



**Austin Russell**

Founder & CEO

Please see Legal Notices at the end of this presentation for explanation of Forward-Looking Statement and important cautions.



American drivers spend  
**93 billion hours driving** over  
**3 trillion miles** per year



# 1.2 million

Annual fatalities from vehicle collisions globally.

The background is a dark, blurred image of a car crash scene. A checkered flag is visible in the upper left, and a car is partially visible in the lower right. The overall tone is somber and urgent.

# 1 in 100

of us will tragically lose our life in a car crash.



A dark, blurred background image of a city street at night or dusk. A utility pole with various signs is visible on the left, and a car is blurred in the middle ground, suggesting motion. The overall tone is somber and urgent.

Vehicles with current camera and radar-based  
ADAS systems experienced collisions in

70%

of pedestrian Automatic Emergency Braking  
scenarios.



# \$1.4 trillion

Estimated annual value of societal harm  
from motor vehicle crashes in the US.

# Safety Standards: Other Forms of Transportation

## The shocking Boeing 737 Max incident, briefly explained

A door plug falling mid-flight has renewed scrutiny of air travel and of Boeing's planes.

By Li Zhou | [@lizhou.com](#) | Updated Mar 13, 2024, 5:40pm EDT

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## Boeing CEO Dave Calhoun to step down in wake of ongoing safety problems

By [Chris Isidore](#), CNN  
7 minute read · Updated 2:04 PM EDT, Mon March 25, 2024

f X e o



MORE FROM CNN

**Opinion:** How Boeing lost its way

**Former JetBlue CEO Robin Hayes to lead Airbus in North America**

**Hertz CEO out following electric car 'horror show'**

## Transportation Fatalities Last Year

Global Automotive Fatalities: 1,190,000

Global Airline Fatalities: 72



# AV Industry: How Replacing Drivers Was Promised



# The Reality



INSIDE **EVs**



The San Francisco Standard

# Gartner Cycle for Autonomous Vehicles



Source: Gartner; Star indicates current estimated position of industry; Estimated timeline by Gartner to Plateau = 5-10 years, not to scale





Luminar: Enhancing the driver



# Next Generation Safety and Autonomy





Enhancing safety = **Lives saved**

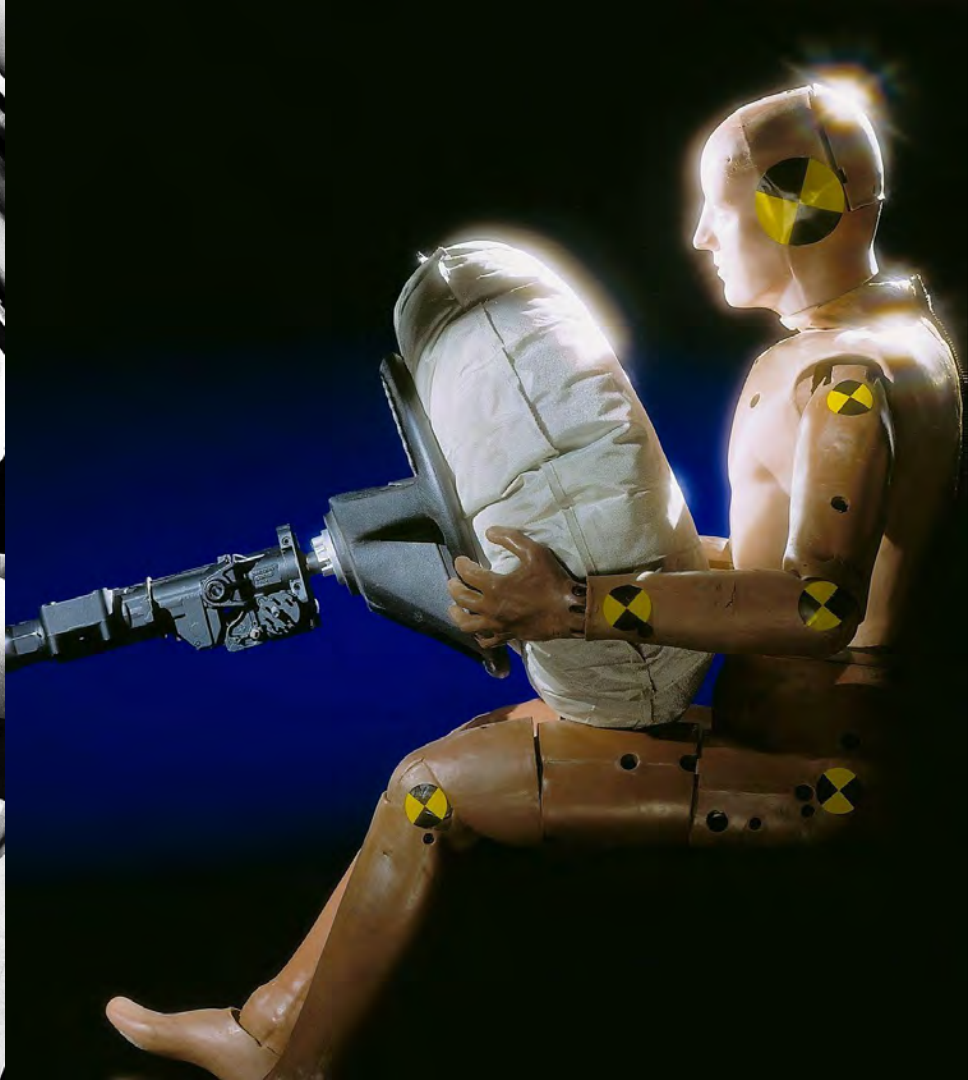


Enabling autonomy = **Time saved**

The New Era begins with **Volvo.**









## ALL CARS HAVE SAFETY FEATURES. VOLVO PUTS SAFETY FEATURES ON ITS SAFETY FEATURES.

When it comes to safety, no one demands more of Volvo than Volvo. For example, all cars are required by law to have two brake circuits, so if one circuit fails, you have another.

Volvo designed two triangular circuits controlling three wheels. So if half your car is a headlight or taillight burns out, Volvo's car should be the first to tell you. A warning light on the dash.

All car seats have head rests to reduce the chances of whiplash. Volvo's head rests have openings to increase your chances of seeing what's coming up behind you.

Rear door locks are a standard safety item. Volvo's beyond the standard and makes them child-proof. When you consider these, and all of Volvo's other features—4-wheel power-assisted disc brakes, 3-point belts front and back, window defoggers front and side, energy-absorbing front and rear ends, a passenger compartment surrounded by six steel pillars designed to support seven tons—you may decide that Volvo is the most secure place to invest your money.

That's easily understood. Safety always appeals to people.



**VOLVO**  
The car for people who think.

## WE DESIGN EVERY VOLVO TO LOOK LIKE THIS.



You're looking at a perfect Volvo. A Volvo that performed exactly as our safety engineers designed it to. Its front and rear ends, for example, collapsed on impact. As a result, much of the crash energy was absorbed instead of being passed on to the passengers. The car's middle section, however, didn't collapse. That's because the entire passenger compartment is surrounded by Volvo's unique "safety cage." Made of six box section steel pillars, this protective housing is strong enough to support the weight of six Volvos.

But the passengers of this car were also protected in ways you can't see. Because inside are such standard features as a driver's side Supplemental Restraint System, a collapsible steering column and, of course, 3-point seat belts, front and rear. Every Volvo is designed to help protect its passengers in all these ways. And, as a result, will look remarkably similar to this one after being in the same type of accident. If you're concerned about safety, you can't find a more beautiful car.

**VOLVO**  
A car you can't live without.

CALL TOLL FREE FOR YOUR ANALYSIS OF THIS SAFETY INFORMATION. © 1990 VOLVO NORTH AMERICA CORPORATION



**HOW WELL  
STAND UP TO**  
Wild things like trucks.  
The new Volvo 740 GLE.  
Produced by Volvo.

## IN AN ACCIDENT, COULD YOU SURVIVE YOUR CAR?



## WHEN'S THE LAST TIME YOU HEARD A SALESMAN TALK ABOUT SAFETY?

You'll hear a lot of gushing about gas economy. And expensive talk about smaller-size cars. But rarely will you hear the man who's trying to sell you, tell you what happened when his car was test-crashed into a barrier.

But in our showroom, you will. Our people sell Volvos and their living is based in good measure on explaining to people like yourself the protection built into every Volvo they show you.

So your salesman will explain why Volvos come with four, not two, power disc brakes. And how the two independent braking circuits each work on a total of three wheels. (The U.S. government is aware of Volvo's crash-worthiness too. They've bought 24 Volvos for a crash-testing program that will help establish safety standards for cars of the future.)

He'll even point out a little thing like the defoggers/defrosters that help clear the front side windows. Because when you have traffic thundering to the right and the left of you, it isn't a little thing.

So whether you come in to inspect the luxurious new Volvo 260 series or one of the new 240s, he has a lot of explaining to do. And it won't hurt you.

**VOLVO**  
The car for people who think.



# Volvo – A History of Safety Firsts

Three Point  
Safety Belt

Side  
Impact  
Airbags

Inflatable  
Curtain

Blind Spot  
Information  
System

First  
Introduction  
of Mobileye

**Luminar  
LiDAR  
Introduction**

**1959**

**1991**

**1998**

**2003**

**2007**


**2024**



Volvo Cars


Began working with Luminar in 2017



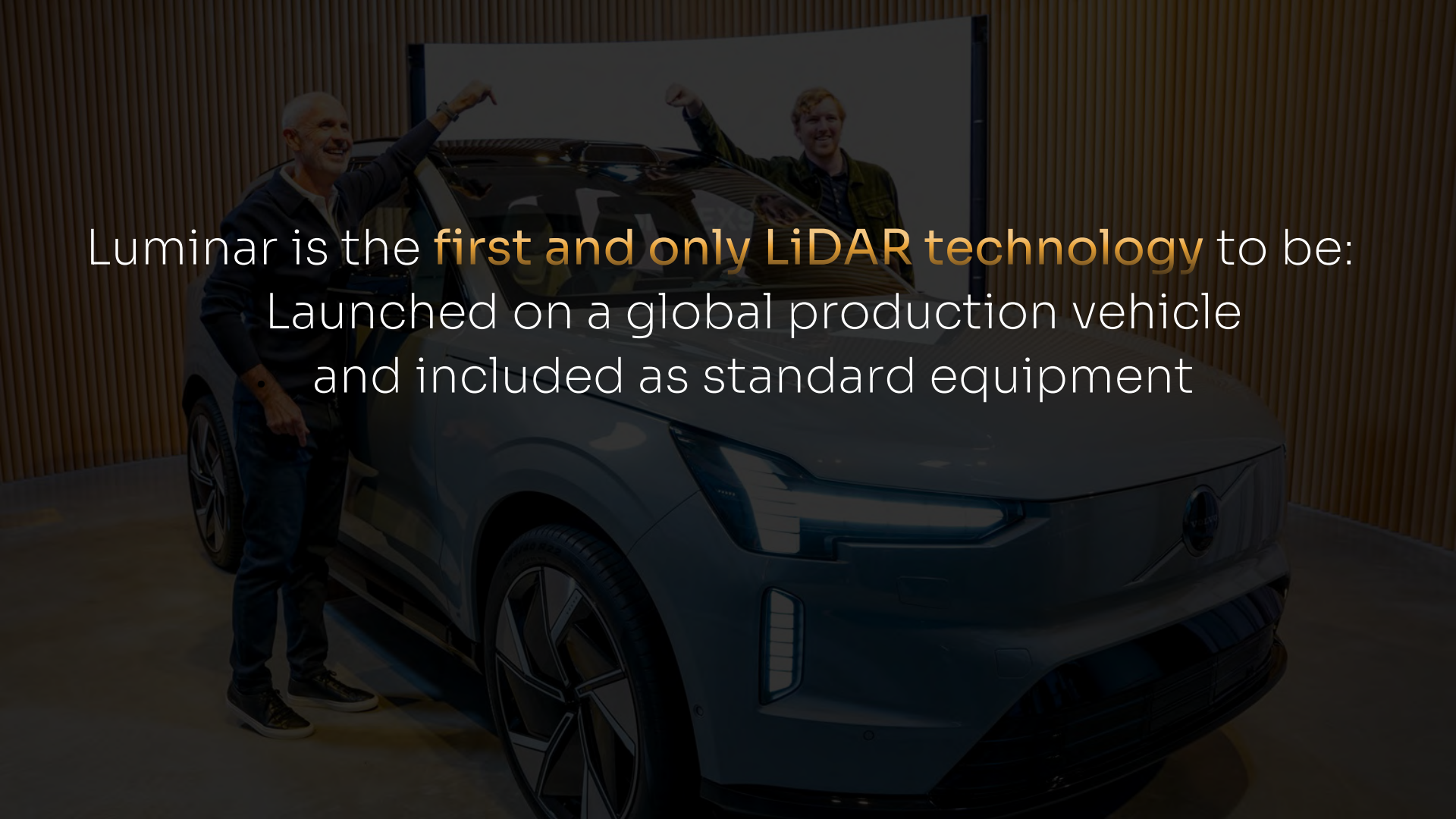
A dark blue Volvo SUV is shown from a front-three-quarter view. Two men are on top of the car, celebrating with their arms raised. One man is on the left, wearing a dark sweater and jeans, and the other is on the right, wearing a green jacket. The car is parked in front of a wall with vertical wooden slats. The text is overlaid on the image.

In 2020, Volvo Cars officially decided to put  
**Luminar** technology on **production cars**  
in low volume



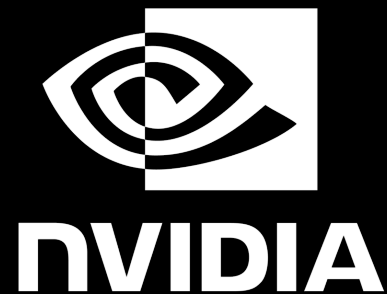
A dark blue Volvo EX90 SUV is shown from a front-three-quarter view. Two men are standing next to the car, both with their arms raised in celebration. The man on the left is older, with grey hair, wearing a dark sweater and jeans. The man on the right is younger, with red hair, wearing a green jacket. They are in a room with vertical wooden slat walls. The car's driver-side door is open, and its distinctive LED headlights are visible. The overall image has a dark, moody aesthetic with a semi-transparent text overlay.

