centering are often disabled on some of the sharper curves present on limited-access roadways, either because drivers switch the features off or they deactivate automatically.

“We know that advanced driver assistance features may help prevent crashes, but obviously they can only do so if drivers use them,” says IIHS Senior Research Transportation Engineer Wen Hu, the lead author of the paper. “This study suggests that these technologies will only be able to reach their full potential if drivers can trust them to handle curves.”

ACC works like conventional cruise control, but it automatically slows the vehicle to maintain a preselected following distance from the vehicle ahead so the driver doesn’t need to repeatedly brake and reset the system. Lane centering provides automated steering assistance designed to keep the vehicle in the middle of the lane.

Hu and her co-authors used field operational test data collected by the Massachusetts Institute of Technology’s Advanced Vehicle Technology Consortium. On-board data-acquisition systems collected information from two 2016 Land Rover Range Rover Evoque and two 2017 Volvo S90 vehicles driven by 39 drivers over four weeks. The Evoques were equipped with ACC, and the S90s were equipped with both ACC and Volvo’s Pilot Assist partial automation system — which combines ACC and lane centering.

Analyzing the data, the researchers found that ACC or Pilot Assist were less likely to be active as curves became sharper. In the Evoque vehicles, drivers were 72 percent less likely to use ACC on the sharpest category of curves (those with a radius smaller than 2292 feet) than they were to use those features on straight road segments. In the S90 vehicles, drivers were 75 percent less likely to use Pilot Assist and 66 percent less likely to use ACC on the sharpest curves.

The researchers did not determine in this analysis whether the driver switched off the system or it deactivated automatically. Lane centering can automatically become suspended when the driver manipulates the steering wheel or uses the turn signal, or when the system’s sensors cannot detect the lines painted on the road. ACC deactivates when the driver applies the brakes.

“The fact that Pilot Assist was frequently inactive on the sharpest curves is an important limitation, since the kinds of crashes lane centering could help prevent are more likely to occur on curves than on straightaways,” says Hu.

An [earlier IIHS study](#) of police-reported crashes showed that front crash prevention cuts rear-end crash rates in half and reduces rear-end crashes involving injuries by 56 percent. ACC could boost those reductions, since it typically results in greater following distances, giving drivers more time to react to an emergency ahead.

[Another study](#) found that lane departure warning — which alerts the driver when the vehicle is drifting from its lane — lowers rates of single-vehicle, sideswipe and head-on crashes of all severities by 11 percent and lowers the rates of injury crashes of the same types by 21 percent. Because they also provide steering assistance, lane centering systems might boost those reductions as well.

For more information, go to [iihs.org](https://www.iihs.org)

The Insurance Institute for Highway Safety (IIHS) is an independent, nonprofit scientific and educational organization dedicated to reducing deaths, injuries and property damage from motor vehicle crashes through research and evaluation and through education of consumers, policymakers and safety professionals. IIHS is wholly supported by auto insurers.
