

Nauto's AI Safety System Soars in Performance Study

| December 2024 VTTI AI Dash Cam Performance Evaluation

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Disclaimer

This document was prepared by Nauto and does not represent the views of VTTI unless explicitly noted. Any comparisons to other technologies were performed by Nauto and were based on data from VTTI's June 2023 and December 2024 evaluations of AI dash cam technologies. VTTI does not endorse any products included or not included in this presentation.



Summary

Background

The Virginia Tech Transportation Institute (VTTI), a globally recognized leader in transportation research, conducted a performance test of Nauto's AI-powered safety system in December 2024. The new evaluation was commissioned by Nauto to closely mimic the study scenarios from the June 2023 report, AI Dash Cam Performance Benchmark Testing, with the goal of testing Nauto's technology using the same test protocols that were used for other technologies. In this piece, Nauto compares VTTI's data from both tests as well as utilizing its own data from over 4 billion AI-monitored miles and industry statistics to evaluate Nauto's position in the market relative to other solutions.

Key Results

The 2024 testing of Nauto showed 100% detection of distracted driving behaviors during testing (texting, using phone in lap, and taking a phone call) with a time-to-alert under 5 seconds in both daytime and nighttime conditions.

Why It Matters

Nauto's data and customer results demonstrate that higher performance, real-time AI-powered alerting of risky driving behaviors results in greater and faster reduction in collision frequency, loss, and risky driving behaviors in commercial fleets.

Nauto's Distracted Driving Test Results

100% Detection of Distracted Driver Events, Day & Night

Up to 4X Faster Time to Alert for Distracted Driving Behaviors

< 5 Second Time to Alert for Distracted Driver Events

		Nauto	
		% of Successful Alerts	Average Time to Alert
Distraction	Overall	100%	3.8s
	Texting	100%	3.6s
	Phone in Lap	100%	3.2s
	Phone Call	100%	4.7s

Why the Transportation Industry Trusts VTTI

The Virginia Tech Transportation Institute (VTTI) is a globally-recognized research organization dedicated to advancing transportation safety and innovation. Founded in 1988, VTTI conducts cutting-edge research to improve vehicle systems, infrastructure, and driver behavior, fostering safer and more efficient roadways for all users.

The Leaders in Performance Evaluation

VTTI delivers dependable testing under real-world conditions. This study utilized the Virginia Smart Roads, a state-of-the-art, closed test-bed research facility managed by VTTI in cooperation with the Virginia Department of Transportation (VDOT). The Smart Roads enable evaluations during both daytime and nighttime scenarios with controlled variables, such as weather and driver proficiency, managed by VTTI's expert researchers.

Proven Impact on Safety and Policy

Over the years, VTTI's research has influenced meaningful changes in public policies, both nationally and internationally, to improve the safety of drivers, passengers, and pedestrians. Additionally, VTTI's work continues to advance the design of vehicles and infrastructure, promoting safety and reducing environmental impact.

VTTI leads the National Surface Transportation Safety Center for Excellence and led the [U.S. Department of Transportation Safety Through Disruption University Transportation Center](#) from 2016-2023.

VTTI's Research Looks to Reduce the Over **40,000 Fatalities¹** and **\$340 Billion Economic Cost²** of Motor Vehicle Incidents Each Year

1. Insurance Institute for Highway Safety, June 2024

2. NHTSA, January 2023

Overview

Objectives

The objective of this study was to assess Nauto technology for alert performance under VTTI's AI-dash cam testing protocol used in VTTI's 2023 AI Dash Cam Study. The study tested Nauto's fleet safety technology's alert performance for six risky driving behaviors as performed in a heavy truck (summarized in this report), and five driver maneuvers performed during high-risk driving scenarios in a light-duty vehicle (to be released in a future report).

Methods

VTTI has a dash cam assessment protocol used in both studies. VTTI evaluated performance by calculating rates of in-cabin audible alerts, rates of alerts recorded on the virtual platform's dashboard, and time to alert (TTA) from the start of the tested driving behavior or from time to collision, depending on the test scenario. The study design was developed based on previous research, with a focus on findings from naturalistic driving research involving commercial drivers.

Nauto used the results from this study to show a comparison to the 2023 VTTI study results sponsored by Motive.

Assumptions

- The system was tested in one placement location, at 2 times of day/lighting conditions, with 10 replications per day/nighttime testing (20 tests per task).
- Factors that may affect system performance that were controlled in the current study:
 - Weather: The trials were conducted in generally good weather, on dry roadways
 - Driver: All trials included the same commercial driver (a trained VTTI researcher)
 - System location in the vehicle: There was a slight difference in system installation/ placement between the 2023 study and this one. This study used one installation location while the 2023 study rotated each system through three installation positions.
 - Vehicle model
- Analysis results may not apply to conditions outside of those tested in the current study.