By 2021, **Volvo Cars** had selected **Luminar** as  
**standard** for the EX90

A dark blue Volvo XC90 SUV is shown from a front-three-quarter view. Two men are standing next to the car, both with their arms raised in celebration. The man on the left is older, with grey hair, wearing a dark jacket and jeans. The man on the right is younger, with red hair, wearing a green jacket. They are in a room with vertical wooden slats on the wall. The car's driver-side door is open. The text "Luminar is the first and only LiDAR technology to be: Launched on a global production vehicle and included as standard equipment" is overlaid on the image in white and yellow font.

Luminar is the **first and only LiDAR technology** to be:  
Launched on a global production vehicle  
and included as standard equipment

# Volvo EX90 integrating NVIDIA and Luminar





An aerial photograph of a large industrial complex, likely a car manufacturing plant, featuring several large white-roofed buildings and extensive parking lots filled with vehicles. The facility is situated in a desert-like environment with mountains visible in the background under a clear sky. The text is overlaid on the upper portion of the image.

Luminar has officially kicked off our **Start of Production (SOP)** for Volvo Cars.


This is the first time our **multi-billion-dollar  
Order Book** will begin to  
**massively convert into revenue.**



# Going Global

Deploying across **North America, Europe, & Asia**  
over the **next year**.



A photograph of a modern, single-story commercial building with large glass windows and a light-colored facade. The building is identified by a logo on its upper right side that reads "LUMINAR" in a stylized font, with a colorful geometric icon to its left. The scene is set at dusk or dawn, with a soft orange and yellow glow on the horizon. Several palm trees are planted along the sidewalk in front of the building. A paved parking lot with several cars is visible to the right. The overall atmosphere is professional and modern.

Luminar expects to ship **>5x more product** in  
the 2nd half of this year  
than in our **12-year history combined**.

2020

>100

Estimated number of  
LiDAR efforts<sup>1</sup>

Now

<10

LiDAR companies that  
successfully developed  
and delivered

1

LiDAR industrialized,  
launched & standardized  
for global production



Established a **global supply chain network**  
to enable **mass adoption**



# Diversified global contract manufacturing partners



Assembles and  
calibrates LiDAR and  
completes final testing.



Assembles transceiver  
based on design and  
components from Luminar.



Will assemble and  
calibrate LiDAR and  
completes final testing.



Luminar now awarded on **25+ commercial programs.**



Note: See most recent 10-K filed with SEC for more details on awarded commercial programs

EX90 kicks off a domino effect for vehicle launches





# Powertrain Landscape

ICE



Internal Combustion  
Engines

71%

EV



Electric  
Vehicles

16%

HEV



Hybrid Electric  
Vehicles

13%

# Powertrain Landscape

ICE

EV

HEV

Luminar is powertrain agnostic.

Planned into programs across all major powertrains.

Internal Combustion  
Engines

71%

Electric  
Vehicles

16%

Hybrid Electric  
Vehicles

13%

# Automotive Adoption Cycles

3pt Safety Belt



Airbags



Electronic  
Stability Control



Traction Control



Automatic  
Emergency Braking



1960s

1970s

1980s

1990s

2000s

2010s

2020s

Note: Gradient shading indicates introduction to  
standardization of technology



LUMINAR



Swiss Re





**Ali Shahkarami**

Global Head of  
Property & Casualty Solutions  
Swiss Re

The **Swiss Re** accidents database is based on accidents statistics with **1 billion** vehicle years of exposure and **70 million insurance claims**.

The results of safety testing with Luminar technology:

Up to **27% reduction** in frequency of **accidents**

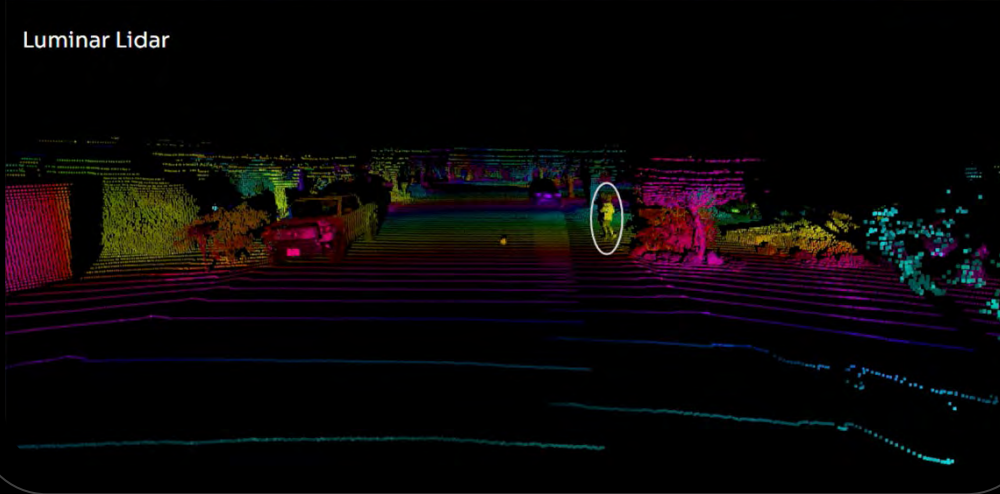
Of the accidents that still happen, **reduction in severity by up to 40%**

**LiDAR is critical** not just for enabling autonomous capabilities and higher-level assisted driving functions, but also helps **the most basic levels of vehicle active safety.**

Camera



Luminar Lidar



Luminar LiDAR can accurately sense where objects are in 3D, compared to cameras that 'guess' from 2D data

Luminar can also see clearly at night, and inclement weather where cameras cannot



# Substantial Value Creation from Insurance Savings

**\$2,500**

Average US annual vehicle insurance premium, including insurance loss

**\$25,000**

Average cost of insurance to consumer over 10 year vehicle lifetime

Up to

**\$900**

Insurance savings per annum based on safety efficacy study by Swiss Re<sup>1</sup>

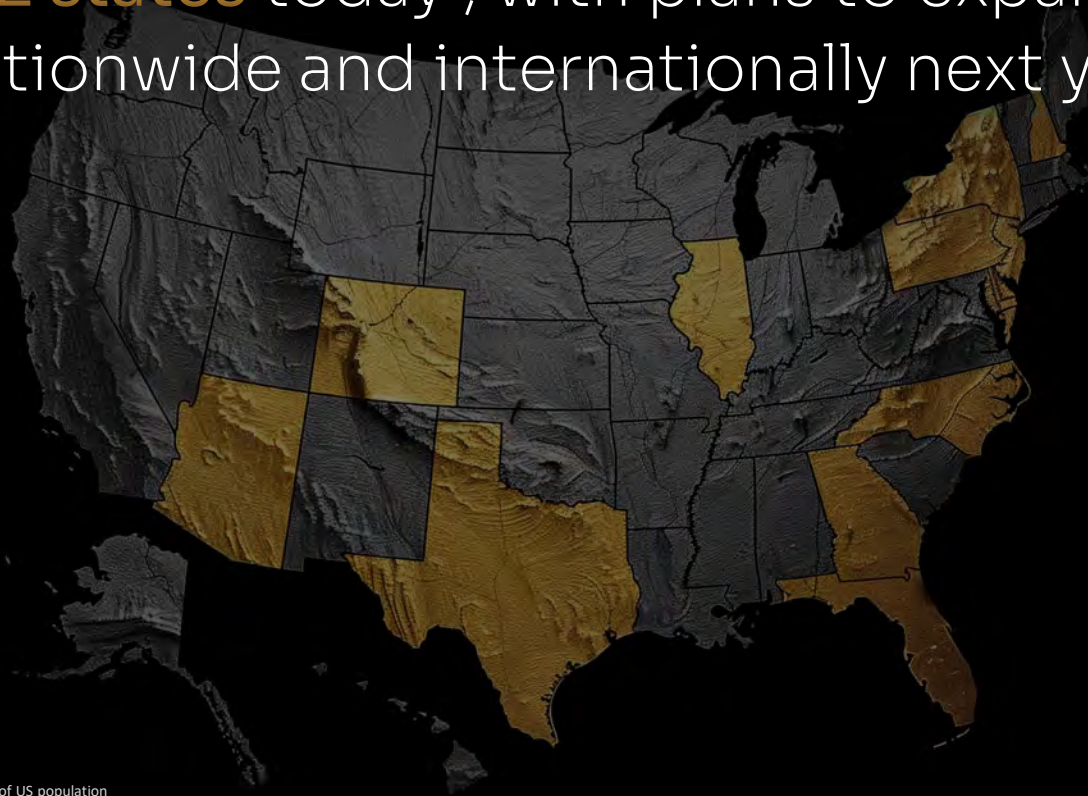
Up to

**\$9,000**

Average insurance savings to consumer over 10 year vehicle lifetime

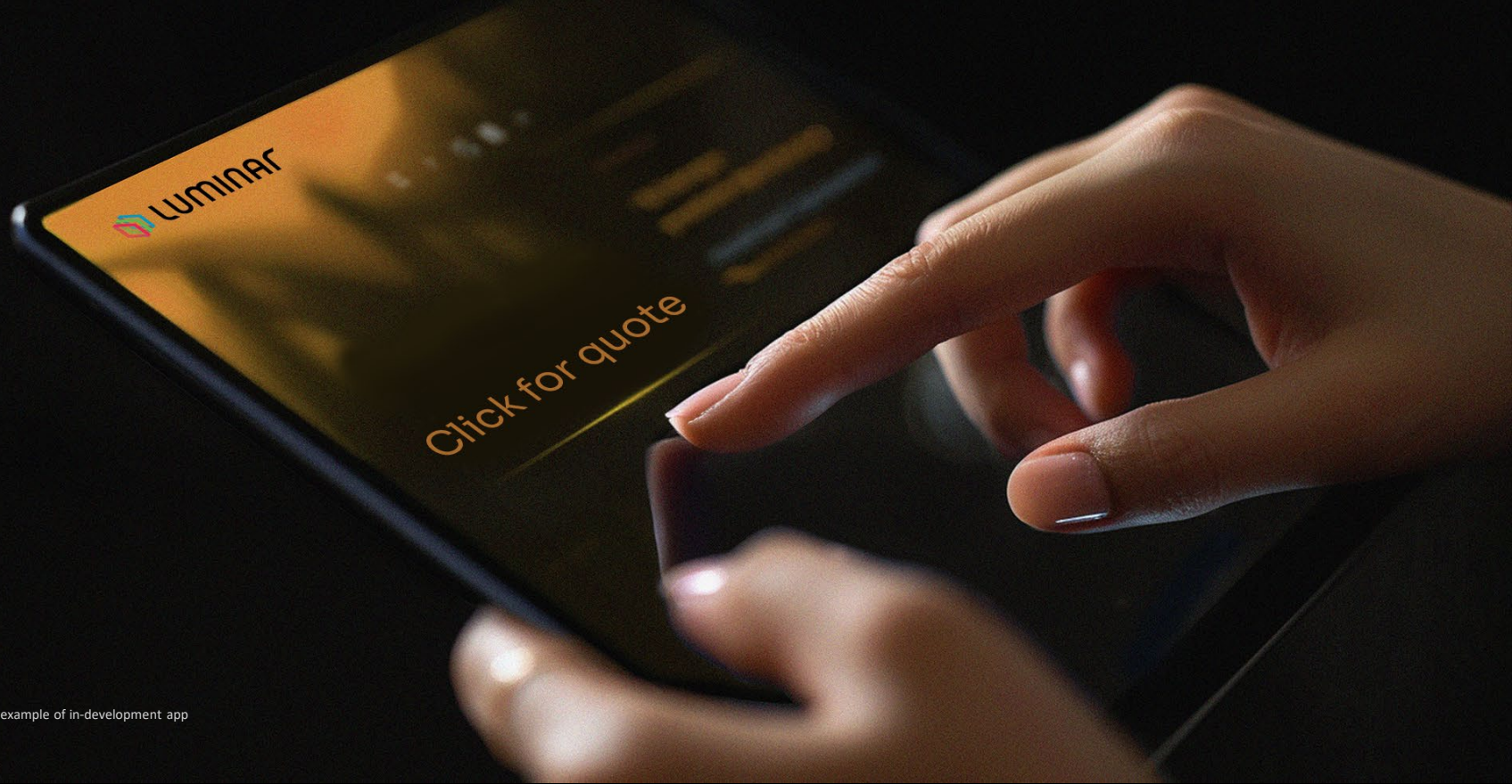
Based on Swiss Re risk-based testing of Luminar's LIDAR & software driving system. Assumes 27% reduction in relative frequency of collisions for Luminar-equipped vehicles and 40% reduction in severity of collisions when occurring. Calculation =  $27\% + (73\% \times 40\%) = 56\%$  implied insurance savings of collisions for Luminar-equipped vehicles.  $\$2,500 \text{ average insurance premium} \times 65\% \text{ average insurance loss} = \$1,625$ .  $\$1,625 \times 56\% = \$910$  implied annual insurance savings for Luminar-equipped vehicles.

