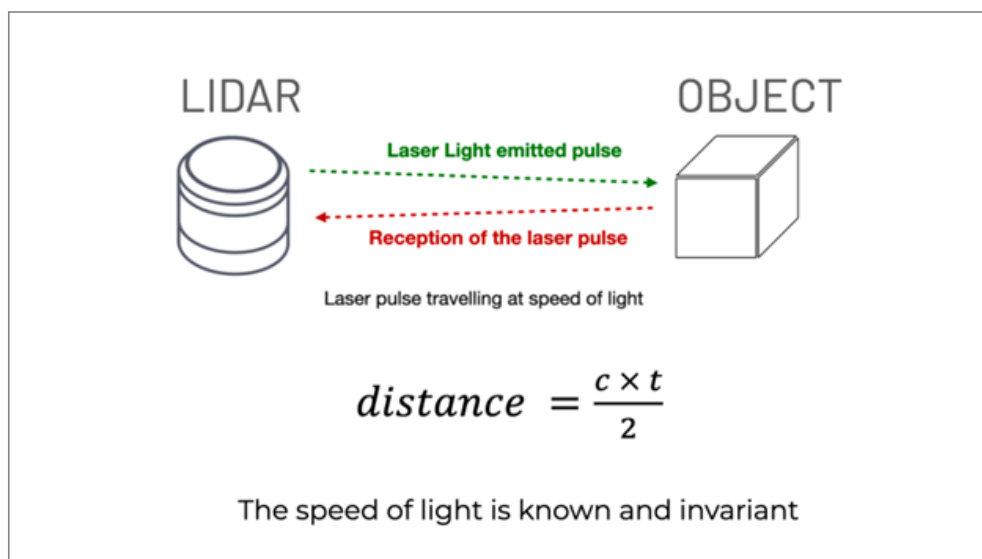# From Cubside to Crosswalk: How LiDAR is Engineering a Safer World

Written by Outsight Team

The modern world is in constant motion. From the bustling curbside of an international airport to the complex intersections of a city, managing the flow of people and vehicles is a critical challenge. Inefficiencies in these environments don't just cause delays; they create significant safety risks. Today, a unified technological approach is emerging to address these distinct but related problems, promising a future with fewer accidents and more seamless journeys.

This solution is powered by **3D LiDAR (Light Detection and Ranging)**, a technology that provides a real-time, three-dimensional understanding of physical spaces.

Its application in both optimizing airport operations and powering **Vision Zero** initiatives — which aim to eliminate all traffic fatalities and severe injuries — highlights a major shift. By delivering precise, anonymous spatial intelligence, LiDAR is becoming the cornerstone of safer, smarter infrastructure.

LIDAR   OBJECT

Laser Light emitted pulse

Reception of the laser pulse

Laser pulse travelling at speed of light

$$distance = \frac{c \times t}{2}$$

The speed of light is known and invariant

The Bottleneck Problem: Airports and Urban Intersections

Though they serve different functions, airport curbsides and city crosswalks share a common problem: they are high-stakes environments where vehicles and pedestrians intersect in unpredictable ways.

At major airports, curbside congestion has become a primary source of frustration and risk. With passenger traffic growing globally, the demand for drop-off and pick-up space frequently exceeds capacity.