Study Protocols Were Designed to Generally Replicate the 2023 VTTI Study

Results

100%

successful in-cab alerts for distraction and driver behavior

3.8s

average time to alert for tested distraction behavior¹

Nauto Sets Standard for Alert Accuracy and Time to Alert

When compared with the results from the 2023 VTTI study, the results from the December 2024 study demonstrate Nauto's excellence compared to other available systems in identifying various risky driver behaviors and the speed of sounding in-cab alerts to the driver.

Nauto developed this table to compare the percent of successful in-cab alerts for each test, as well as the average time to alert in-cab. The table uses all available in-cab test data from both the 2023 and the 2024 VTTI studies. There was a slight difference in system installation/placement between the 2023 study and the 2024 study. The 2024 study used one installation location while the 2023 study rotated each system through three installation positions.

*VTTI does not endorse any products

Comparison of Alert Accuracy and Time-to-Alert Data

		Nauto		Lytx		Motive		Samsara	
		% Successful Alerts	Avg. Time to Alert	% Successful Alerts	Avg. Time to Alert	% Successful Alerts	Avg. Time to Alert	% Successful Alerts	Avg. Time to Alert
Distraction	Overall ¹	100%	3.8s	18%	17s	80%	7.1s	33%	7.2s
	Texting	100%	3.6s	18%	14.5s	92%	6.9s	47%	7.5s
	Phone in Lap	100%	3.2s	8%	16.2s	53%	7.0s	15%	8.7s
	Phone Call	100%	4.7s	28%	21s	95%	7.5s	38%	5.5s
External Road Risks	Rolling Stop	95%	3.4s	Not Tested	Not Tested	77%	3.8s	0%	N/A
	Close Following	100% ²	10.7s ²	28%	13.1s	67%	15.5s	18%	26.1s
Seatbelt Usage	No Seatbelt ³	100%	13.0s	100%	20.1s	100%	15.5s	See Footnote ⁴	See Footnote ⁴
Results from 2024 Study				Results from 2023 Study					

LEGEND

% Successful Alerts	Avg. Time to Alert
100%	> 5s
80-99%	> 5s
60-79%	5-10s
40-59%	10-20s
0-39%	20+s

- Nauto calculated overall distraction alert accuracy and time to alert by averaging all published data from the Texting, Phone In Lap and Phone Call tests.
- Disclaimer: Following the initial publication of this report, it was discovered that the algorithm on the equipment used in the original testing did not function as intended, affecting the accuracy of the results. To ensure the integrity of the findings, the testing was redone under the same conditions using the same operational equipment. The updated results indicate improved outcomes compared to the initial findings. While the original testing results remain accessible in the report for transparency, we encourage readers to refer to the Appendix with updated results [viewable here](#).
- Seatbelt alerts do not occur until after the condition has been observed for more than 10 seconds at a speed > 5 mph. This is to allow drivers time to put their seatbelts when starting a drive.
- VTTI was informed after the study was completed that the seatbelt alert for the Samsara device was not properly enabled.

Accuracy and Speed Matter

Automatic Driver Improvement Reduces Risk

When in-cab driver alerts are both fast and accurate, drivers are more likely to make lasting changes to their driving behaviors. Nauto's data shows that after the Nauto system was installed, **over 80% of drivers self-improved their behaviors and reduced their distracted driving by up to 80%** – without management intervention or coaching.

More Time to React Helps Avoid Collisions

A vehicle traveling 65 mph covers approximately 100 yards in three seconds. If an alert gets a **driver's attention back on the road after three seconds** of distraction instead of nine seconds, that's the total distance of two football fields drivers have to react to external factors and avoid a collision.

Builds Driver Trust & Acceptance

Fast, highly-accurate alerting with minimal false positives is essential to winning drivers' trust. If a system fails to alert when a risky situation exists or alerts late after the danger has passed, drivers often start to ignore the safety system, or even worse, the system could become an irritating distraction, diminishing its impact.

Fewer Incidents = Fewer Fatalities and Injuries

With faster, more accurate alerts, **drivers are more attentive** and can focus on avoiding collisions and reducing the severity of unavoidable incidents. There were over 40,000 estimated motor vehicle fatalities in the United States in 2023. Eliminating distracted and risky driving behaviors can help reduce those numbers.

Accuracy and Speed = Cost Savings and a Stronger ROI

What do superior alerts mean for a business's bottom line? Nauto typically delivers loss reduction ranging from 40-80%. That loss reduction helps drive a faster payback period and a compelling return on investment that lower-performance systems can't match.