Luminar is a **licensed insurance agent** in **12 states** today<sup>1</sup>, with plans to expand nationwide and internationally next year



Footnote: <sup>1</sup>12 states currently cover ~40% of US population

# Partnered with our first two digital platforms to distribute Luminar insurance



Note: Illustrative example of in-development app



# Regulatory **headwinds** versus Regulatory **tailwinds**

**Waymo's autonomous car up in flames: vandalism sparks debate over self-driving safety**

*Social media videos showed the EV catching fire and emitting a massive*



*The New York Times*

*Cruise Says Hostility to Regulators Led to Grounding of Its Autonomous Cars*



**Unions Call for Federal Crackdown of Automated Vehicles**

NOVEMBER 9, 2023

**NHTSA Proposes Automatic Emergency Braking Requirements for New Vehicles**

Technology would significantly reduce fatalities and injuries



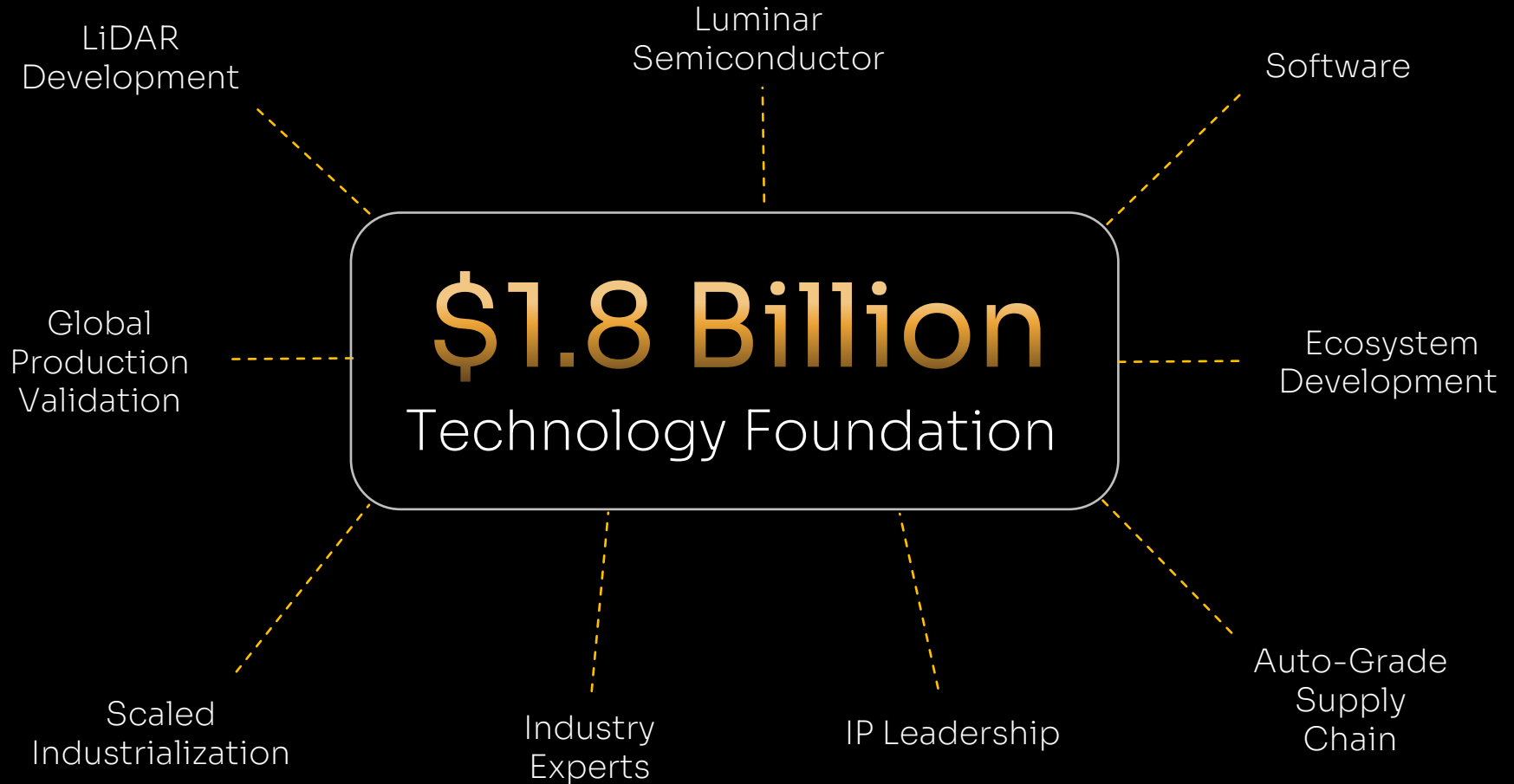
**NHTSA and FMCSA Propose New Safety Standard Requiring Automatic Emergency Braking Systems in Heavy Vehicles**

Proposed rule could prevent over 19,000 crashes, save 155 lives, and prevent thousands of injuries every year



## 4 Factors Driving Standardization: A Summary

1. Consumer Demand for Safer Cars
2. Automaker Adoption Cycles of New Technologies
3. Regulatory Pressure & Mandates
4. Insurance Savings to be Captured





Insurance



Swiss Re



Consumers



OEM Partners



Platform Partners

Qualcomm



mobileye

ecarx



Software Stack



scale



Series Production



Celestica

fabrinet



LiDAR Systems



Transceiver



Semiconductors



Luminar  
end-to-end  
ecosystem  
stack



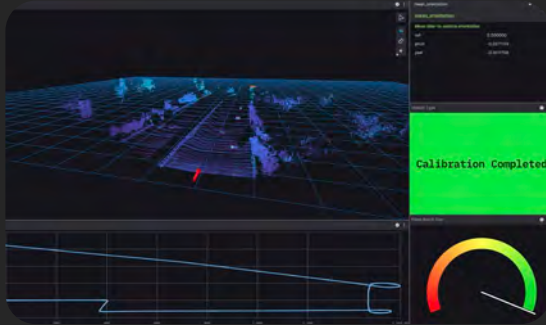
Aaron Jefferson

VP of Product



**Software** translates the 3D data from Luminar LiDAR's 3D point cloud into **safety benefits**.

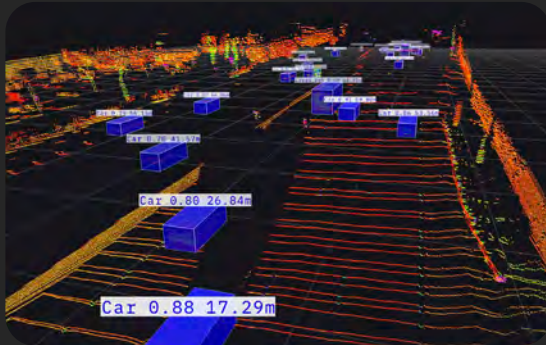
# Sentinel™



Core Functions



Tools & Simulation



Perception & Mapping



Proactive Safety

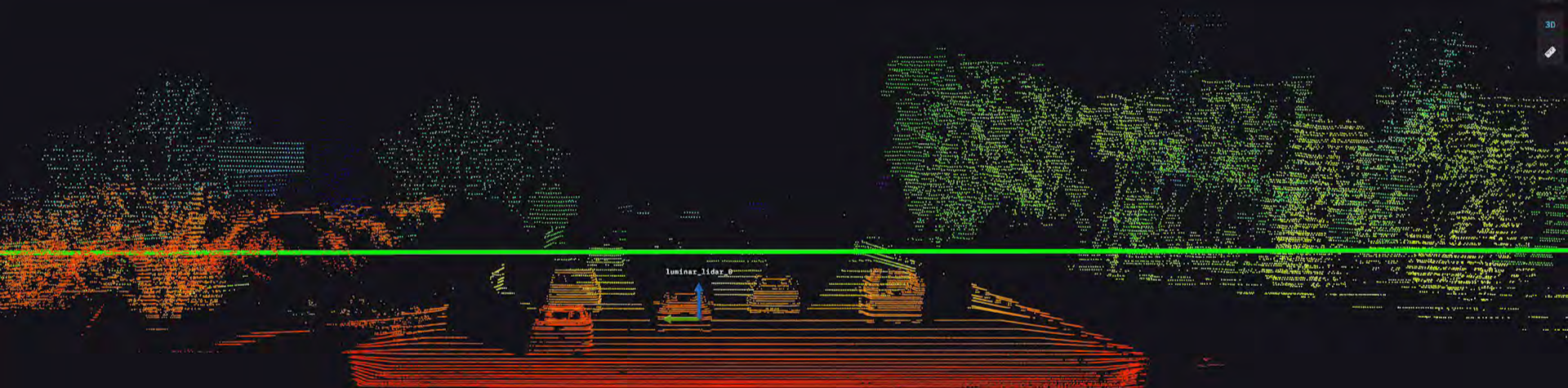
Compensation Angle

0.72  
0.71  
0.70  
0.69  
0.68  
0.67  
0.66  
0.65  
0.64  
0.63  
-67.17 -50 -40 -30 -20 -10 2.83

■ Scan Pattern Compensation Angle (deg)