Long-term international and domestic passenger traffic (2016–2053)
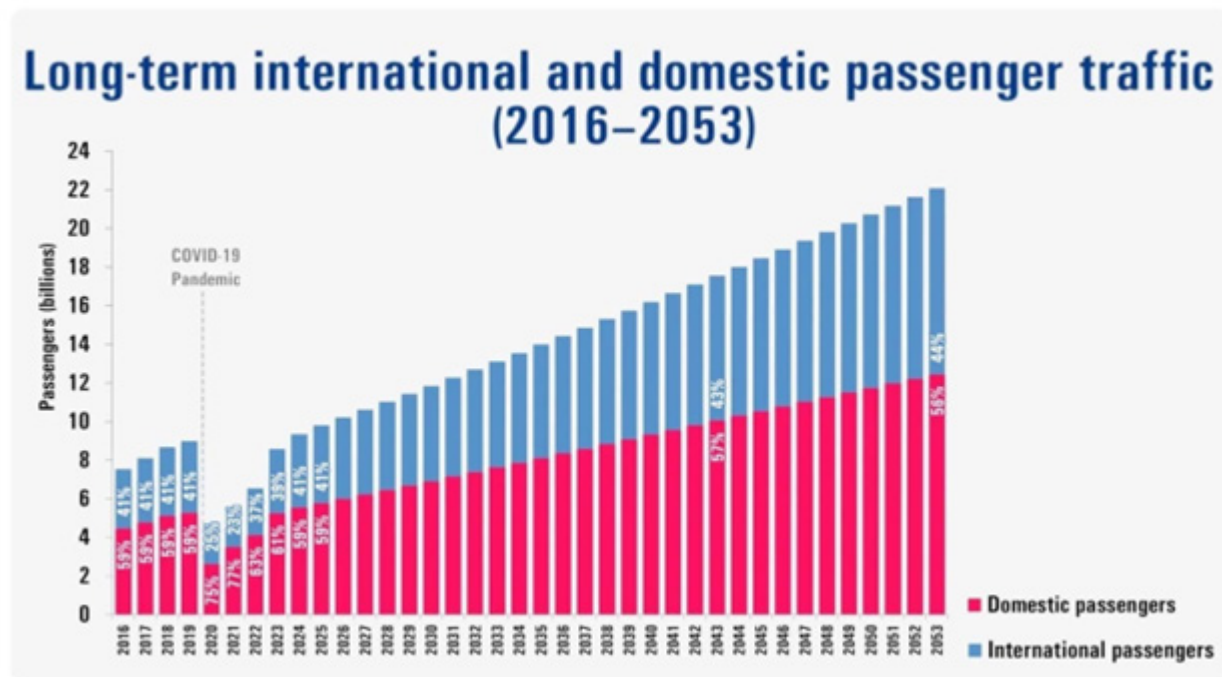
This leads to vehicles double-parking, pedestrians moving unpredictably between cars, and a chaotic environment that undermines both efficiency and safety. Traditional monitoring solutions, like CCTV cameras or manual supervision, lack the precision and real-time adaptability to manage this complexity effectively.

Similarly, urban intersections are the epicenters of road danger. Vulnerable Road Users (VRUs), including pedestrians and cyclists, are particularly at risk. The core challenge for traffic authorities is a lack of real-time data on near-misses and dangerous interactions, making it difficult to proactively address high-risk areas before fatal accidents occur.

## LiDAR: A Unified Vision for Safety and Efficiency

3D LiDAR technology offers a transformative solution for both of these challenges by providing a detailed, anonymous, and real-time view of any environment. By using laser pulses to map its surroundings, LiDAR overcomes the limitations of older technologies:

- **Precision in all conditions:** Unlike cameras, which struggle with glare, shadows, or bad weather, LiDAR provides consistent and accurate 3D data 24/7.
- **Privacy by design:** LiDAR does not capture biometric data or personal identifiers, making it an ethical choice for monitoring public spaces.

- **Comprehensive tracking:** It can simultaneously track hundreds of vehicles and pedestrians, understanding their speed, trajectory, and classification.