Accuracy and Speed Drive
Loss Reduction and Save Lives

Why Distraction Is So Important

1.6M

crashes caused annually by using a phone while driving¹

Distracted driving is estimated to cause over 3,000 fatalities each year according to the NHTSA, making it a critical factor in any safe driving initiative. Nauto's proprietary data captured from over 4 billion AI-processed driving miles shows that **inattentive driving accounts for 70% of collision-related losses**.

Combatting Distraction in Fleets

Most traditional fleet safety systems such as telematics and ADAS systems are blind to the various inattention-related risks that are the greatest cause of collisions. Basic AI dash cams try to close the real-time alerting gap with after-the-fact video snippets for driver coaching. However, manual coaching, long after the risky behavior has occurred, delivers far less driver behavior change compared to automated, real-time coaching and requires more time and cost.

There is a clear correlation between the speed and accuracy of detection and alerting and a system's effectiveness in automatically and rapidly reducing distracted driving. There is also **a clear correlation between reducing distracted driving and reducing collisions and associated losses**.

1. [National Safety Council](#)

Nauto Addresses Major Collision Factors That Other Systems Miss

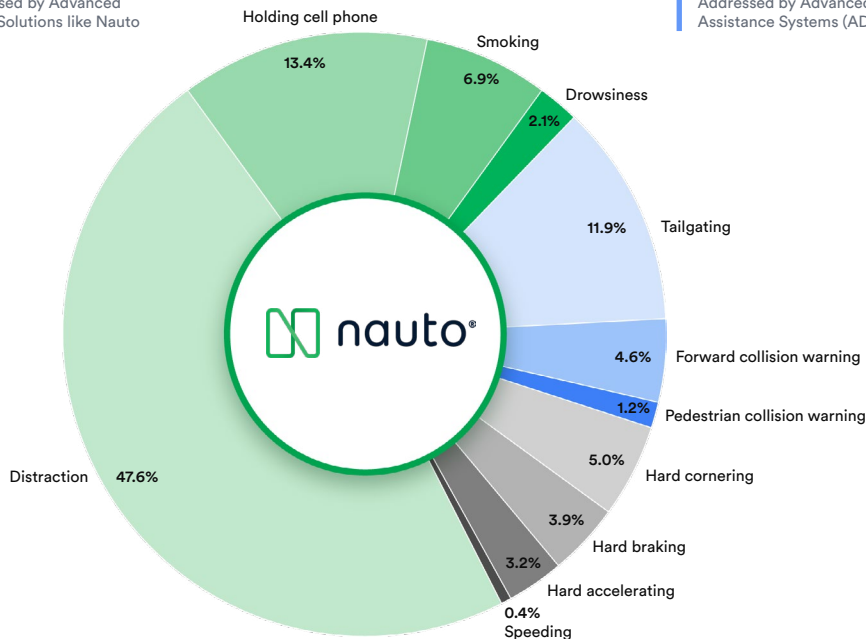
Average Contributions to Collision-Related Losses¹

Inattention: 70%

Addressed by Advanced Safety Solutions like Nauto

External Risks: 18%

Addressed by Advanced Driver Assistance Systems (ADAS)



Aggressive Driving: 12%

Addressed by Telematics

1. From Nauto's database of over 4 billion AI-processed miles. Note: Percentages may not add to 100% due to rounding

Risk of Underperformance

80%

of collisions involve some form of driver distraction,
typically occurring within three seconds before the crash¹

There are a multitude of dash cam systems that claim they can help combat distracted and dangerous driving behaviors. **But what if those systems underperform?** That's a risk fleets cannot take.