# Core Functions

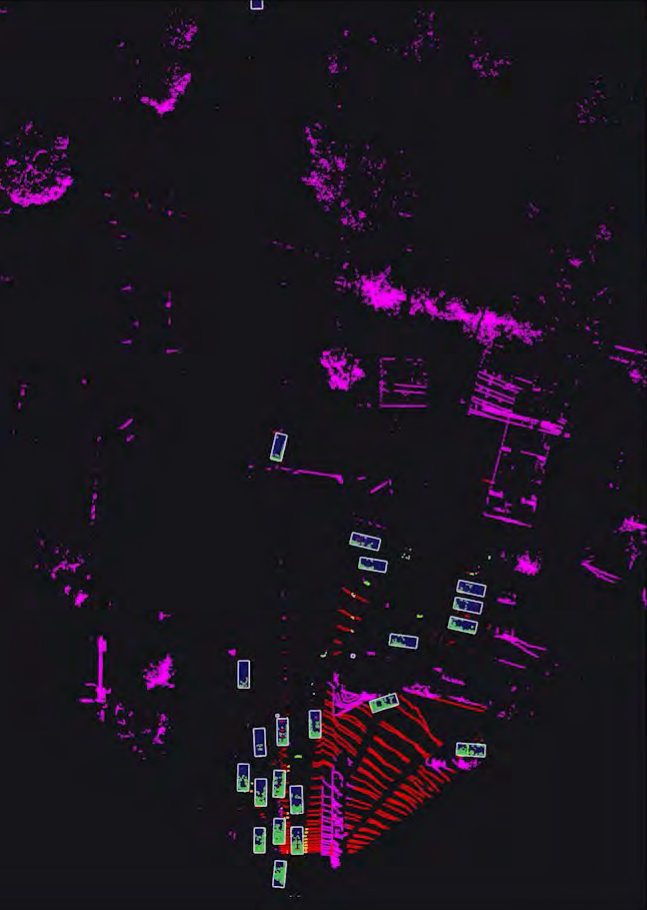
3D



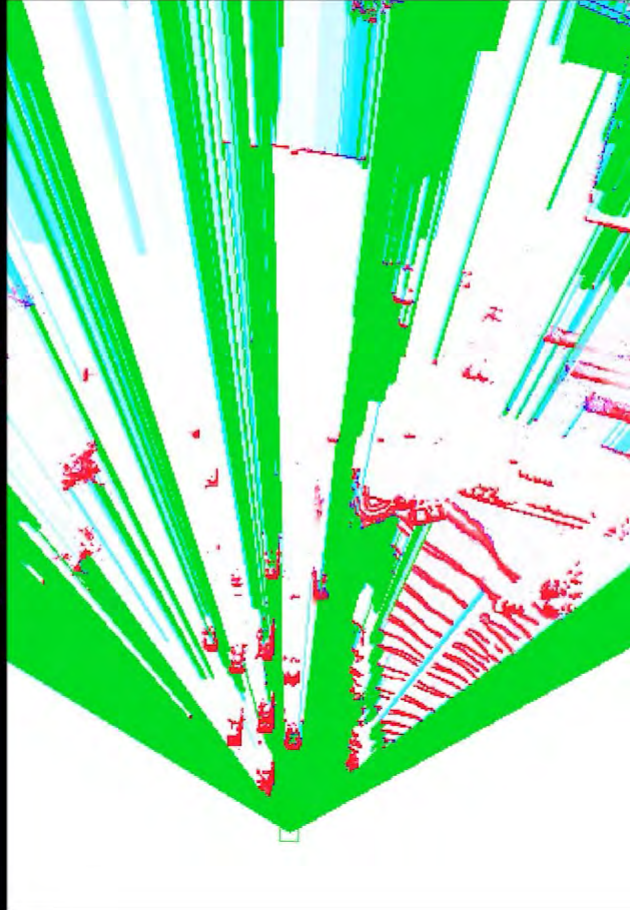


# Perception

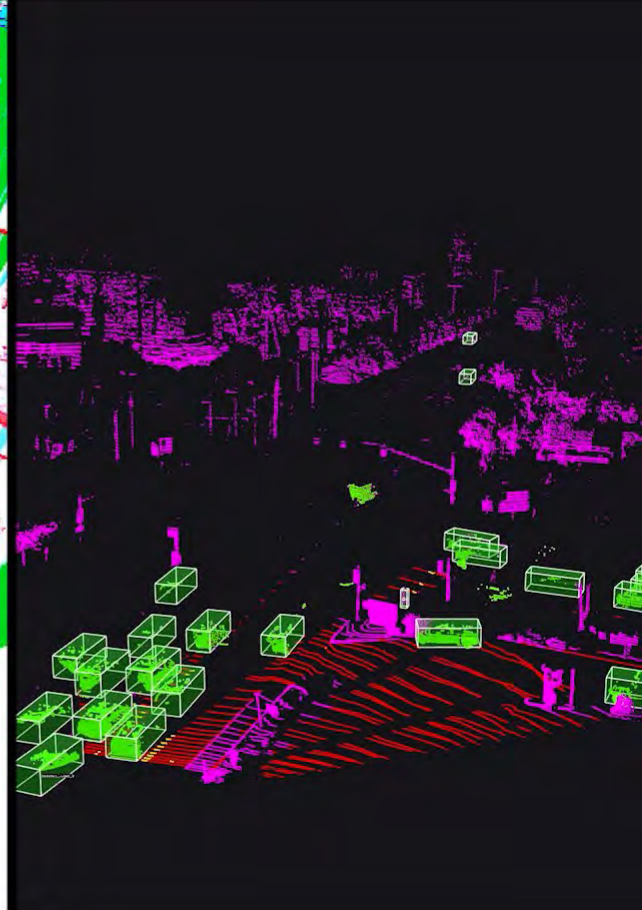
Luminar AI/ML Detections



Luminar Geometric Detections

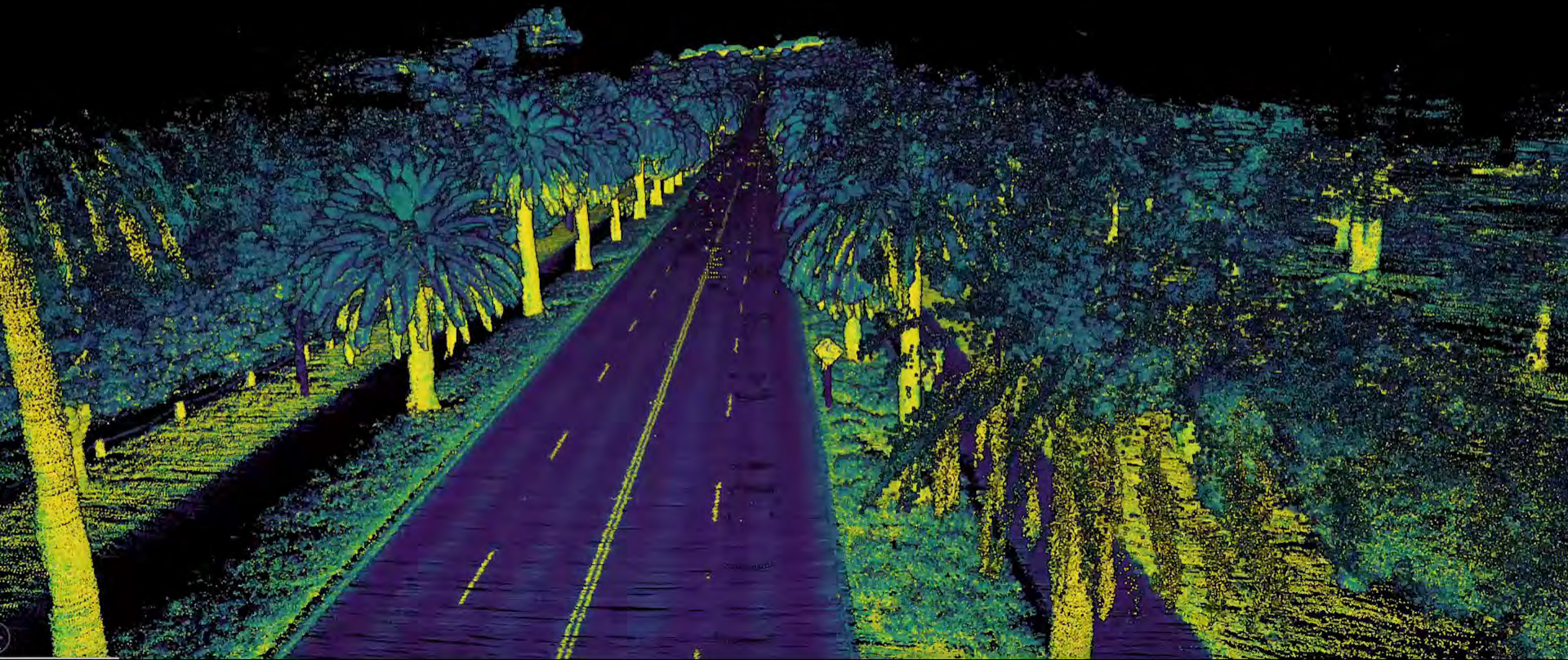


Fused



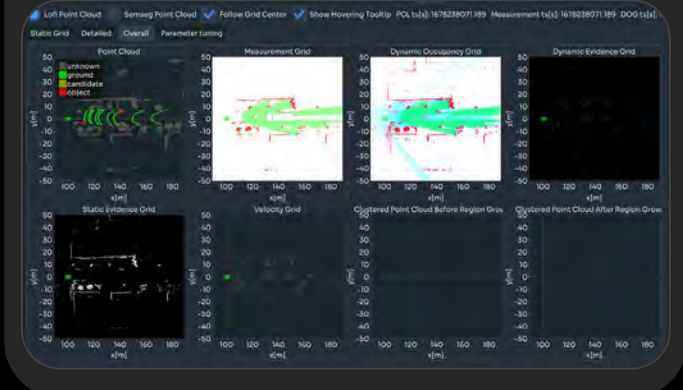
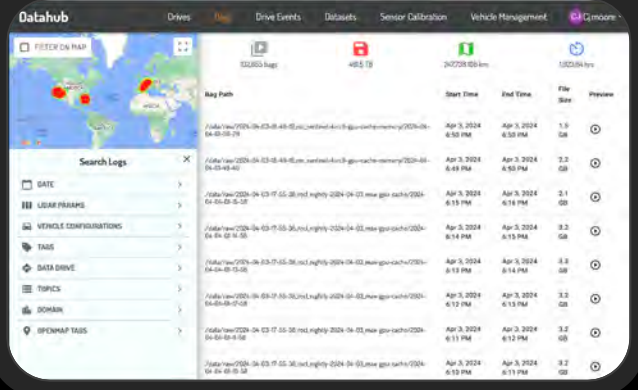
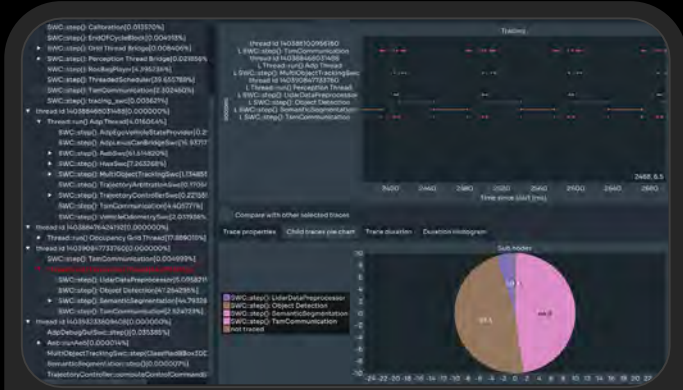