This capability allows airport operators to digitize their curbside, turning chaotic activity into actionable data. With software platforms like Outsight's Shift Perception, this raw data becomes a powerful tool to:

- Monitor vehicle dwell times to prevent unauthorized parking.
- Identify pedestrian flow to optimize crosswalk placement.
- Alert staff to developing congestion before it becomes critical.
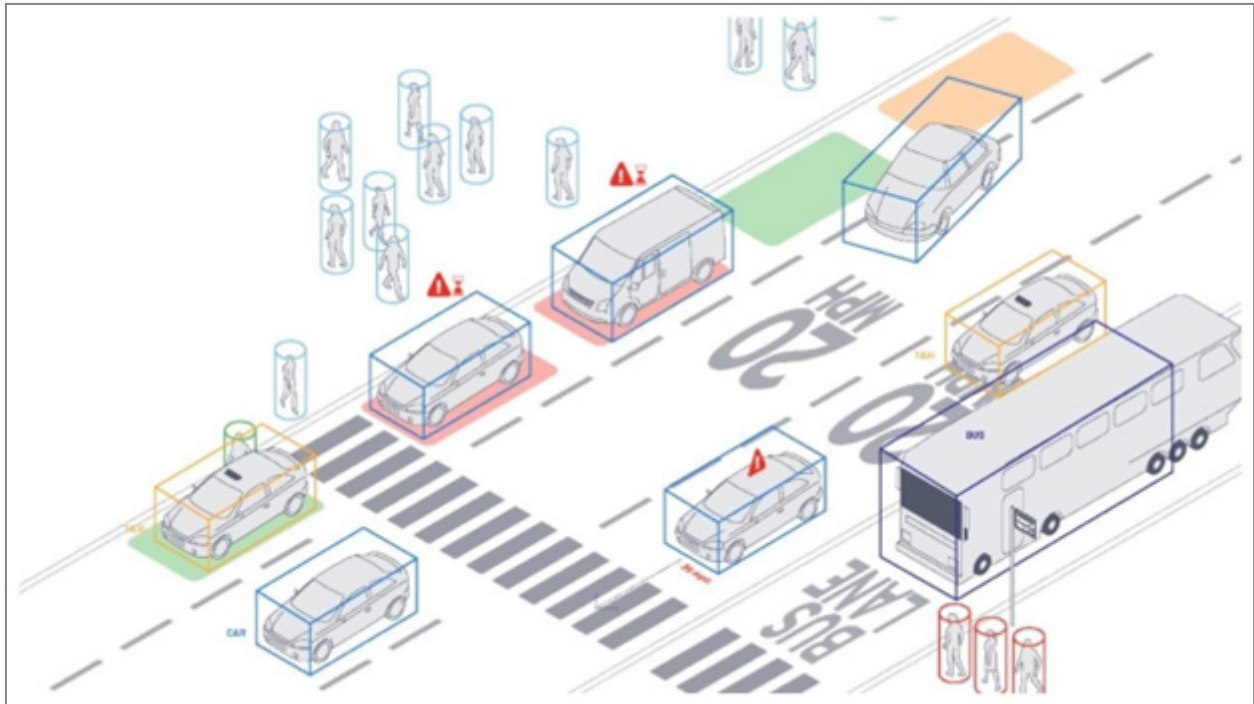
Outsight's Spatial AI platform runs on Intel's edge tech stack. It uses Intel® Core™ CPUs on edge PCs to process LiDAR data in real time, leverage Intel® SceneScape for sensor fusion, and accelerate AI inference with Intel® Deep Learning Boost. Models are trained using Intel® Geti™, enabling the co-development of cutting-edge spatial computing solutions.

Powering Vision Zero with Edge Computing

When applied to urban roads, the same LiDAR technology becomes a powerful tool for achieving Vision Zero. The sheer volume of data generated by city-wide sensors makes real-time analysis a challenge. This is where **Edge Computing** becomes essential.

By processing the LiDAR data directly at the sensor's location (at "the edge" of the network), an Edge Computing system can analyze events and detect risks in milliseconds. This real-time processing enables:

- **Proactive safety alerts:** The system can identify near-misses and dangerous interactions between vehicles and pedestrians, providing traffic managers with invaluable data to redesign high-risk intersections.

