Sightic

Building technology that understands and prevents human risk.

A Closer Look at Sightic's Substance Impairment Detection Solution

Sightic | Technology | Impairment detection

Introduction

Road safety remains a critical issue worldwide, with alcohol-related accidents posing a significant threat to drivers and pedestrians alike. Sightic has developed an advanced AI-driven impairment detection system aimed at addressing this issue by identifying impaired drivers in real time using existing Driver Monitoring Systems (DMS).

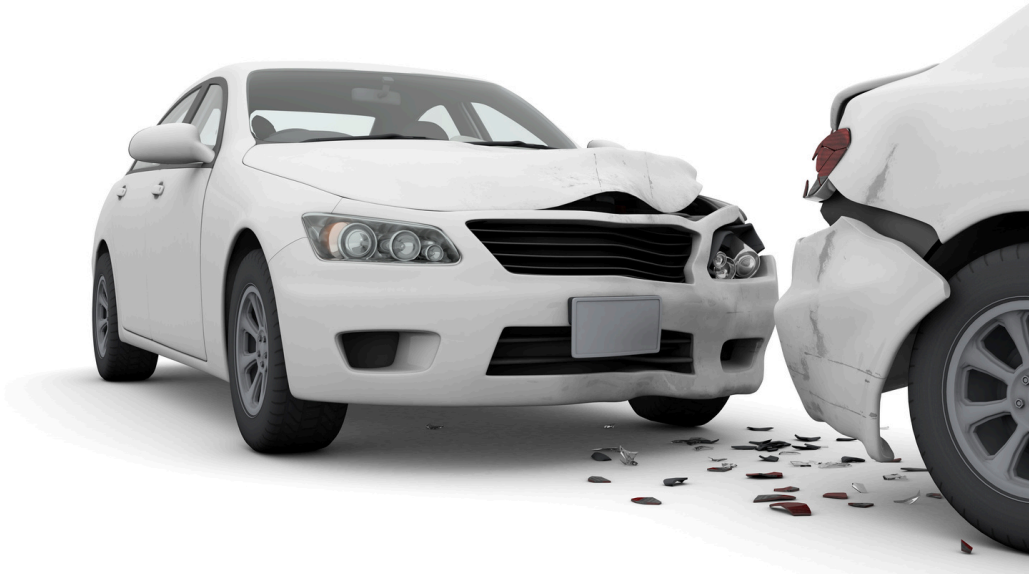
Our technology leverages the world's largest naturalistic impaired driving data collection, positioning us at the forefront of alcohol impairment detection.

This document explores the capabilities of our system, its unique data-driven approach, real-world applications, and future developments, including the potential for pre-start scanning.

The Problem: Alcohol-Related Traffic Accidents

Alcohol-related traffic accidents are a leading cause of fatalities on the road. Traditional breathalyzer methods require physical stops and tests, which are not feasible for continuous monitoring. Sightic's solution continuously monitors a driver's behavior using AI-powered algorithms, identifying signs of impairment without requiring new hardware installations in vehicles.

Unlike other systems, our continuous monitoring begins detecting impairment at very low speeds, right as the vehicle starts moving. To further enhance safety, we also offer pre-start scanning, which assesses drivers before they start the vehicle, providing an additional layer of protection and potentially preventing impaired driving altogether.



The Solution: AI-Driven Substance Impairment Detection

Data Collection & Process

Sightic's system processes data from in-vehicle cameras integrated into standard DMS setups. During our data collection, conducted in naturalistic driving scenarios, we analyze key signals of impairment, such as:

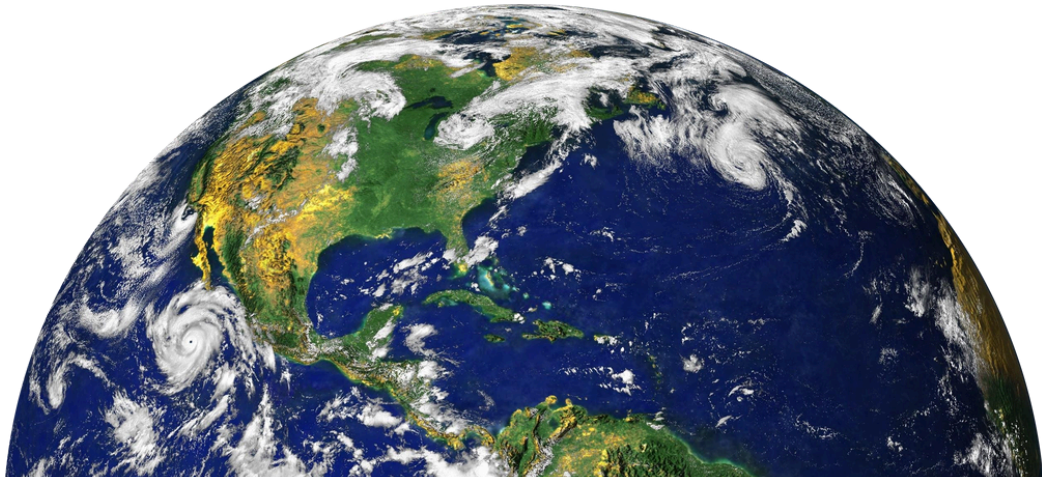
- **Eye tracking:** Monitoring the driver's eye movements and focus on the road.
- **Head movement:** Detecting unusual or erratic head movements.

This data is processed through our AI models, which have been trained on the world's largest impaired driving dataset, gathered from a combination of controlled environments and real-world driving scenarios in collaboration with key industry partners.

World’s Largest Naturalistic Impaired Driving Data Collection

Sightic's defining feature is its extensive dataset of real-world impaired driving behavior, representing the world’s largest collection of its kind. This dataset includes hundreds of drivers in high blood alcohol content scenarios, overcoming ethical and logistical challenges to ensure comprehensive and representative data across a wide variety of age, gender, and ethnic groups.

This unique dataset enables our AI models to learn from real-world impaired driving behaviors, resulting in highly accurate impairment detection across diverse scenarios.



Pre-Test & Continuous Monitoring: Standalone or Combined

While our primary focus has been on continuous monitoring, we are now also developing a pre-start scan to complement this approach.

By reusing existing in-cabin infrastructure (driver monitoring hardware and software), pre-start scanning enhances safety by evaluating drivers for substance impairment before they begin driving. This is a short (10—20 second) eye-tracking scan, similar to our existing app technology, where the driver follows a moving dot on the car's console screen, and the system uses DMS cameras to detect impairment.

The benefit of this pre-start scan is that it can detect severe impairment before the vehicle is operational - filling a safety gap left by continuous monitoring, which typically requires time to accumulate enough data for accurate detection.

In addition, the mobile app solution can be integrated directly into an OEM's own application through the Sightic Mobile Application Software Development Kit (SDK), making deployment seamless and flexible.