# High-Definition 3D Maps and Localization



Proactive Safety™

# Tools and Simulation



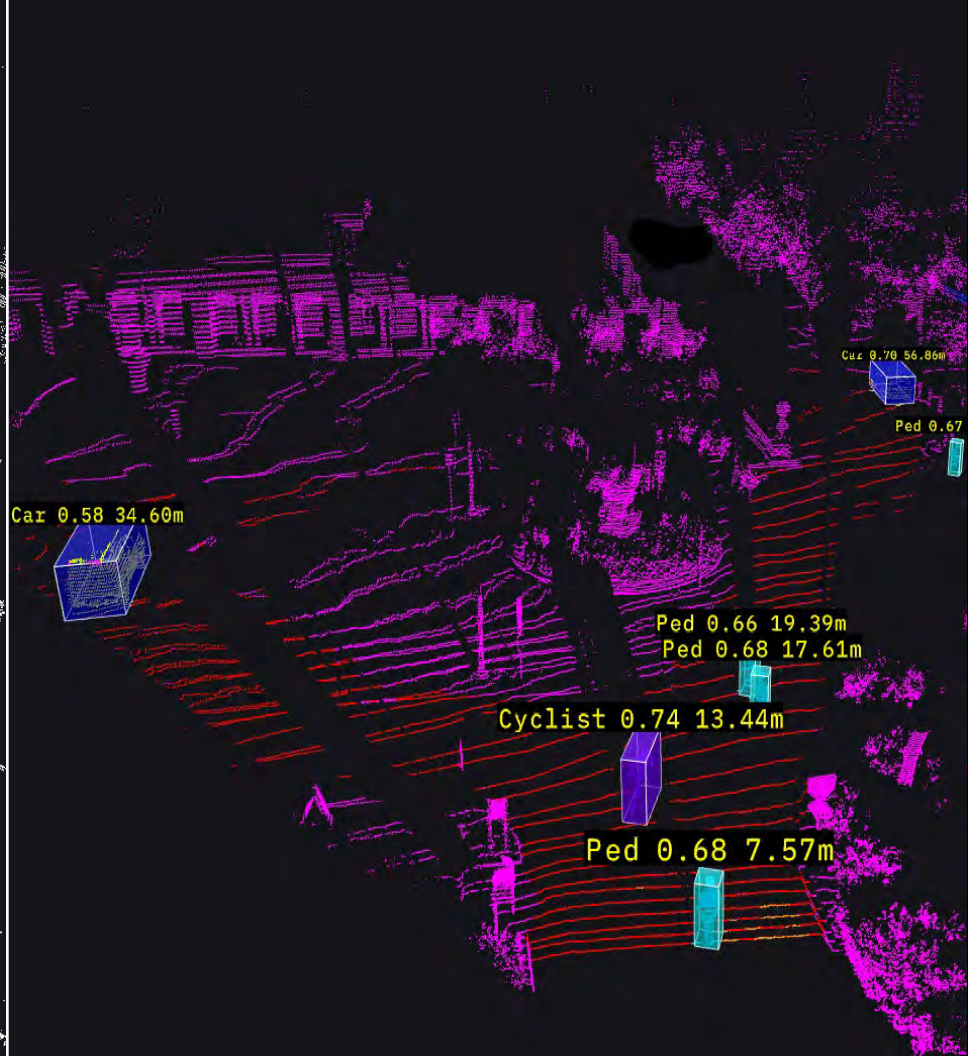




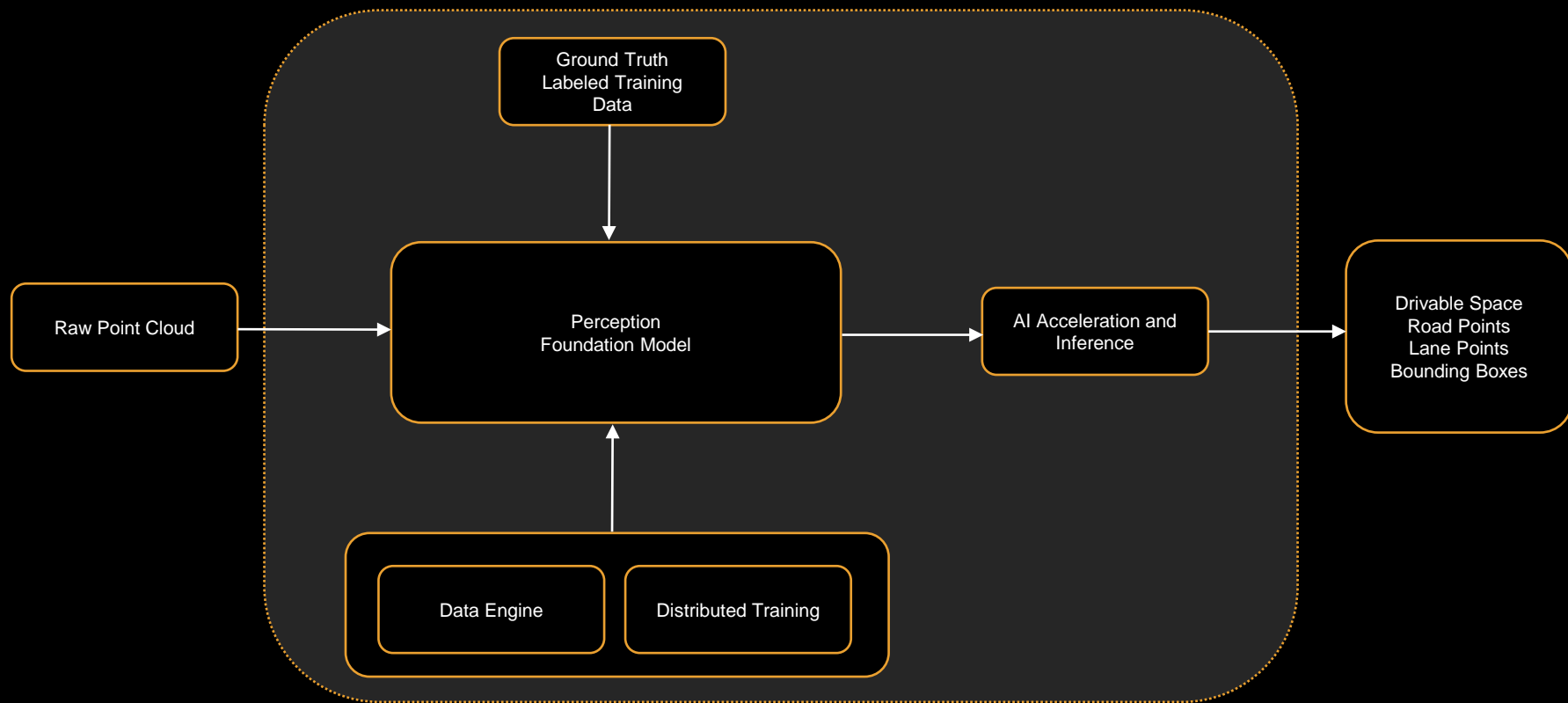
**Annie Guan**

Director, AI and Machine Learning

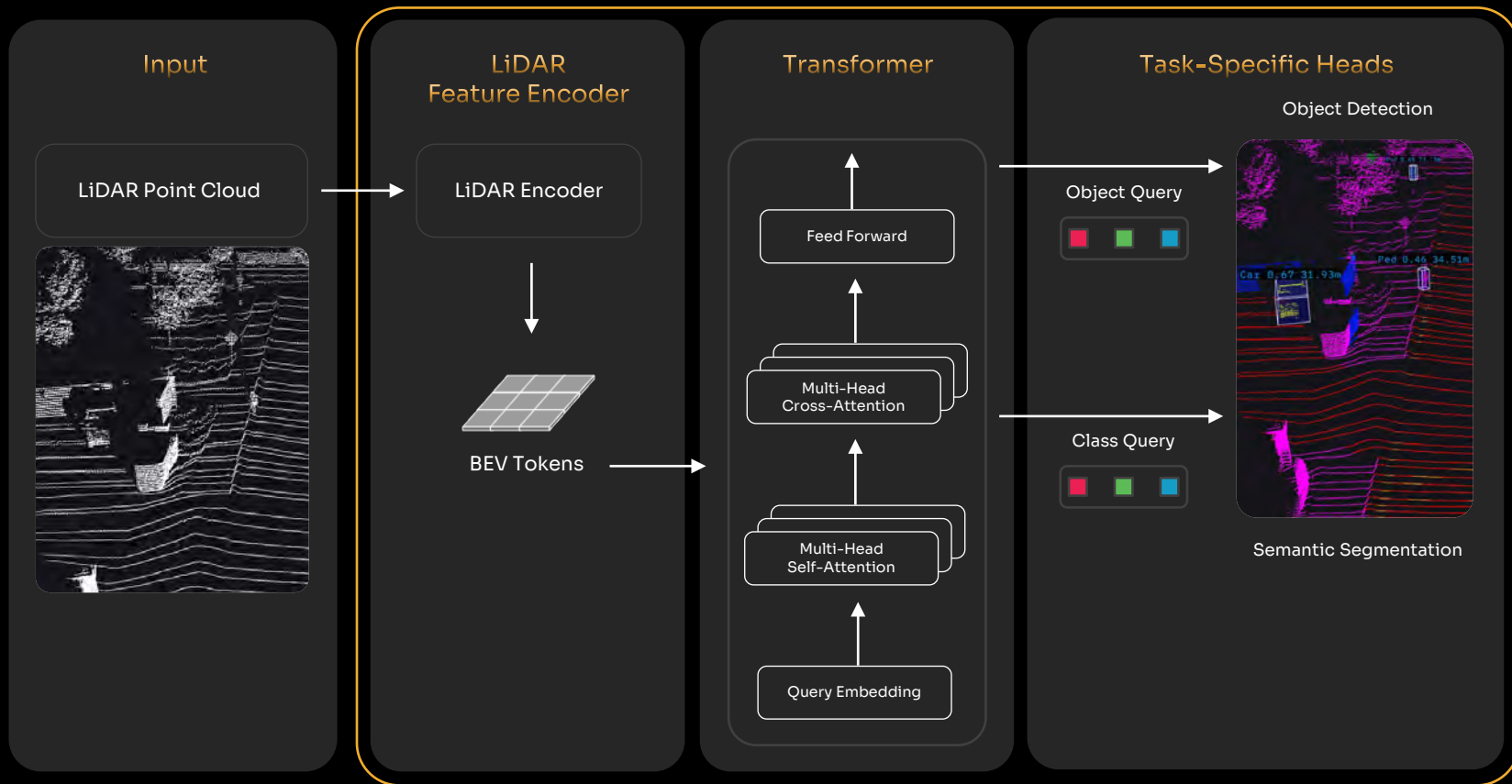


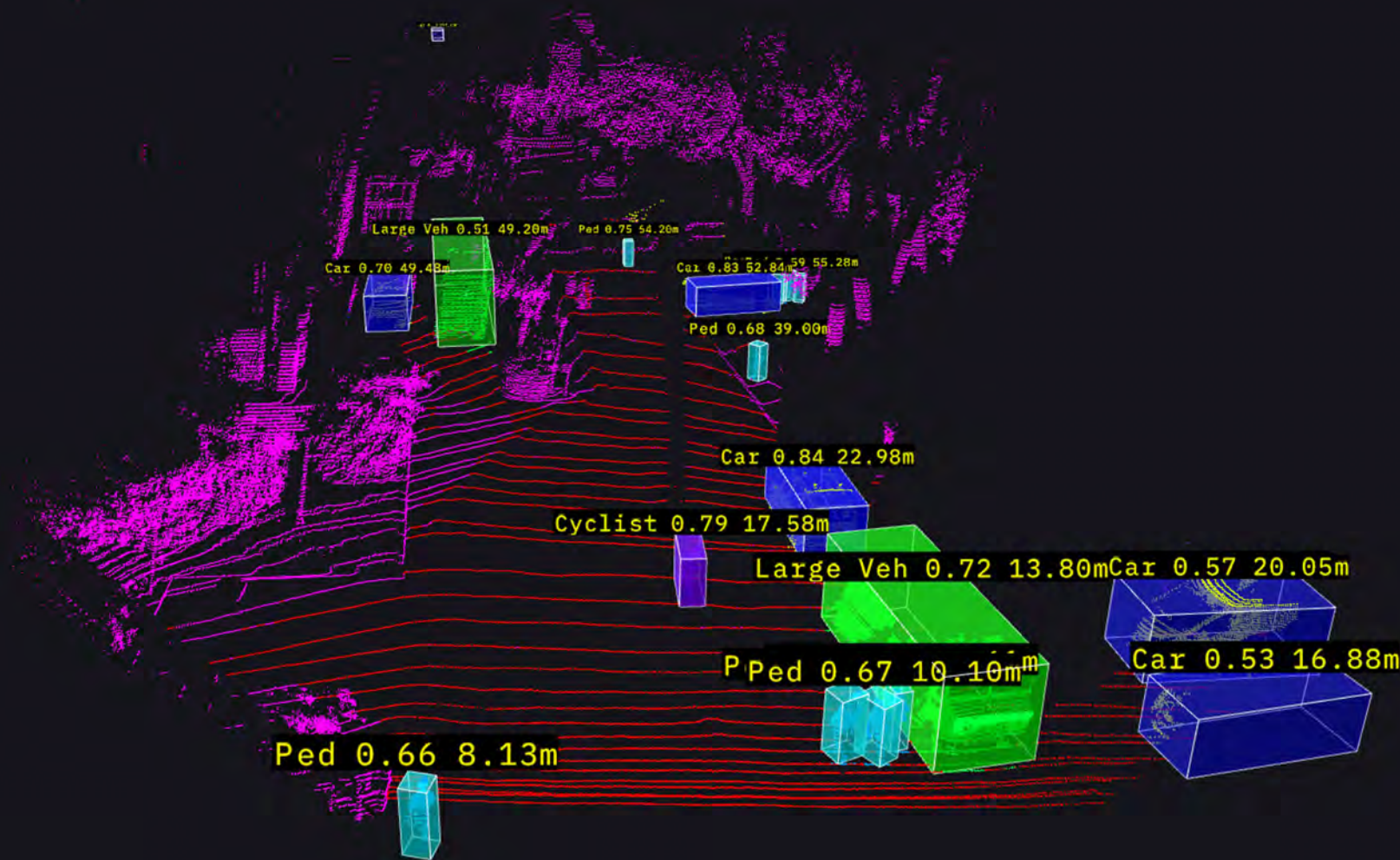


# Luminar AI Engine



# Perception Foundation Model





# LiDAR x GenAI: Luminar AI Agent

Our Roadmap: Tools For  
Training with Synthetic Data



# AI Agent



## AI Agent

LiDAR  
Tokenizer

Transformer  
Encoder &  
Decoder

LiDAR-  
Language  
Alignment

Large  
Language  
Model



3D Contextual  
Scene Understanding

Prediction

Planning

Human Vehicle Interactions

# 3D Contextual Scene Understanding

Camera

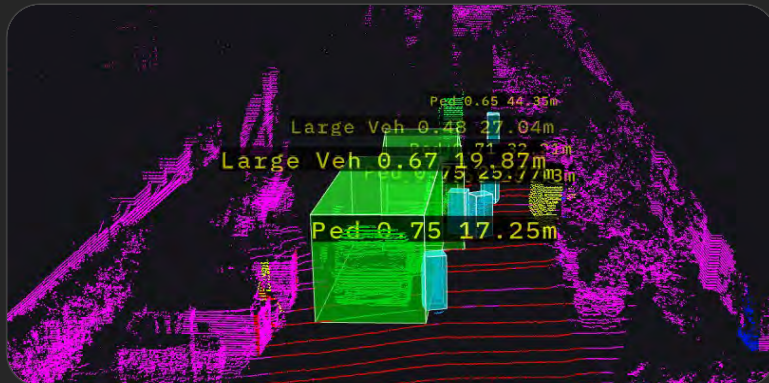


ChatGPT



A bustling urban street scene with trucks lined up and people bustling about, shaded by trees on a sunny day.

LiDAR



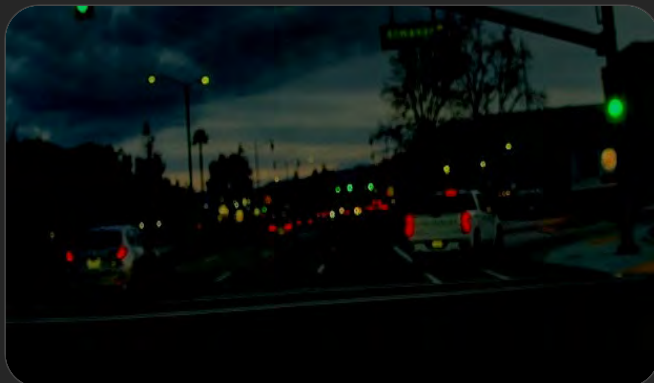
AI Agent



On an urban street, a truck with dimensions of 7.1 m long, 2.8 m wide, and 3.2m high is parked on the roadway at location [19.9m, 3.0m, -0.5m]. Its presence obstructs the flow of traffic. Meanwhile, pedestrians, located at [17.3m, 1.5m, 1.2m], navigate around the trucks, bypassing traffic obstruction.

# Prediction

Camera

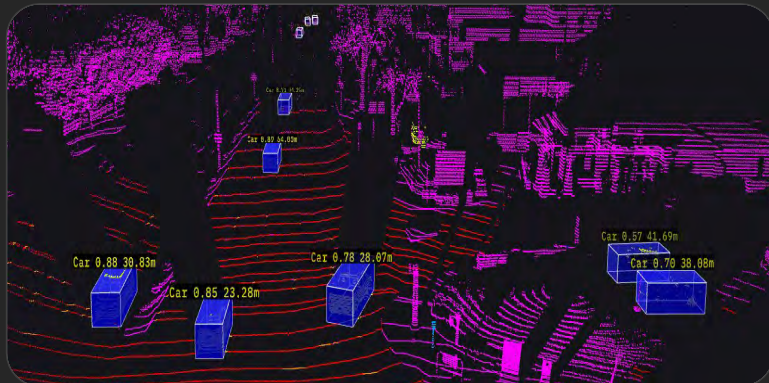


ChatGPT



Dusk descends on the city as traffic lights glow green, guiding commuters home under a twilight sky.

LiDAR



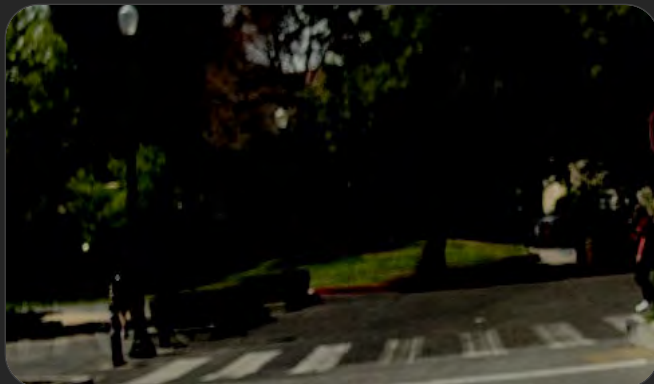
AI Agent



A pickup truck with dimensions [5.6m, 2.1m, 1.8m] at location [28.1m, -3.3m, -1.9m] is about to make a right turn.

# Planning

Camera

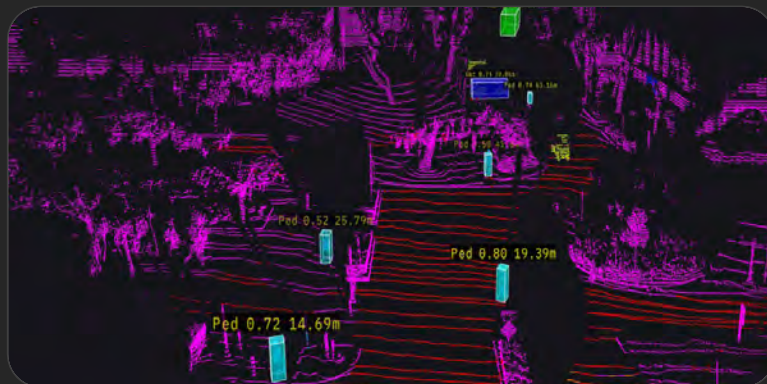


ChatGPT



Evening falls on a quiet suburban intersection, with a stop sign standing vigilant as a pedestrian crosses the street.

LiDAR



AI Agent



The pedestrian at [19.4m, -2.9m, 1.5m] is preparing to walk across crosswalk. Please brake and stop.

# Human Vehicle Interaction

Camera

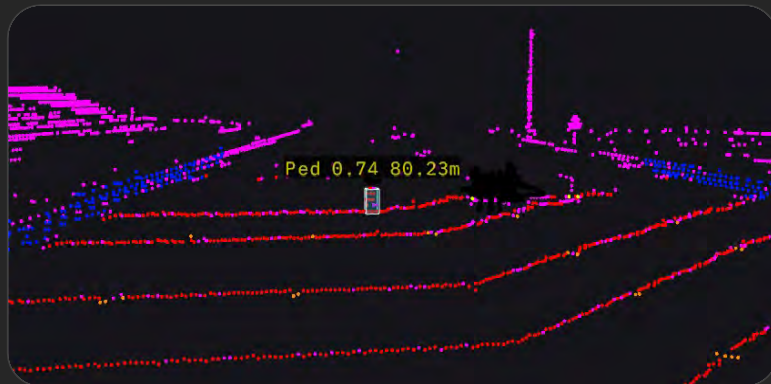


ChatGPT



A person tends to a black luxury SUV on a city street with vibrant curb markings under a clear blue sky.

LiDAR



AI Agent



Warning: A child is emerging from an obscured area 80 m ahead. Collision anticipated in 2.5 s. The vehicle will stop to avoid an accident.



# Human Vehicle Interaction

Camera

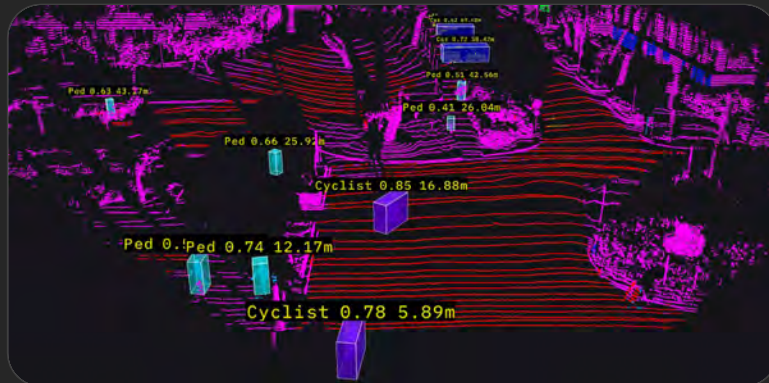


ChatGPT



Urban crosswalk scene with active cyclists and pedestrians.