- **Smart traffic signals:** It allows for the development of adaptive traffic lights that can extend a green light for a slower-moving pedestrian or adjust timing based on real-time traffic flow.
- **Connected vehicle communication:** The insights can be sent directly to modern vehicles, warning them of an impending collision with a cyclist or pedestrian who is out of the driver's line of sight.
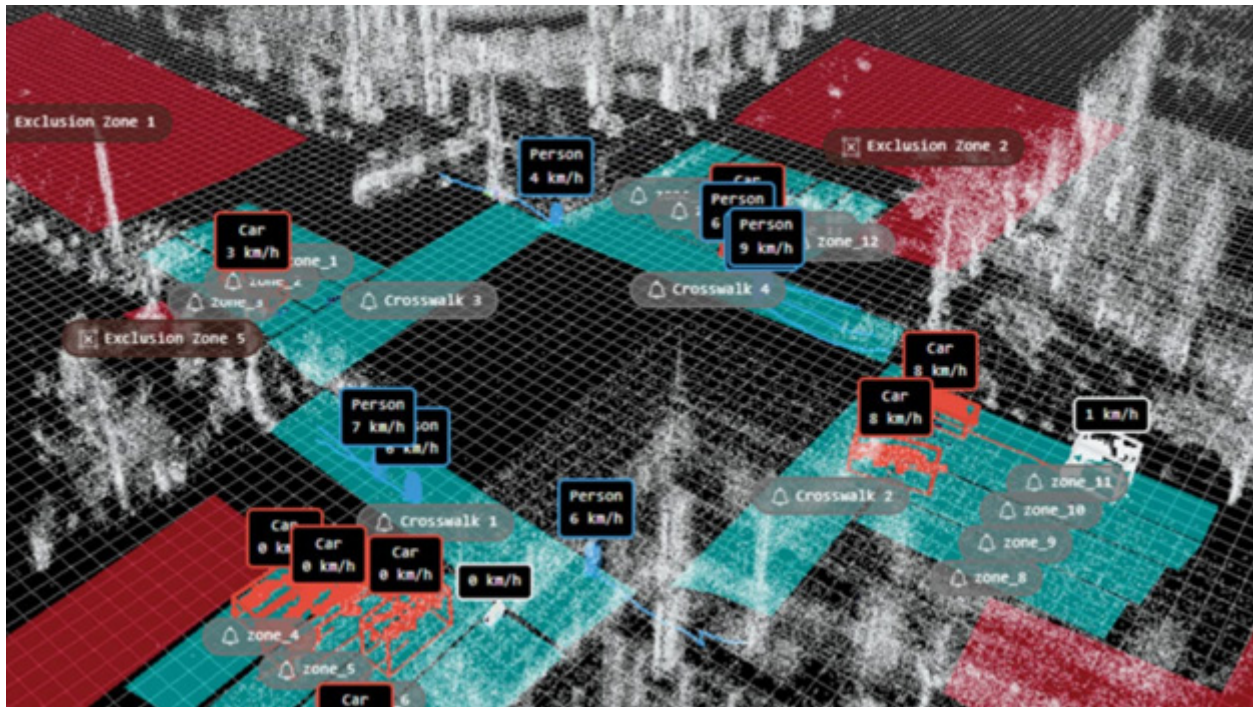
Solutions that integrate LiDAR with edge processing, like the one developed by Outsight, are making this a reality. By deploying this technology at intersections, cities can gather the data needed to prevent accidents before they happen, moving from reactive analysis to proactive prevention.

Conclusion: A Safer Future Built on Spatial Intelligence

Whether managing the flow of travelers at an airport or protecting pedestrians on a city street, the underlying challenge is the same: understanding how people and vehicles move and interact in complex spaces. 3D LiDAR, combined with intelligent software and edge computing, provides the Spatial Intelligence needed to solve this problem.

By creating a detailed, real-time digital twin of our physical world, this technology empowers operators and authorities to make smarter, faster, and more informed decisions.

The result is a system that is not only more efficient but fundamentally safer for everyone. The journey from a congested curbside to a zero-fatality crosswalk is being mapped by the same powerful technology, promising a future where our infrastructure is truly intelligent.

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