Loss of Trust and Lack of Change

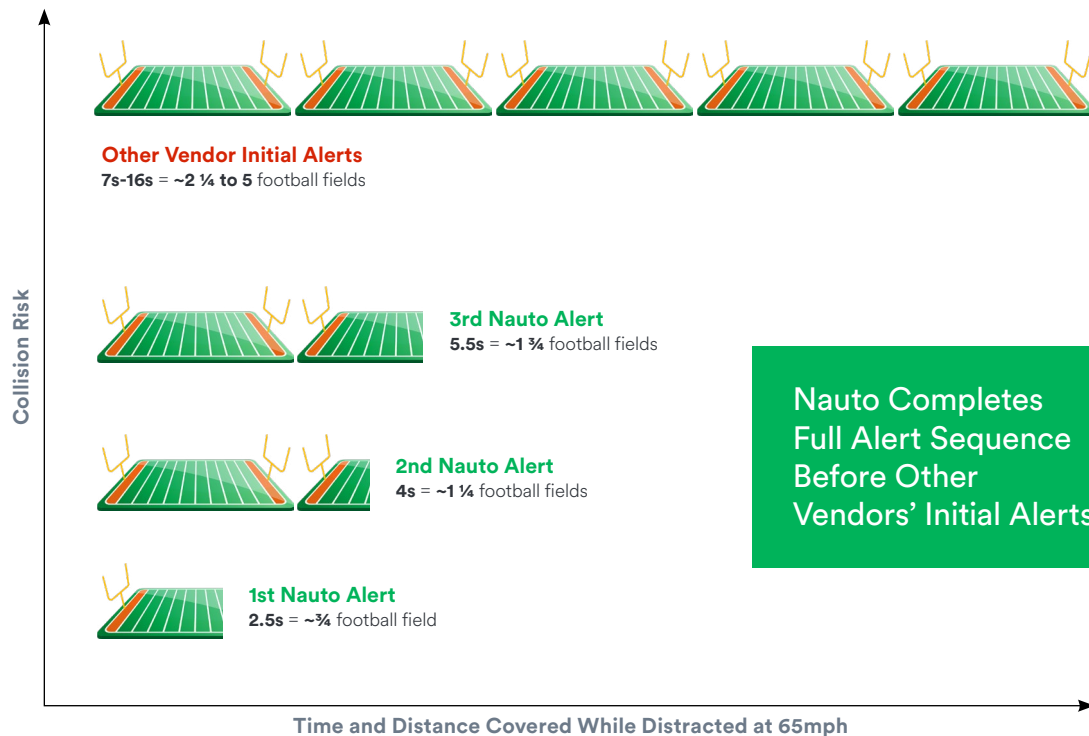
If a system for monitoring drivers in order to increase safety has low accuracy, misses behaviors it should be flagging, or delivers false positives, it can lead to a lack of driver trust. False positives can cause alert fatigue and drivers tuning out the system altogether, **decreasing a safety solution's effectiveness and undermining attempts to change driver behavior.**

Driving Blind

If alerts are slow to sound in the vehicle, the system's effectiveness in preventing collisions is greatly reduced. A vehicle traveling at 65mph covers approximately 100 yards or 12-15 car lengths in 3 seconds. Every second and every yard counts when trying to avoid a collision with another vehicle, an object, or a person. **Slow alerts that leave drivers distracted are not capable of achieving the same safety results as near real-time alerts.**

¹ NHTSA, The Impact of Hand-Held And Hands-Free Cell Phone Use on Driving Performance and Safety-Critical Event Risk, April 2013

Longer Duration of Distraction = Greater Risk



Nauto Completes
Full Alert Sequence
Before Other
Vendors' Initial Alerts

What Makes Nauto's Real-Time AI Different

As the VTTI study data illustrates, Nauto delivered high accuracy and speed of alerts. But that's not all that makes Nauto's real-time AI safety solution unique. In addition to alert accuracy and time-to-alert performance, there are other features that Nauto believes make its real-time AI safety solution unique.

Risk Coverage

Nauto has a deep understanding of risk and what actually causes collisions based on the 4 billion miles logged in our database coupled with advanced data science research. Our product development efforts are focused on providing **real-time alerts for the most important factors that reduce collision risk and losses.**

Advanced Technology

The Nauto solution is built on the **most powerful hardware available** today, which supports sophisticated, compute-intensive algorithms that are protected by **dozens of patented innovations.** This combination is the foundation for class-leading in-cab alert accuracy and speed.

Risk Fusion

Based on published information, only Nauto is currently capable of real-time, multi-risk fusion calculations to **provide drivers with advanced detection and alerting to the presence of pedestrians, bicyclists, and motorcyclists in combination of driver behavior detection.**

The Bottom Line

VTTI's study provides objective system performance data for Nauto's real-time AI safety solution. Nauto believes this data showcases its system's ability to deliver **superior safety and savings**, through 40-80% collision reduction, driver behavior improvements, and large decreases in collision loss, leading to payback in as little as 4.5 months for self-insured fleets.

Nauto Customers
Experience a
40-80%
Reduction in Collisions

Detailed Test Results

Texting

Phone in Lap

Hand-Held Phone Calls (Outgoing)

Rolling Stop

Close Following

No Seatbelt

Disclaimer

Nauto created all graphs and in the following test results slides using the data from the 2024 and 2023 VTTI studies. Any comparison to other technologies was performed by Nauto. VTTI does not endorse any products included or not included in this presentation.

