AEye

Long range incident detection

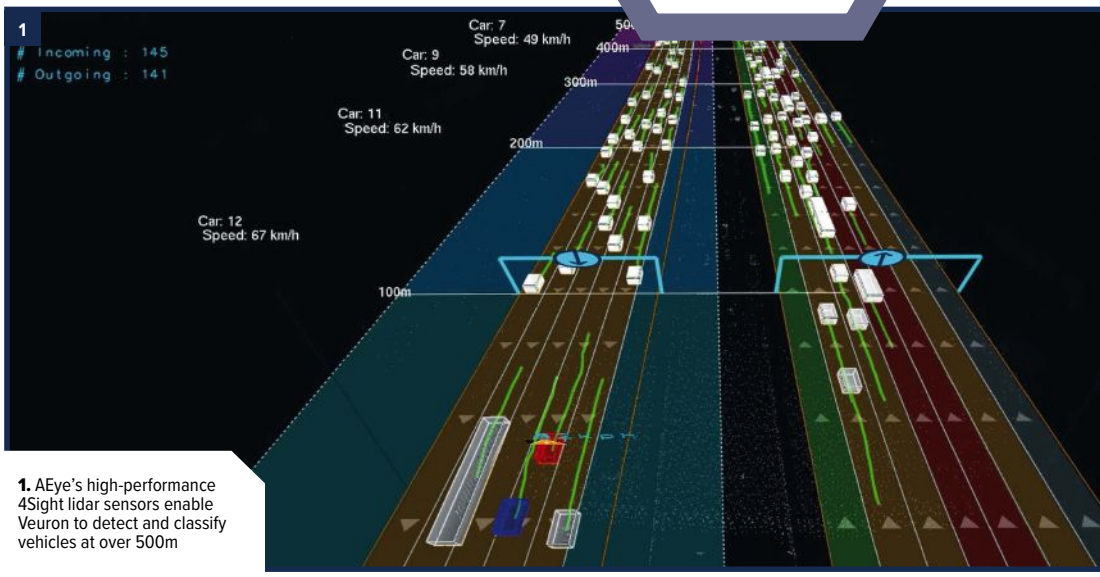
A new software-defined high-resolution lidar solution has been developed for automatic incident detection, boasting a range of 1km and improved performance and reliability

1km
The range AEye, VSI Labs and MnROAD's new AID solution covers (0.62 miles)

Automatic incident detection (AID) systems play a vital role in ensuring the safety of drivers and passengers on freeways by providing prompt and accurate alerts to traffic managers regarding incidents which can disrupt roadway operations, leading to increased congestion and safety risks.

Traditional AID systems, such as those relying on radar and camera sensors, are limited in their ability to provide high resolution, detection reliability and coverage beyond 200m, which can hinder their effectiveness in detecting and responding to incidents. This 200m limitation can also pose a significant safety risk, as incidents that occur beyond that range may not be detected, leading to delayed response times and increased risk of secondary incidents.

To overcome these limitations, new AID technologies are being developed to provide a more efficient and cost-effective solution for incident detection and response, with the ultimate goal of saving lives on the road.



1. AEye's high-performance 4Sight lidar sensors enable Veuron to detect and classify vehicles at over 500m

Software-defined lidar

One such technology is software-defined lidar, a solution developed by AEye that overcomes the challenges of legacy AID systems by delivering increased detection capabilities in adverse environmental conditions and at longer distances, while avoiding false detections.

AEye, in partnership with VSI Labs and MnROAD, the Minnesota Department of Transportation's cold weather pavement testing facility, developed a testing platform to validate the industry's first reliable 1km range AID solution, offering two software-defined lidar sensors on a single mounting pole. Testing results are anticipated for Spring 2023.

AEye's 4Sight M is a high-resolution, ultra-long range lidar sensor, which enables increased coverage with fewer sensors, lowering the cost of materials, installation, infrastructure, and maintenance over the lifespan of the system, while improving data collection quality and reliability. It enables traffic managers and emergency vehicles to respond quickly to a collision and drivers to travel more safely by warning them of hazardous conditions on the road that may not be immediately visible.

