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Putting the Brake on Accidents: AI-Powered Road Safety Solution

Durgadutt Nedungadi, SVP-International Business
Amit Kumar, Sr. Director-Marketing

Road Accidents: A major concern for India

2 Lakh

lives are lost every year from road crashes

3 Lakh

are critically injured or permanently disabled

~3%

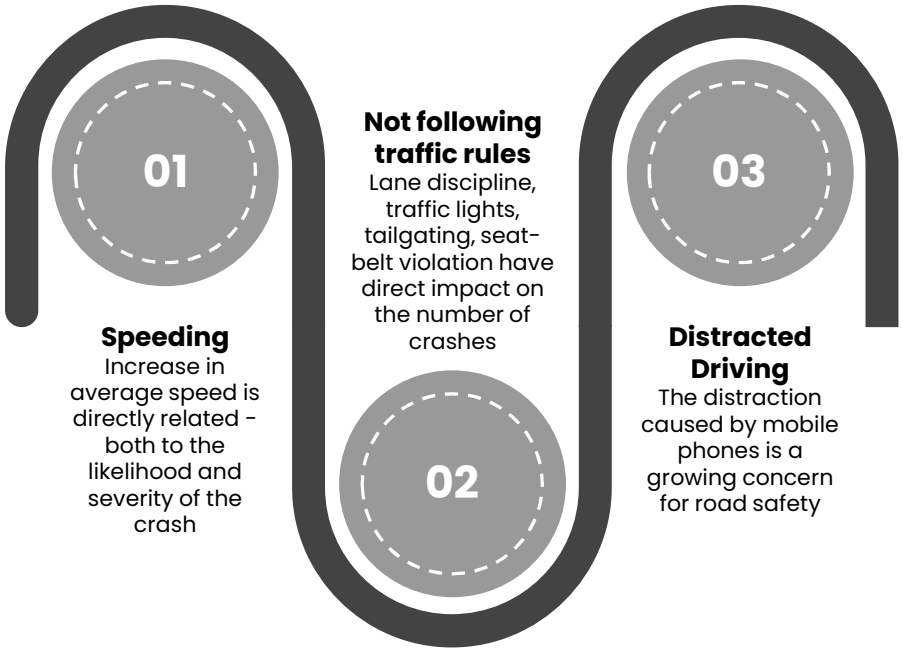
Cost to the GDP

Source:https://auto.hindustantimes.com/auto/news/india-cant-reduce-50-road-accidents-by-2024-due-to-shortcomings-nitin-gadkari-41686200900850.html

A large number of fatalities are the result of Human Error

80%

are preventable



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India is Electrifying

BY 2030

70%

Commercial Vehicles

40%

Busses

80%

2 Wheelers

30%

Private Cars

Source: Counterpoint

The Brussels Times

Electric cars involved in more accidents than regular vehicles, study shows

Sunday, 11 September 2022

Electric cars are involved in 50% more traffic accidents than their petrol and diesel counterparts, according to a study by insurer Axa.

The high number of accidents has actually nothing to do with the technology, but everything to do with the driving behaviour of the drivers. It is mainly the fast and sharp acceleration that surprises drivers, especially those new to the cars, and leads to accidents.

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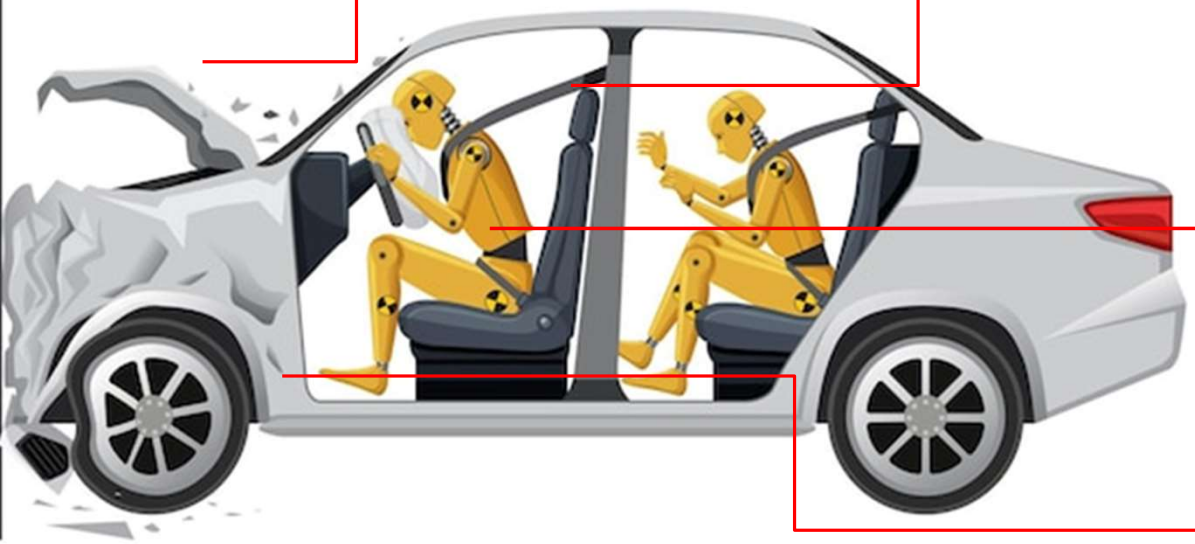
Driver Behavior is the KEY