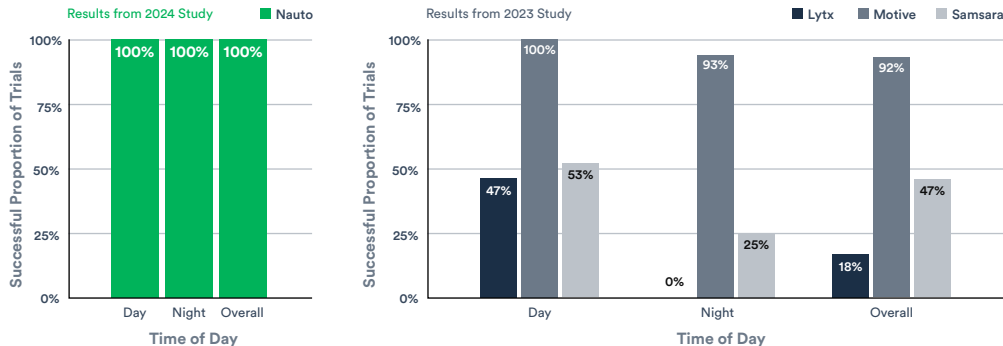
With Nauto, Texting Is Detected Faster and More Accurately

Texting is one of the most common forms of distraction and is dangerous because the driver's eyes are not focused on the road.

Texting also distracts the driver's mind, leading to decreased awareness of their surroundings. And with one or two hands removed from the steering wheel to text, texting automatically puts drivers in an unsafe and unprepared state to take corrective measures.

"Looking down" is a key contributing factor in approximately 70% of Nauto-analyzed collisions, making texting a critical behavior to eliminate.

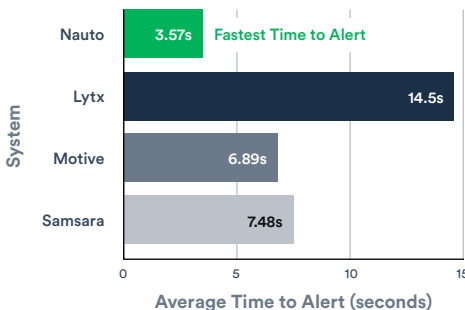
100% Texting Detection, Day and Night



Nauto Insights

Nauto believes that detection accuracy is a key factor in preventing texting-related incidents by getting drivers' focus back on the road faster. Plus, Nauto's independent analysis of its 4 billion AI-processed driver miles shows that **80% of its customers' drivers self-corrected unsafe driving behaviors** – such as texting – without additional coaching.

Up to 4x Faster Alerts for Texting Than Other Fleet Safety Solutions



Nauto Insights

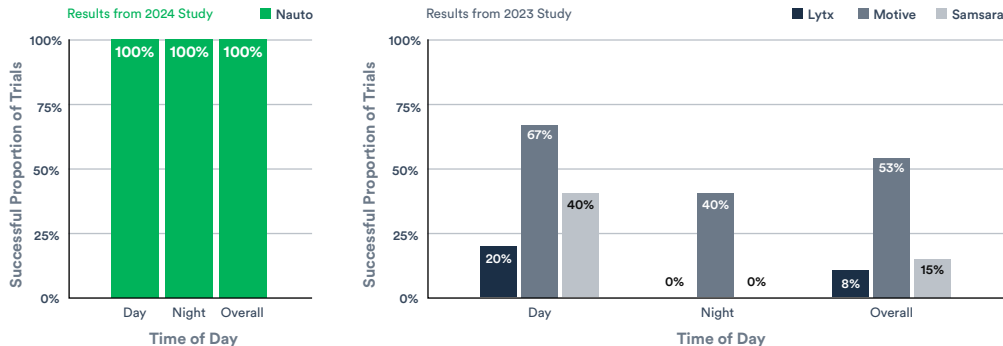
Nauto goes through its full alert escalation sequence before the fastest competitor's first alert. Nauto's independent analysis of its customer data shows that alerting drivers to distracted behaviors faster can help prevent texting-related incidents.

There's No Hiding Phone Usage From Nauto

Law enforcement agencies are cracking down on smartphone usage while driving, making the lap a common phone placement. But the constant looking down to text, check a map, or watch a video is a danger to both drivers and those around them.

Nauto was able to detect drivers using their phones in their laps **100% of the time, day or night.**

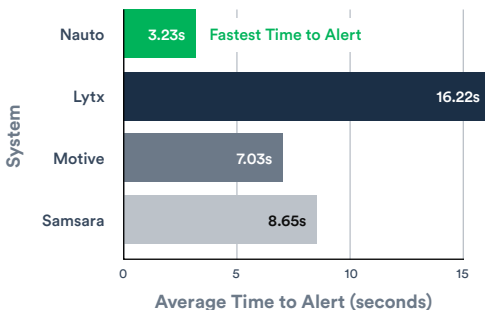
100% "Phone in Lap" Usage Detection, Day and Night



Nauto Insights

Increased smartphone enforcement created a new behavior of "phone in lap" usage, but Nauto's 100% detection and rapid alerting of this risk can help correct driver behavior to put the phone away for good.

Up to 5x Faster Alerts for "Phone in Lap" Usage Than Other Fleet Safety Solutions



Nauto Insights

Every second – and every foot – counts when drivers have to react. **Nauto's in-cab alerts begin a little over three seconds after the behavior begins.** Nauto's independent research shows that helping prevent unsafe behaviors in near-real-time has improved driver safety and performance in Nauto customer fleets.