LiDAR

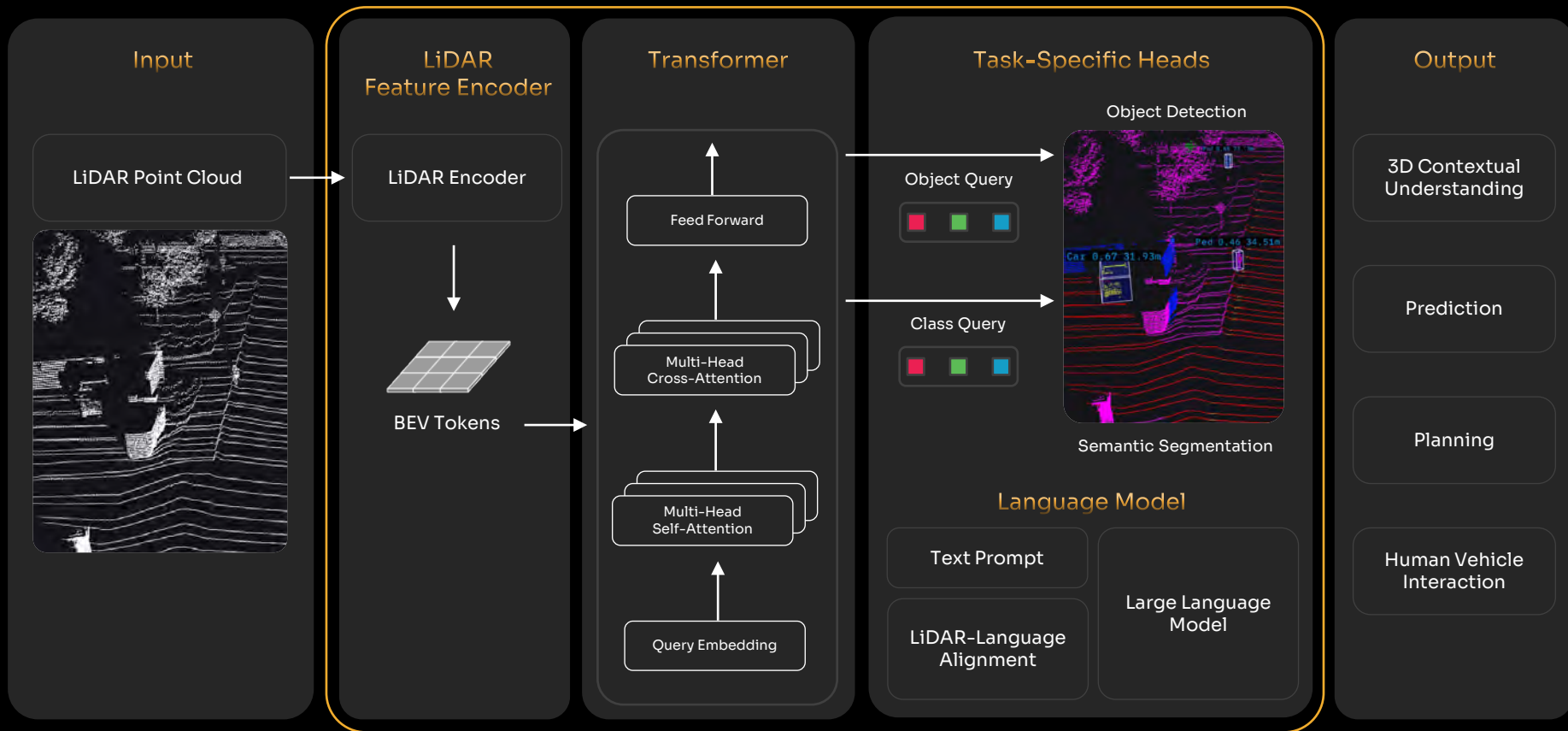


AI Agent



Q: Is there any safety hazard around my vehicle?  
A: Yes, there is a bicyclist bypassing from the left at 6 m ahead you. Another bicyclist is 17 m passing through. Pedestrians are walking around nearby. Please decelerate.

# AI Agent







**Qasar Younis**

Co-Founder and CEO  
Applied Intuition



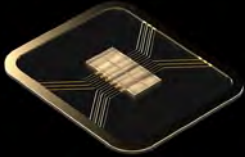


**Jason Eichenholz**

Chairman of Luminar Semiconductor, Inc.

Internal semiconductor powerhouse  
developing  
**next-gen lasers, receivers, & processing ASICs**  
to achieve **high performance and low costs**  
at a fundamental level

Designed and developed by  
**Luminar Semiconductor Inc.**



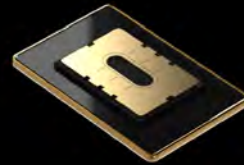
**Laser  
IC**

Gen 4 laser chip(InP)



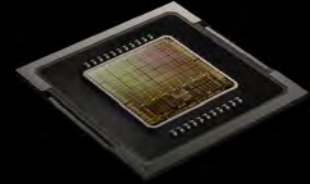
**Laser  
Driver**

Laser driver chip(Si)



**Detector  
IC**

New 5<sup>th</sup> gen receiver  
chip(InGaAs)



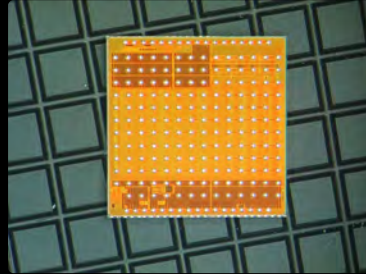
**Analog Processor/  
Mixed Signal ASIC**

5<sup>th</sup> gen signal  
processing chip(Si)

# Laser IC and Laser Driver



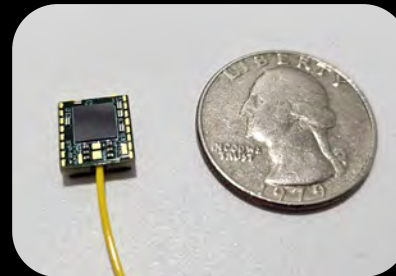
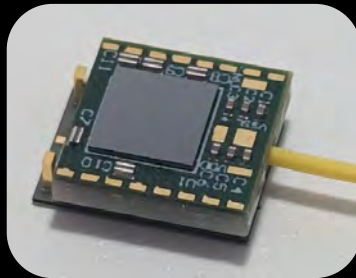
Gen 4 laser chip(InP)



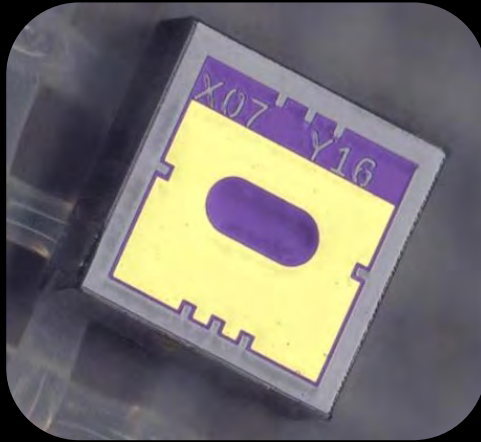
Laser driver chip(Si)



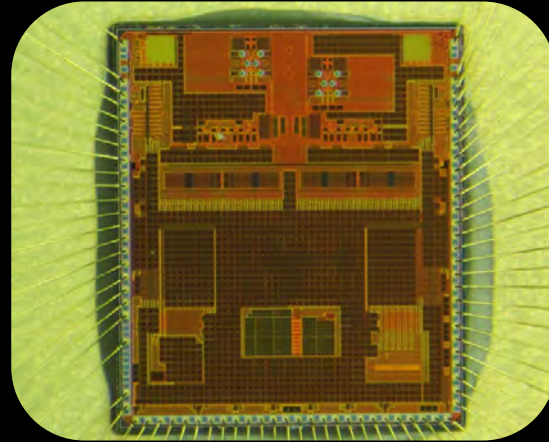
Integrated laser



# Detector IC | Analog Processor



New 5<sup>th</sup> gen receiver  
chip(InGaAs)

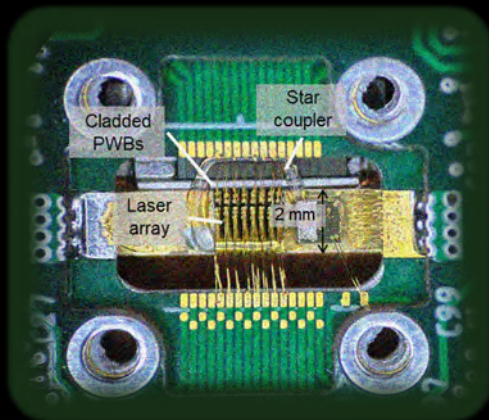


5<sup>th</sup> gen signal  
processing chip(Si)

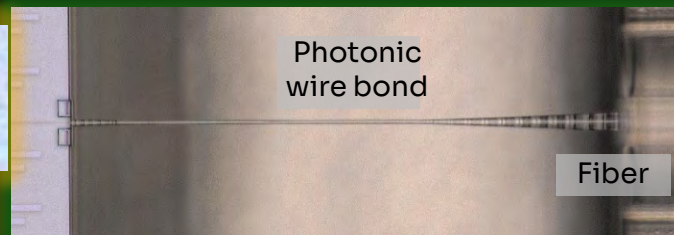
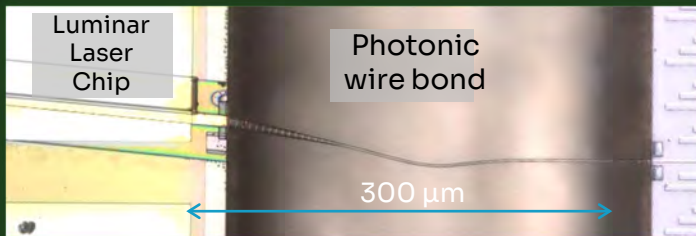


# Leveraging Luminar Semi Laser for Photonic GPU Interconnects

## Beginning Work With Top GPU Companies for AI Data Centers



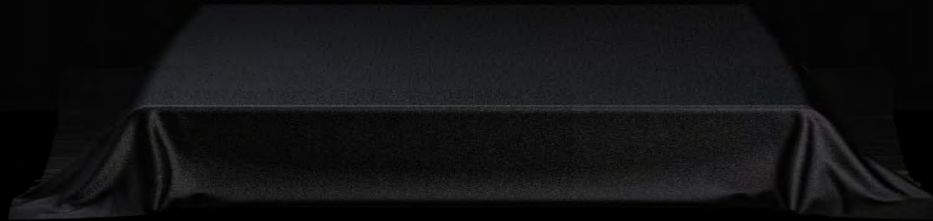
Luminar Semi 16- $\lambda$  Light Source





**Dr. Matthew Weed**  
Senior Director of Product

# Accelerating Mass Adoption



# The classic automotive scale priorities

**Cost**

at all costs

**Integration**

where convenient

**Performance**

what's left

# Inverting the classic automotive scale priorities

**Performance**

for desirable function

**Integration**

balancing function & design

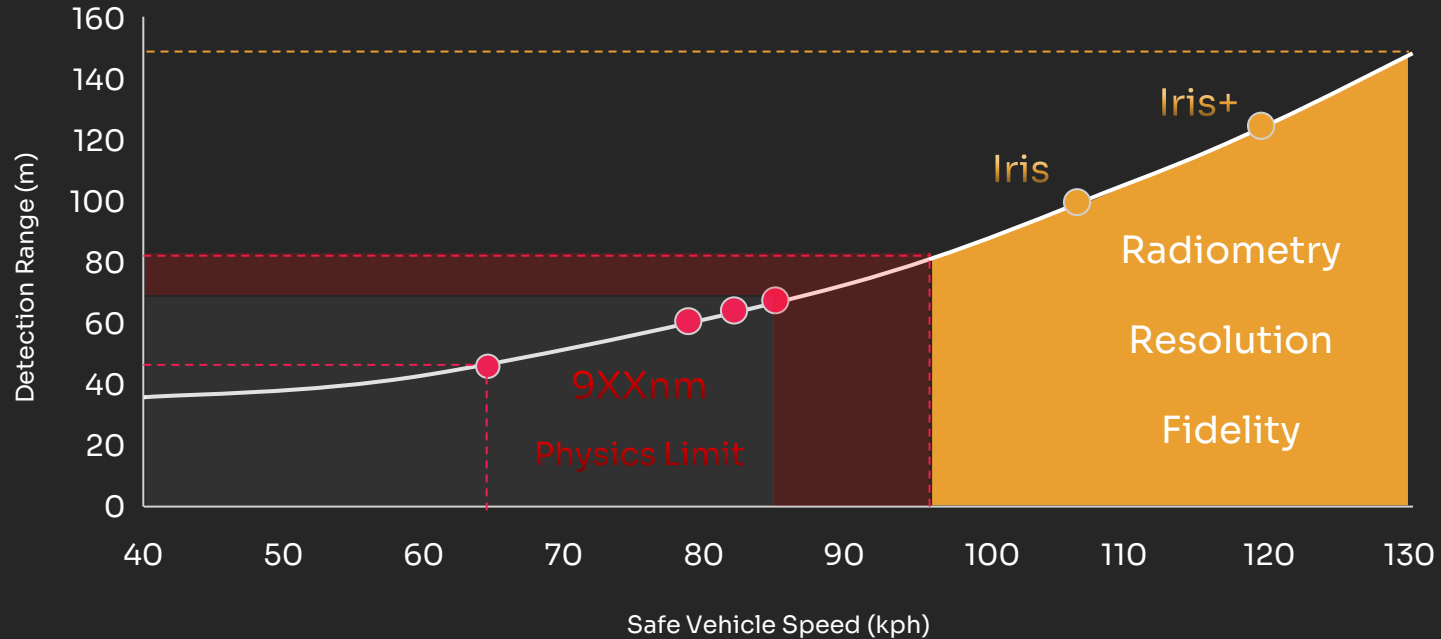
**Cost**

to optimize value






Luminar has spent a decade developing  
technology that delivers **the best performance**  
against **the most valuable use cases.**

# Enabling safe highway speed autonomy



# Detection Distance Benchmarking

Distance from LiDAR [m]	# of Points Collected by LiDAR		
	Competitor 1	Competitor 2	Luminar Iris
25	12	30	12
50	0 to 5 (NOT stable)	0 to 10 (NOT stable)	24
75	-	-	11
100	-	-	6
125	-	-	-
Example Picture @ 50m			



