WHAT IS SAFETY OF THE INTENDED FUNCTIONALITY?

The emergence of automated driving and autonomous vehicles (AVs) brings great safety engineering challenges. What if sensors work as designed, but their performance falls short under real-world conditions?

Unique Challenges for Autonomous Vehicle Safety

Sensors and perception algorithms identify an array of scenarios on the road, but can sometimes get confused by human behavior, weather, light conditions, and the objects they encounter.

Hazardous Scenario NOT DETECTED by Vehicle

1

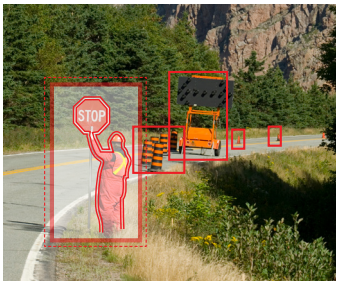
Snow covered road obscures lane markings.[1]

2

Trained to pick out objects in bright sunshine, the vehicle struggles to make sense of the lanes.[2]

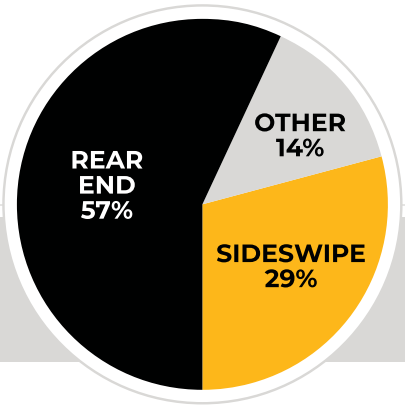
3

Vehicle accidently drives into neighboring lane.



THE BEHAVIOR OF NEURAL NETWORKS CAN BE UNPREDICTABLE

A perception algorithm might recognize various types of pedestrians with a high degree of accuracy, but then unexpectedly misidentify a construction worker wearing a yellow reflective vest.



In California, autonomous vehicles get rear-ended in most of the incidents they're involved in.[3] This can occur if an autonomous vehicle stops for a "ghost" object after misidentifying a metal plate or fire hydrant and other drivers do not predict its decision.

It's Time for SOTIF

A new standard is currently under development to make AVs safer: ISO 21448 "Road Vehicles – Safety of the Intended Functionality" (SOTIF). It examines whether a needed safety functionality is successfully delivered in the absence of a failure, such as performance limitations of sensors or systems, or unexpected changes in the road environment.

Hazardous Scenario DETECTED by Vehicle

Snow covered road obscures lane markings.

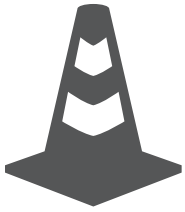
Although the road markings are barely recognizable, the AI system detects that this is due to snow and has means to adjust the parameters of its perception system (i.e., other brightness or contrast parameters for camera)

Vehicle remains safety within its lane after obscure markings are seen after adjustments

Ansys Is Here to Help

Higher standards demand higher levels of engineering, and these sophisticated problems can only be identified and solved by uniting safety analysis and simulation to predict results in advance.

Ansys medini analyze is a recognized industry leader for functional safety analysis. Expanded to include innovative capabilities for ensuring SOTIF compliance, this robust solution joins a comprehensive Ansys toolset that enables teams to build performance into their designs from the earliest stages — and verify that performance before vehicles hit the road.



Identify and address limitations and triggering conditions that may lead to SOTIF hazards.

Simultaneously meet the demands of ISO 21448 and ISO 26262 standards in an integrated workflow.

Reduce development time, eliminate redundancies and accelerate time-to-market.

1) https://www.wired.com/story/snow-ice-pose-vexing-obstacle-self-driving-cars/
2) https://www.insurancejournal.com/news/international/2018/03/22/484123.htm
3) https://www.wired.com/story/self-driving-car-crashes-rear-endings-why-charts-statistics/

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