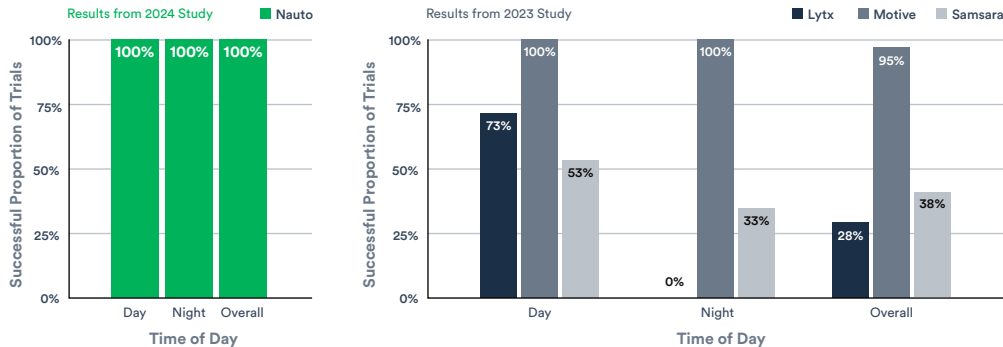
Hanging Up on Phone Distractions

Hands-free devices and Bluetooth technology have made it easier and safer for drivers to have conversations while driving. But placing the call by looking at the phone introduces a period of distraction, that while potentially only seconds long, can be enough time for an incident to occur.

In the VTTI study, Nauto detected drivers placing an outgoing call on a hand-held phone **100% of the time, day or night.**

With timely alerts, Nauto helps drivers bring their attention back to the road and prevent the visual, manual, and cognitive distractions of placing a call.

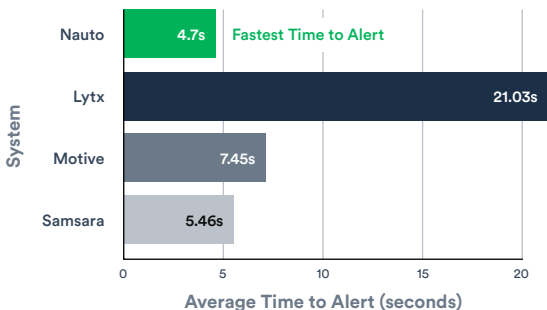
100% of Outgoing Phone Calls Detected, Day and Night



Nauto Insights

A study from the National Center for Biotechnology Information found that **the risk of a crash or near-crash is eight times higher when dialing a cell phone.** Nauto's independent research of its customers' data shows that drivers have changed their phone behaviors through the use of the system, adopting safer habits and keeping their focus on driving.

Up to 4x Faster Alerts for Outgoing Phone Calls Than Other Fleet Safety Solutions



Nauto Insights

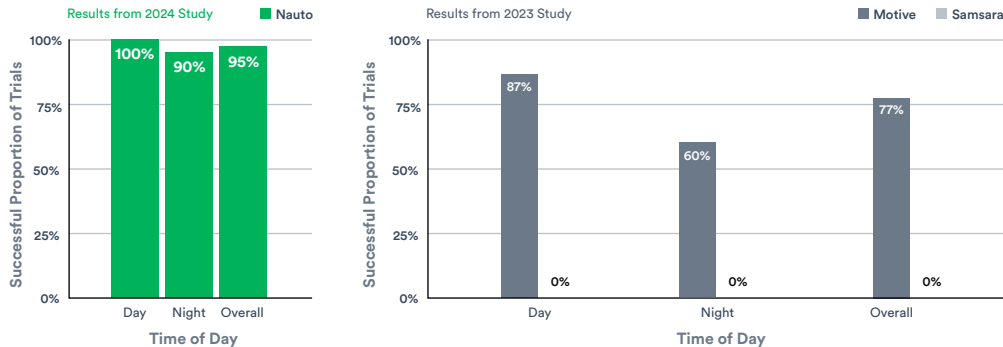
Nauto strives to more successfully return a driver's attention back to the road through its alerts, helping encourage behavior changes like only placing phone calls when stopped as well as generally reducing phone usage while driving.

The Danger of Intersection Incidents

Unsignalized intersections, such as those with stop signs, are a major source of vehicle incidents. Stop sign intersections are often where vehicles interact with pedestrians and cyclists, and fatalities have been rising year-over-year according to the Federal Highway Administration.

Rolling stops are a danger to those outside the vehicle who too often trust that drivers will do what the law requires and come to a complete stop. In the VTTI study, Nauto detected and alerted drivers to rolling stop behaviors 95% of the time, **providing higher accuracy and speed than the competition.**

95% Rolling Stop Detection, Day and Night



Nauto Insights

A Transportation Research Forum study observed that almost **two-thirds of drivers did not come to a complete stop at an intersection**. Nauto's aim is to help reduce rolling stops through quick and accurate detection of these events, thereby protecting pedestrians and cyclists from this risky driving behavior.