Availability

Clear Day

1550 nm



905 nm

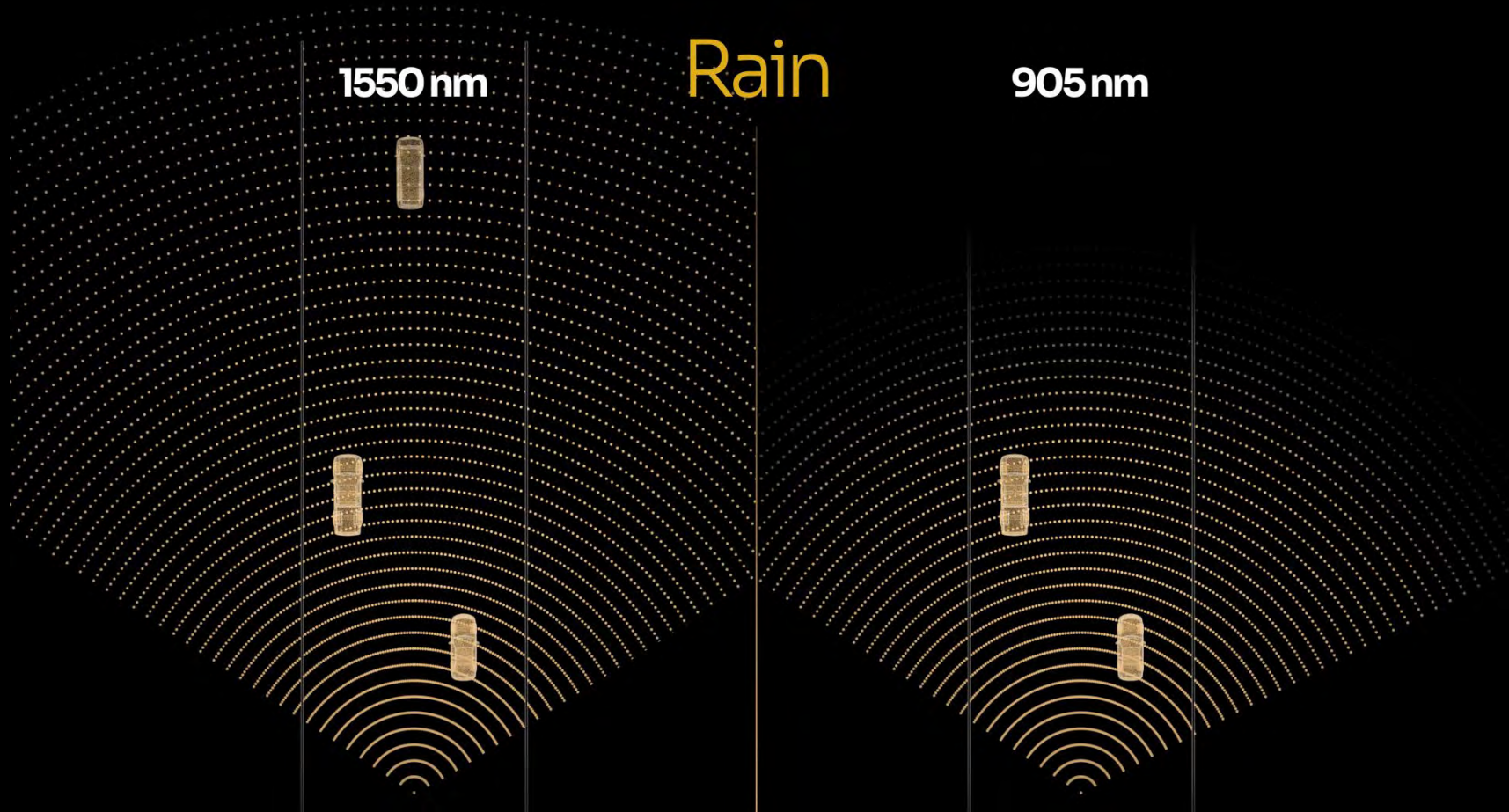


# Availability

## Rain

1550 nm

905 nm



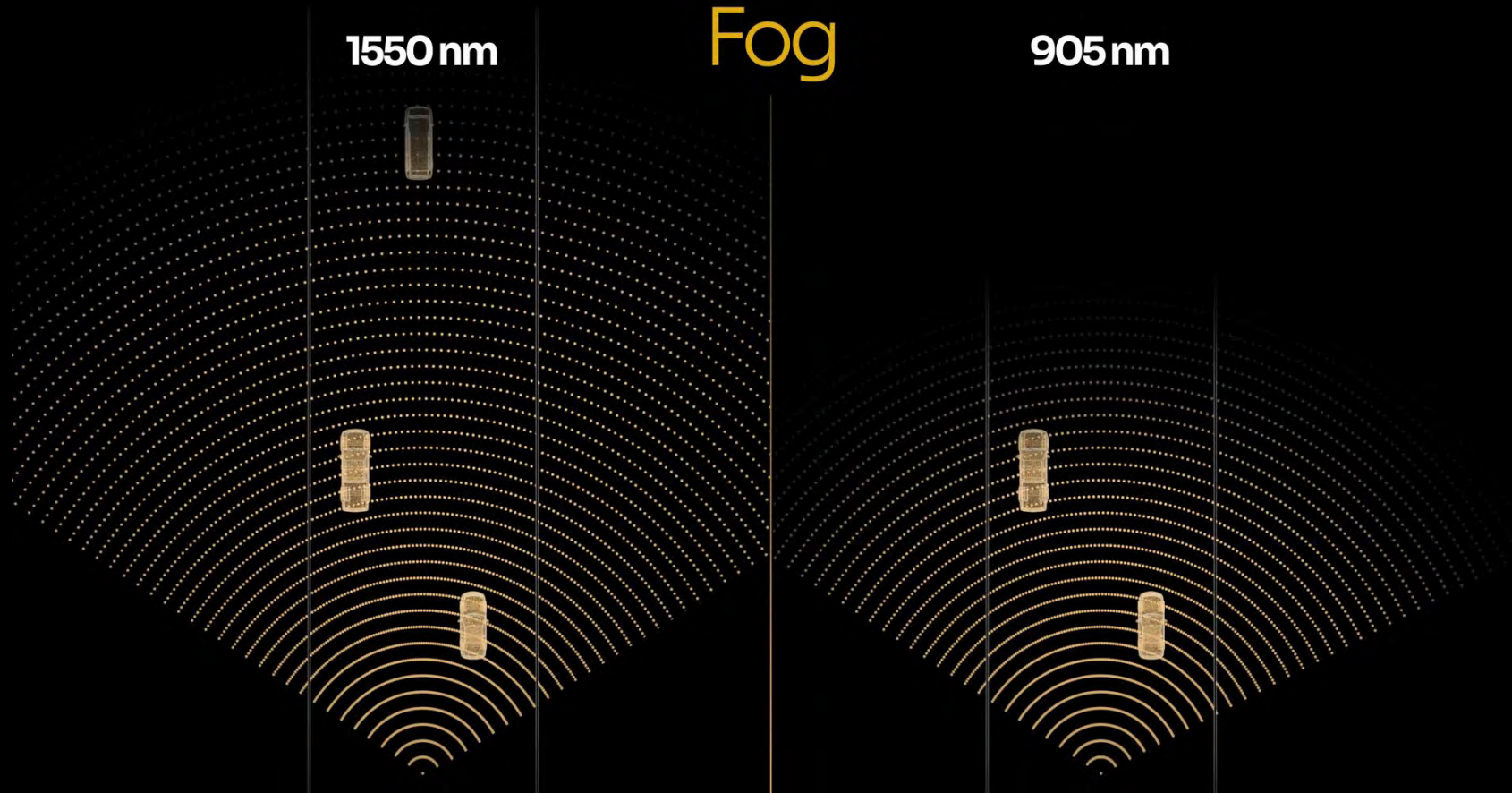


# Availability

## Fog

1550 nm

905 nm



Reducing **size and cost**, improving **performance**, preparing for **scale**



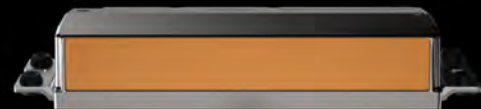
Model G-Series

Built for proof of concept



Hydra

Built for test and development



Iris

Built for series production



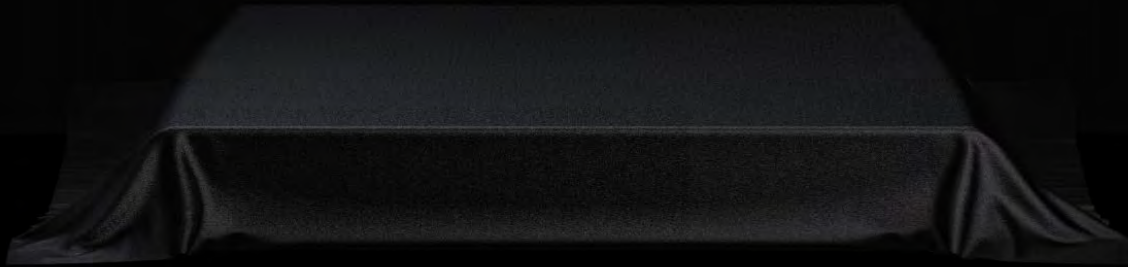


**Leo Hsieh**

President & CEO, TPK

Premium → Mainstream

Democratizing Safety





# Our Next-Generation LiDAR

Simplified Elegant Architecture

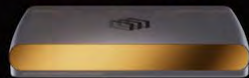
Leveraging Luminar Semiconductor Breakthroughs