AEye's lidar sensor leverages AEye's 4Sight Intelligent Sensing Platform to better locate, identify, classify and track objects. This allows for improved data collection speed and quality, ensuring that more accurate information is used to drive decisions and improve highway safety, congestion, and maintenance. AEye's all-in-one solution comes complete with a library of optimized high-resolution scan patterns to tackle the unique requirements of AID applications.

Easy integration

In addition to improved performance and reliability, AEye transitions much of the system's

> SOFTWARE-DEFINED LIDAR OVERCOMES THE CHALLENGES OF LEGACY A.I.D. SYSTEMS BY DELIVERING INCREASED DETECTION CAPABILITIES IN ADVERSE ENVIRONMENTAL CONDITIONS AND AT LONGER DISTANCES

2. Two AEye 4Sight M sensors installed to monitor 1km of highway for AID systems

hardware complexity to the software layer, resulting in easier integration, higher flexibility and increased data granularity, while offering a single architecture that meets most AID application needs.

AEye's 4Sight perception solution provides accurate, real-time monitoring and optimization for a range of concurrent AID cases, such as wrong-way driver detection, pedestrian detection and traffic data collection.

The solution uses advanced computer vision and machine learning techniques, requiring only a few points from the 3D lidar point cloud to output correct perception data and analytics. Its AID performance mode is efficient, matching the power needed and time-of-flight to reach distance with ease. This efficiency allows AEye to sample the sensor's environment with increased energy, resolution and time as the scan pattern approaches the horizon, as defined by the geometrical properties of the sensor's height and location.

With vehicle collision fatalities rising, it's important to consider how new technologies can help improve road safety. AEye's software-defined lidar is an important step forward in helping to prevent accidents, reduce traffic congestion, and increase municipality savings for a safer, more efficient world.

by Greg Winfree

Data-driven modeling: Where ITS deployment can really pay off

"USING AI, WE CAN EXAMINE THOUSANDS OF SATELLITE IMAGES AND DRAW IMPACT ASSUMPTIONS MUCH FASTER THAN WE COULD BEFORE"

As the annual ITS America Conference draws near, it's clear that 2023 will be a milestone year for the organization, with a keener than ever focus on deployment. That intention is unambiguous in the theme for this year's gathering: Implementing Innovation for All.

Since its establishment in 1991, ITS America has been dedicated to advancing surface transportation through the creative use of advanced technologies. By marshalling the latest and greatest tools, it has sought to improve safety, mobility, sustainability, equity, and access. From the organization's first days and up to the present moment, its members have aspired to fundamentally transform how we get ourselves and the things we need from one place to another.

As aspirations go, it's tough to find one loftier and more altruistic than "transformation." In the end, however, such a goal is little more than a promise. That is, until the promise is fueled by assertive investment and realized through scaled deployment. I'm delighted to share a couple of shining examples in Texas of how we're taking purposeful steps in that regard, with work being done by TTI's Center for International Intelligent Transportation Research (CIITR).

1991
The year ITS America was established

Using readily available GIS data, our staff are simulating the impact of extreme events on critical infrastructure from flooding to earthquakes in the El Paso/Ciudad Juarez region. By studying what-if scenarios like this – and less-predictable events like a hazardous chemical spill – we can model their impacts on the local transportation network and create mitigation plans. This predictive modeling using real-world traffic data can help agencies act quickly during extreme events, when moments can make a life-or-death difference.

Our staff are examining severe traffic backups at the US-Mexico border, using satellite images to model queue lengths and predict the time required for trucks to traverse the border. Analyzing such backups helps us recommend ways to mitigate delay impacts on mobility, safety, and economies at every level. Using AI, we can examine thousands of satellite images and draw impact assumptions much faster than we could before, meaning that the benefit of this work can be realized almost immediately.

My hat's off to our CIITR staff – Rafael Aldrete, Jeff Shelton, and Swapnil Samant – for their work that gives tangible meaning to the notion of transformative mobility. If agencies can make the necessary investments, the fruits of our staff's research are readily within reach and primed for scaled deployment.

Infrastructure's past was one of concrete, asphalt, and steel. But tomorrow's infrastructure is all about data and code. They're fundamentally distinct, but what they share in common is a need for visionary investment and decisive implementation. I'm thinking that 2023 should be a banner year for advancements in both.

Greg Winfree is director of the Texas A&M Transportation Institute (TTI) and a former USDOT Assistant Secretary of Transportation