11% Faster Rolling Stop Alerts Than Other Fleet Safety Solutions



Nauto Insights

Avoiding incidents at stop sign intersections requires increased driver attention compared to other driving scenarios. Vehicles, pedestrians, and cyclists are going to be crossing directly in front of the driver's vehicle giving them almost no time to react. **Nauto's analysis indicates that rapid and accurate alerts can keep drivers from improperly entering crosswalks and intersections, lowering collision risk.**

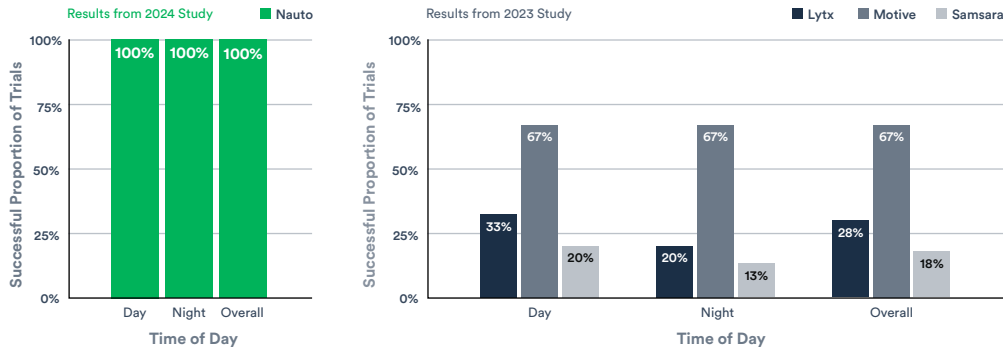
Addressing Close Following of Other Vehicles

The NHTSA estimates that **rear-end collisions account for 23% of all motor vehicle crashes**. For commercial fleets in larger vehicles, the time and distance required to stop are greater, making every second count when it comes to reestablishing a safe following distance.

The Nauto system was able to identify and alert drivers to close following in 100% of the tests in the 2024 VTTI study.

Disclaimer: Following the initial publication of this report, it was discovered that the algorithm on the equipment used in the original testing did not function as intended, affecting the accuracy of the results. To ensure the integrity of the findings, the testing was redone under the same conditions using the same operational equipment. The updated results indicate improved outcomes compared to the initial findings. While the original testing results remain accessible in the report for transparency, we encourage readers to refer to the Appendix with updated results [viewable here](#).

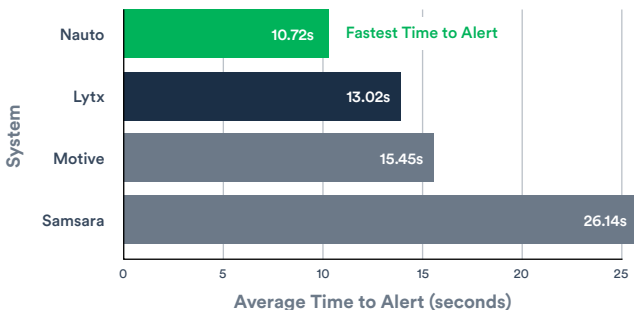
100% of Close Following Detected, Day and Night



Nauto Insights

The stereotypical view of a tailgater is that they are in a rush or potentially having a case of road rage. But **oftentimes, distraction is the reason why drivers are not maintaining a safe following distance**. Nauto addresses driver distraction to help cut down on tailgating while also identifying close following situations as they happen.

Nauto Gives Drivers Valuable Time to React



Nauto Insights

A vehicle traveling at 65mph is covering about 100 yards in 3 seconds, so highway drivers need all the time available to them in order to avoid hazards in the roadway.

Striving to Keep Drivers Safe

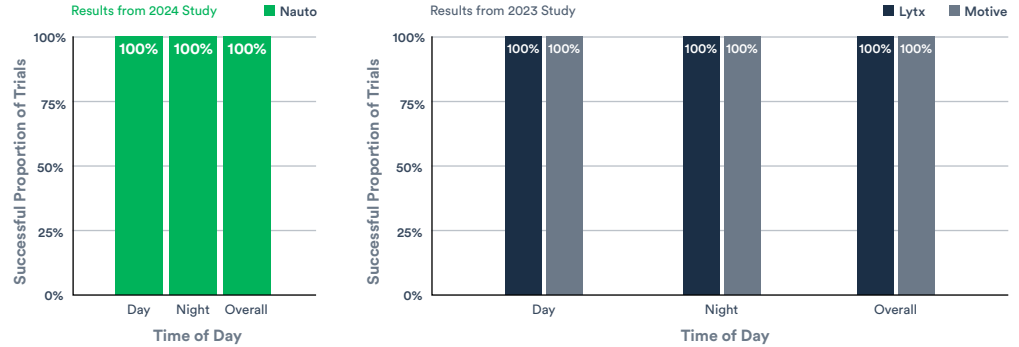
Consistent seatbelt usage is the norm for most drivers with the NHTSA reporting that an estimated 92% of drivers buckled up in 2023. But the impact of not wearing a seatbelt is extreme. In a light truck, seatbelt wearers have a 60% reduced risk of fatality and thousands of lives a year could still be saved through seatbelt usage.