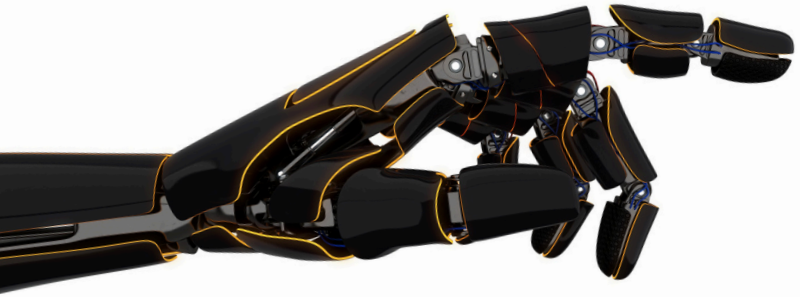
AI & Machine Learning

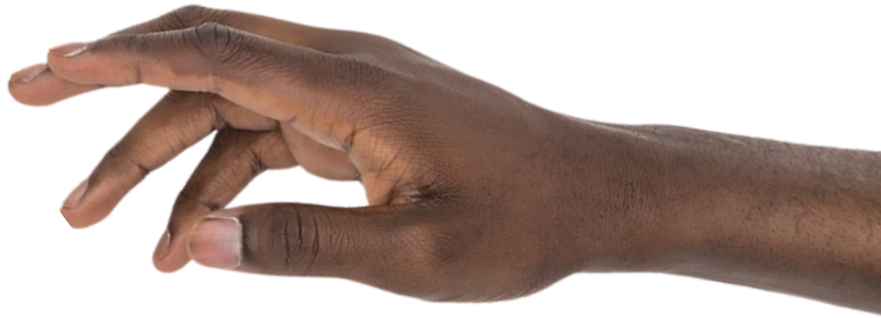
Training the AI Models

Our models are trained using vast amounts of data collected from naturalistic driving. The impaired driving data plays a critical role in enabling our AI to distinguish between sober and impaired driving behaviors. By exposing the model to a wide variety of real-world scenarios, we ensure that the system is capable of detecting impairment with high accuracy.

Pre-Test vs. Continuous Monitoring

The pre-start scan offers immediate impairment detection before the vehicle begins moving, while continuous monitoring tracks the driver's condition during the journey. Together, they represent two complementary approaches to impairment detection - each can also be used as a standalone solution or combined.





Continuous Monitoring Powered by Existing In-Cabin Infrastructure

Sightic's system integrates seamlessly with existing DMS hardware, requiring no additional installations.

This makes it highly cost-effective for OEMs and fleet operators looking to enhance safety protocols while utilizing their current in-cabin infrastructure. Once the vehicle is in motion, continuous impairment detection provides ongoing safety monitoring throughout the journey. In addition, a pre-start scan can be implemented using the same in-cabin systems, allowing drivers to complete a short test before starting the vehicle, with results delivered within seconds.

Ensuring Accuracy in Various Conditions

Our system has been designed to function reliably under various real-world driving conditions, providing consistent accuracy thanks to its integration with existing DMS setups:

- **Night Driving:** Infrared cameras detect eye movements in low-light settings.
- **Sunglasses and Obstructions:** The system tracks through non-IR blocking sunglasses and compensates for partial face obstructions.
- **Variable Lighting:** The system adapts to changing light conditions, such as tunnels or direct sunlight.

Challenges & Future Development

Scaling Real-World Data Collection

One of the biggest challenges in developing driver impairment detection technology is collecting data that accurately reflects naturalistic driving. At Sightic, we focus on impaired driving data gathered from real-road conditions and controlled track environments. With many years of experience in this field, this expertise and our proprietary dataset has made us global leaders in collecting and utilizing naturalistic impaired driving data.

By gathering data across a wide range of real-world scenarios different times of day, lighting conditions, and driver profiles we ensure our AI models are exposed to realistic driving behaviors. Controlled track environments allow us to safely capture impaired driving data, while naturalistic driving data from everyday traffic provides further validation, ensuring the system achieves high accuracy and robustness.

Extremely Low False Positives

Minimizing false positives is a crucial focus of our ongoing development. The system already performs exceptionally well in distinguishing between sober and impaired drivers, and we are committed to reducing false positives even further. We understand how important this is to the industry, and through our continued efforts in collecting real-world data, we are confident that our system will achieve extremely low false positive rates. Our ongoing data collection and refinement efforts ensure our models can handle the complexities of diverse driving environments while maintaining accuracy.

Expanding Beyond Alcohol Detection

Our technology is not limited to detecting alcohol impairment. We have already developed solutions for detecting cannabis impairment through our existing app, and we know exactly which features correlate with impairment. This ready-to-use cannabis detection model will now be integrated into our vehicle-based system as we continue developing and enhancing our solutions for the automotive industry. Our ultimate goal is to create a broader system capable of identifying substance use and impairment from various drugs, ensuring that drivers are fit to operate their vehicles safely.

Sightic

Sightic is committed to advancing driver impairment detection systems through non-intrusive technology integrated with existing driver monitoring systems. Leveraging the world's largest naturalistic substance-related impaired driving dataset, we deliver unparalleled accuracy in real-time impairment detection. Our focus is on enhancing road safety with continuous monitoring solutions and innovative pre-start scanning, addressing both current and future needs in the automotive industry. We aim to set a new standard for reliability and safety, offering seamless integration for OEMs and fleet operators alike.

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