Step-Function Improvements: Performance, Integration, Cost

Automated Assembly & Integrated Supply Chain

# SUPER

SMALL

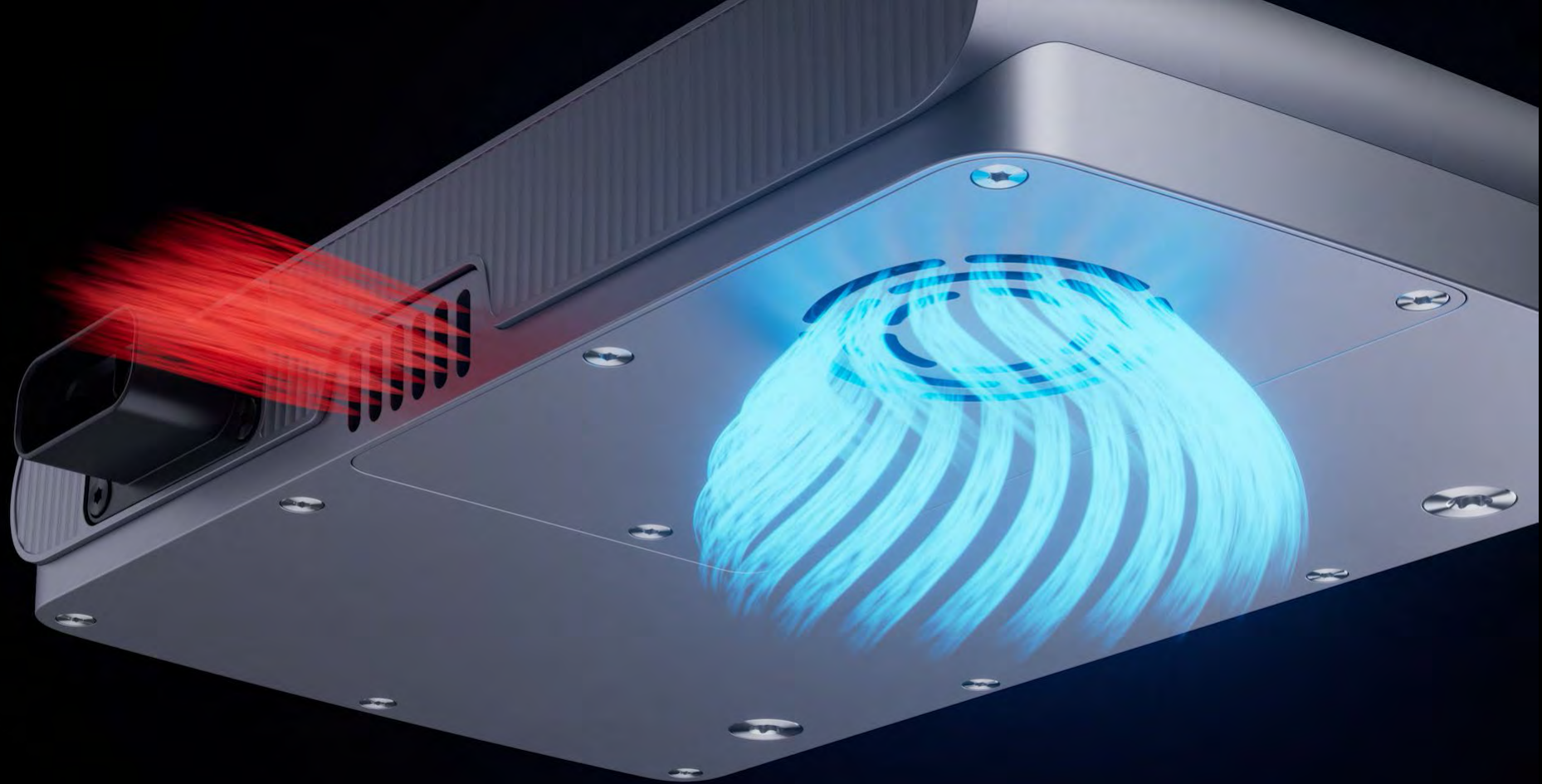


Nearly half the height of Iris  
and 1/3 volume



# ULTRA LIGHT

3x lighter than Iris



2x thermal efficiency



Aircraft grade aluminum

IP68 water resistant



# Luminar Halo integration improvements

Compared to Luminar Iris Family

3x

Smaller

3x

Lighter

2x

Thermal  
Efficiency

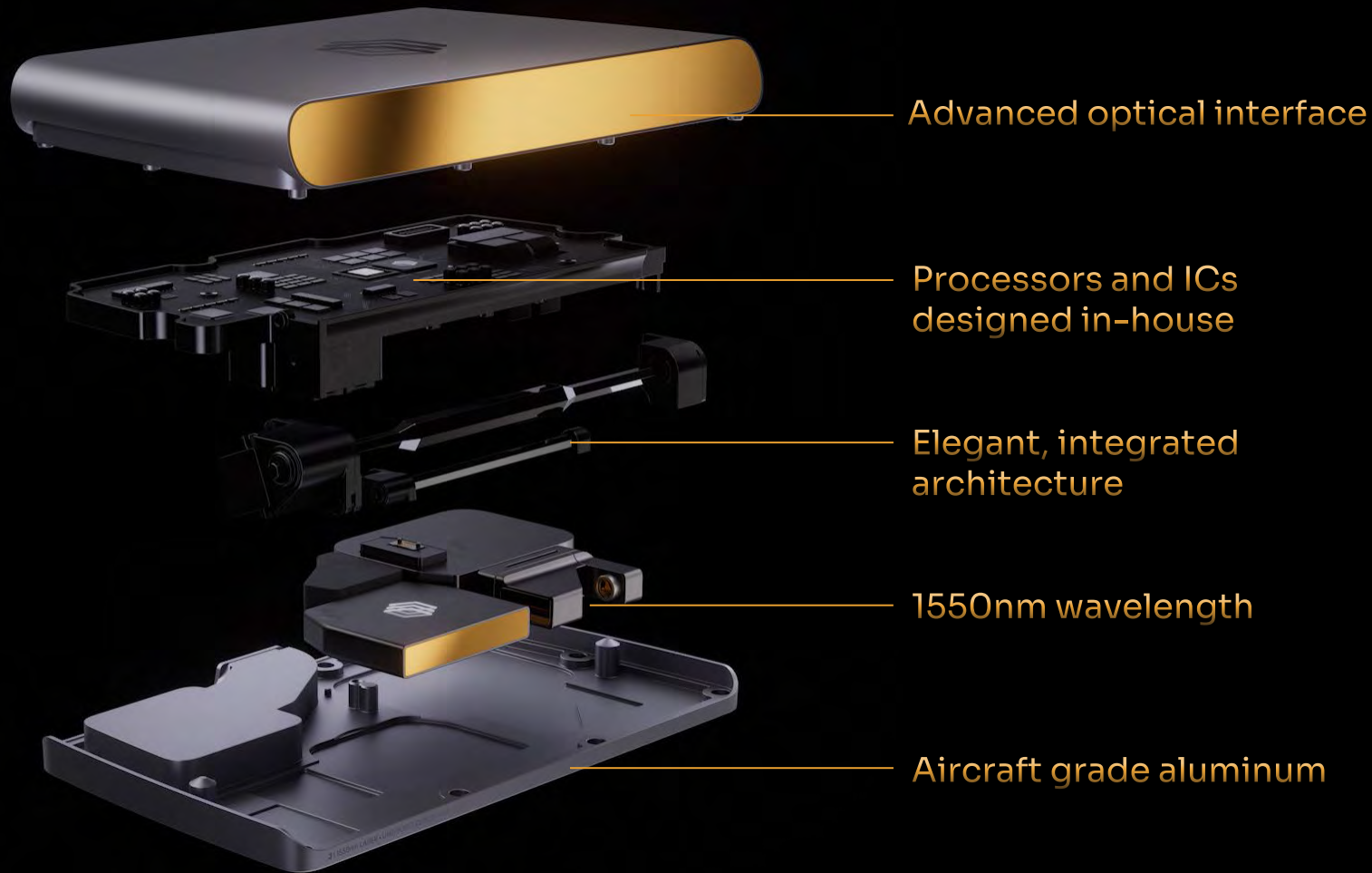


about

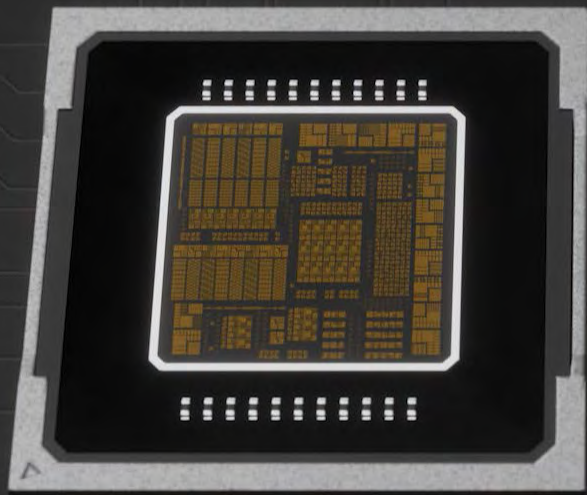
1 inch

1 kilogram

10 watts

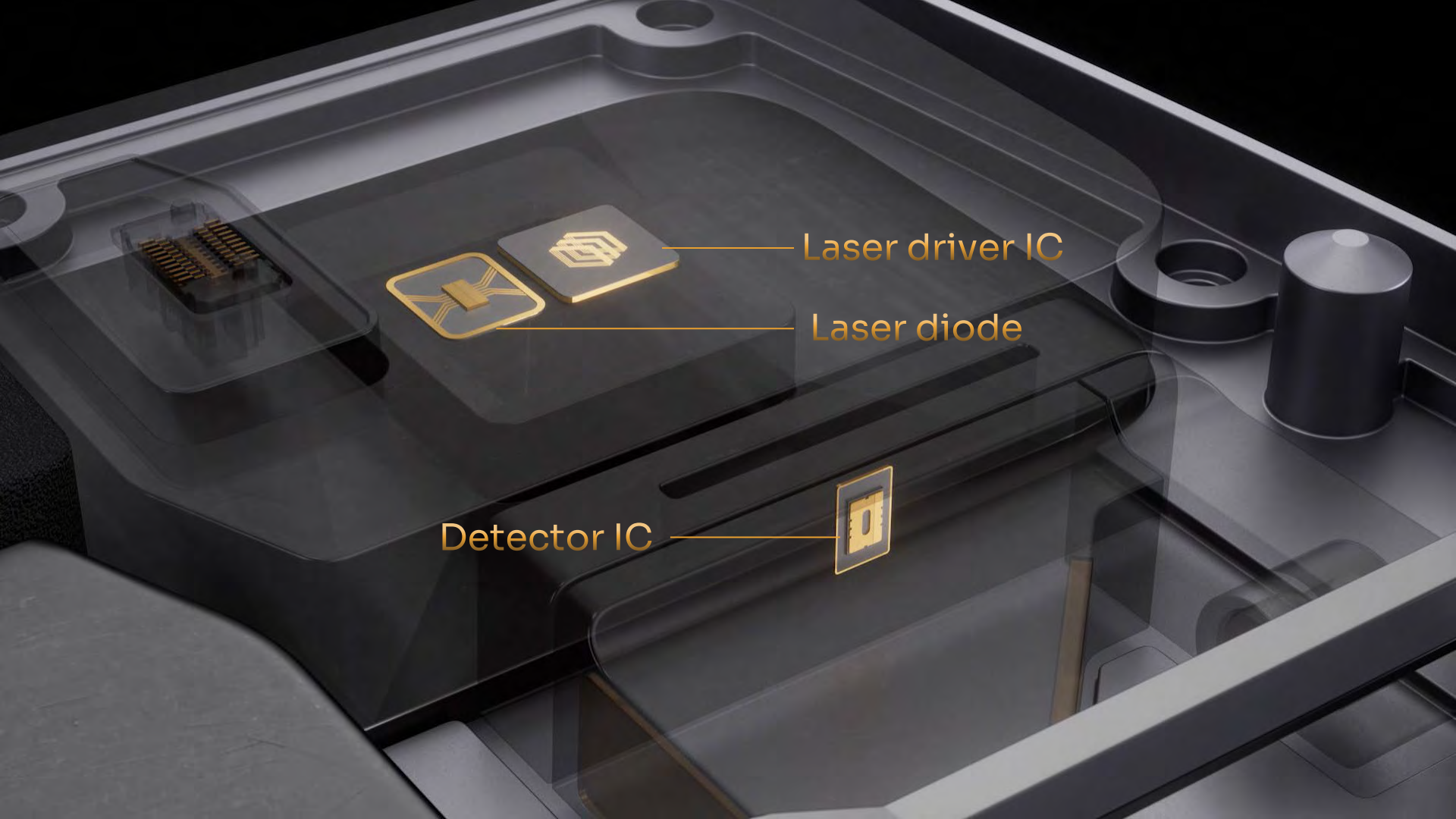


Analog Processor



Digital ASIC





Laser driver IC

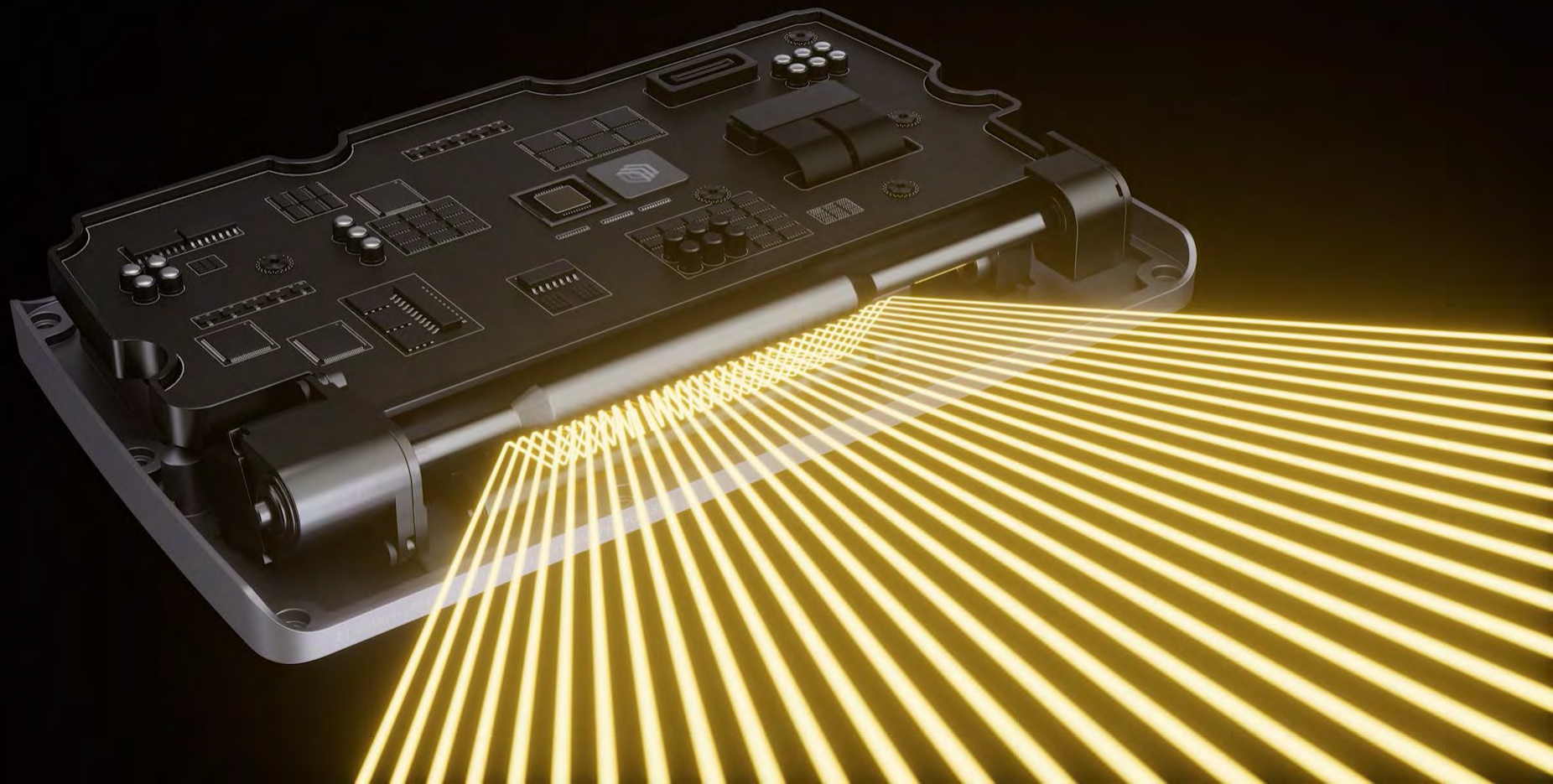
Laser diode

Detector IC



Designed and developed by  
**Luminar Semiconductor Inc.**





40x

Photon SNR improvement

4x

Improved performance  
compared to Iris

2x

Cost Improvement over Iris

Iris is designed for hundreds of thousands

**Luminar Halo is designed for tens of millions**



So sleek it can fit into all rooflines





Luminar Halo stands only **25mm** in height  
and just **16mm** once integrated



And now can be integrated  
seamlessly behind the windshield



## Integrated Camera Option

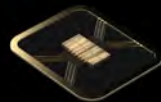
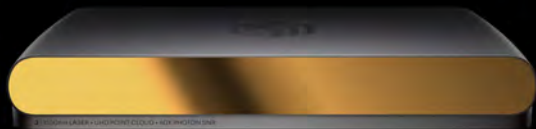
Zoom  
Camera  
(30° FOV)



Wide  
Camera  
(120° FOV)



# LUMINAR HALO



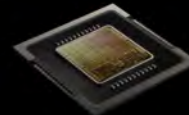
Laser  
Diode



Laser  
Driver IC



Detector  
Diode



Analog  
Processor



Digital  
ASIC

3X

Smaller

3X

Lighter

2X

Thermal  
Efficiency

2X

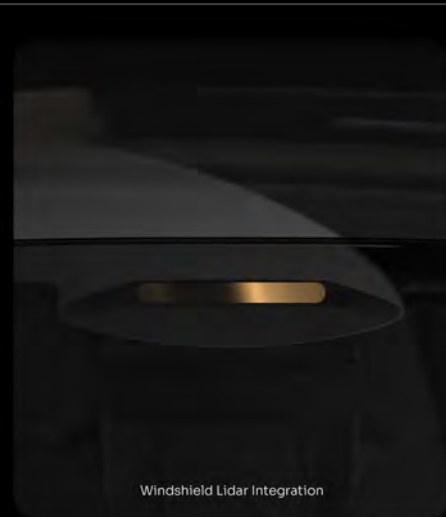
Cost Improvement  
over Iris

4X

Improved  
Performance

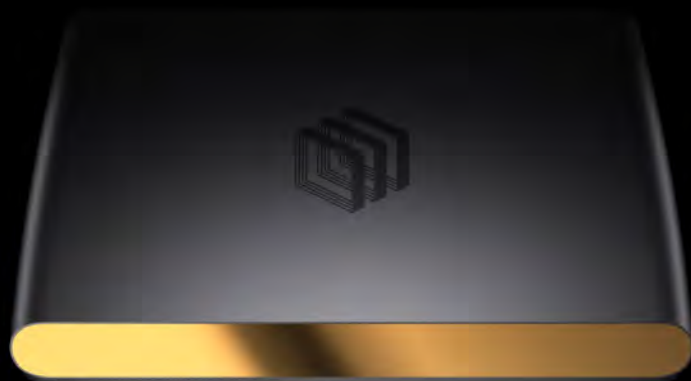


Roof Crown Lidar Integration



Windshield Lidar Integration

2026



This is just the start.

Saving  
100 million lives and  
100 trillion hours over the next  
100 years.







Luminar Day

A New Era  
Begins Today



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