The study results show that Nauto detected when a driver was not wearing a seatbelt **100% of the time, day or night**. After the ten-second buffer to allow drivers to get situated in their vehicle, Nauto was also the **fastest of those measured to alert the driver to buckle up**.

Striving for 100% seatbelt use helps protect drivers from serious injuries and fatalities while protecting businesses from higher insurance costs as well as driver downtime.

Note: VTTI was informed after the 2023 study was completed that the seatbelt alert for the Samsara device was not properly enabled.

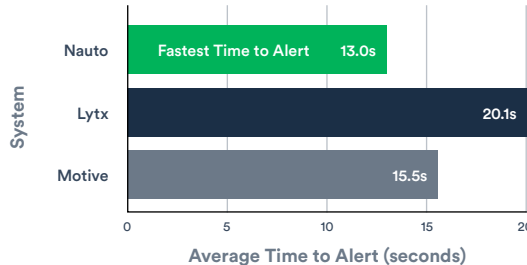
100% “No Seatbelt” Detection, Day and Night



Nauto Insights

According to the NHTSA, buckling up is the single most effective thing drivers can do to protect themselves in a crash. As part of its database of driving miles, **Nauto fleets have achieved 99.5% seatbelt use adherence**.

20-55% Faster Seatbelt Alerts Than Other Measured Fleet Safety Solutions



Nauto Insights

Nauto was the fastest measured system to remind drivers about wearing their seatbelts, giving them prompt, accurate alerts.

Nauto Puts Drivers First

Nauto focuses on driver satisfaction to help **increase adoption and build trust in the system.**

Alerts They Can Trust

Nauto's driver-first approach starts with timely, accurate alerts that reliably keep drivers safe instead of becoming an irritant. The real-time alerts allow drivers to self-coach and make improvements more effectively because they trust the Nauto system.

Progress They Can See

To ensure transparency, drivers have access to their safety score and event videos, so they can track progress and make further improvements.

Protection They Rely On

Drivers appreciate how Nauto not only protects them from collisions but also helps exonerate them when they are not at fault in an incident. The combination of Nauto's internal and external cameras and multi-faceted data can help protect drivers and companies from false claims.

Privacy They Can Believe In

Nauto also **respects driver privacy**. While continuously analyzing 100% of driving, the system only shares data and video if a risky situation is detected, accounting for well below 1% of overall drive time. Finally, because Nauto's AI is so performant, it is possible to completely turn off in-cabin video sharing while still delivering the real-time safety benefit.

Nauto Makes an Impact

+80%

of Drivers Self-Improve
Their Safe Driving Habits

Getting Started with Nauto

Better fleet and driver safety can't wait, so Nauto has developed end-to-end processes that can lead to implementation in just a few weeks.

Nauto's safety advisory services encompass program design, best practice methodologies, baselining, ROI analysis, and driver education to help ensure customer success. The Nauto team works to estimate the impact Nauto can make for a fleet, including in-depth loss reduction analysis and demonstrates value to your finance, operations, and driver teams.

Implementation and installation are fast and easy. The devices can be installed in vehicles in about 20 minutes and the system arrives with pre-configured settings tuned to national safety standards.

Using robust APIs, Nauto integrates with numerous existing technologies including telematics systems (e.g. Geotab), fleet management systems and dispatch, routing, business intelligence, timecard, vehicle maintenance, and claims management tools.

The Nauto solution successfully scales from small fleets with several vehicles to fleets with tens of thousands of vehicles across all industry sectors, use cases, and vehicle types.

Nauto

Makes It Easy to Get Started

Supports Rapid Implementation

Delivers Safety and Savings



Thank You!

Read the full study at:

[VTTI: AI Dash Cam Performance Testing](#)

Disclaimer

This research was funded by Nauto. Although care has been taken to ensure complete and accurate study results, recipients of this document accept the possibility of unintended errors or omissions. The results expressed in this document are based on data collected from September 20, 2024, through December 12, 2024, and on March 3, 2025, under specific testing conditions that may not apply to other circumstances. VTTI does not endorse any products included or not included in this study.