Behaviors such as

Speeding
Following Traffic Rules,
Tailgating
Lane Departure

Seatbelt Compliance



Distracted Driving

Drowsy & Fatigue

Texting or talking on the phone

Hard Acceleration & Braking
Hard U-turn & High-G

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Leveraging Deep Tech to Revolutionize Road Safety

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Make-in-India Technology Start-Up

Netradyne's Driver•i® is the future of vision-based connected vehicle systems, improving driver behavior and fleet safety

Head Quarters
Bangalore & San Diego

2000+
Customers Worldwide

250K+
Vehicles Deployed

750+
Employees

18
Patents

10B+
Miles of Driving Data

Key Investors

Reliance Industries Limited

M12 MICROSOFT'S VENTURE FUND

SoftBank

Point72

HYUNDAI

Key headlines and coverages

Fleet safety startup Netradyne expects to see 100 pc growth by 2024

By Sujata Sangwan
May 06, 2022, Updated on : Fri May 06 2022 08:52:04 GMT+0530

Avneesh Agrawal
Co-founder & CEO, Netradyne

DECCAN HERALD
Friday
July 21, 2023

BUSINESS

11

Infosys cuts its FY24 revenue outlook, despite strong deal pipeline

But operating margin projection retained at 20-22%

Fin services arm demerged from RIL, with an Mcap of $20bn

It is already seen as a disruptor in the financial services space

Karnataka AAR reaffirms 18% GST to be charged on EV battery charging

Sebi allows MFs to introduce new categories under ESG scheme

National highway projects by government dips 37% in Q1

Aircraft lessor Avolon sees supply chain issues persisting into 2025

Adani to convert Dharavi into modern city despite challenges

DHINTERVIEW

Fleet safety is still an afterthought in India: Netradyne' Agarwal

THE TIMES OF INDIA

Date: Wednesday, November 2, 2022.

NETRADYNE: TECH THAT REDUCES ACCIDENTS, AND DRIVER DISTRACTIONS

Netradyne team

➤ **Avneesh Agrawal and David Julian,** two Stanford alumni, founded Netradyne in 2015 with the idea of improving driver and road safety. The founders together hold over 300 patents.

➤ **Netradyne offers IoT devices that use AI and computer vision technologies to enable a safer road transportation ecosystem.** Driveri, its proprietary device, has cameras that can simultaneously process both internal and external views of the vehicle, including detection of traffic signals, road-signs, and other vehicles while simultaneously monitoring the driver to determine drowsiness, distraction, and verify that the driver is wearing a seat belt. These data points are analysed in real-time and benefits fleet managers in boosting safety, reducing operational cost, and improving driver retention.

➤ **Customers have reported that Driveri technology has reduced the number of dangerous incidents and accidents by up to 30-40%,** and the number of distracted driving incidents by about 80%. Netradyne has collected, processed, and analysed over 15 billion drive minutes, 5 billion miles of driving data, and 600 million violation alerts to date. The company believes that this huge amount of data can help policy makers, road transport agencies, and OEMs in building the foundation of tomorrow's transport ecosystem.

➤ Avneesh and David have raised over $200 million from investors including Reliance, Softbank, Point 72, M12 (Microsoft Ventures), and Hyundai. **The company has crossed an annual recurring revenue of Rs 600 crore,** and says they will cross Rs 1,000 crore in 2022-23.

➤ In just seven years, the company has started commercial operations in the US, Canada, UK, Australia, New Zealand, and India, while having major R&D and manufacturing driven out of India.

Forbes INDIA

BRAND CONNECT

ENABLING SAFE TRANSPORTATION WITH AI-POWERED SOLUTIONS - A CASE STUDY BY NETRADYNE AND WRITER SAFEGUARD

Technology is playing a vital role in the Government of India's efforts to reduce road accidents, thus, aligning with the nation's vision for safer roads." Durgadutt Nedungadi, SVP – India & International Business, Netradyne

"We are glad to contribute towards making Indian roads safer by leveraging next-gen technologies in our fleets" Manosh Bhattacharya, Country Head, Writer Safeguard

TRANSTOPICS

India's only transport weekly commanding largest circulation

VOLUME LX, NO 05, THURSDAY, July 27, 2023. PRICE Rs 25

Netradyne conferred with the FICCI Road Safety Award

Hendrickson Launches Air and Mechanical Suspensions and Axles for Trailer Applications in India

First-ever knowledge report on Indian Part Truck Load sector released amidst an august gathering

Valvoline™ and Eicher Extend Exclusive Partnership, Strengthening Customer Trust and Driving Innovation in the Commercial Vehicle Industry

THE ORIGINAL ENGINE OIL

Technology with a Purpose

driver·i

powered by

netradyne

Driver•i™

Vision-based Driver Safety System

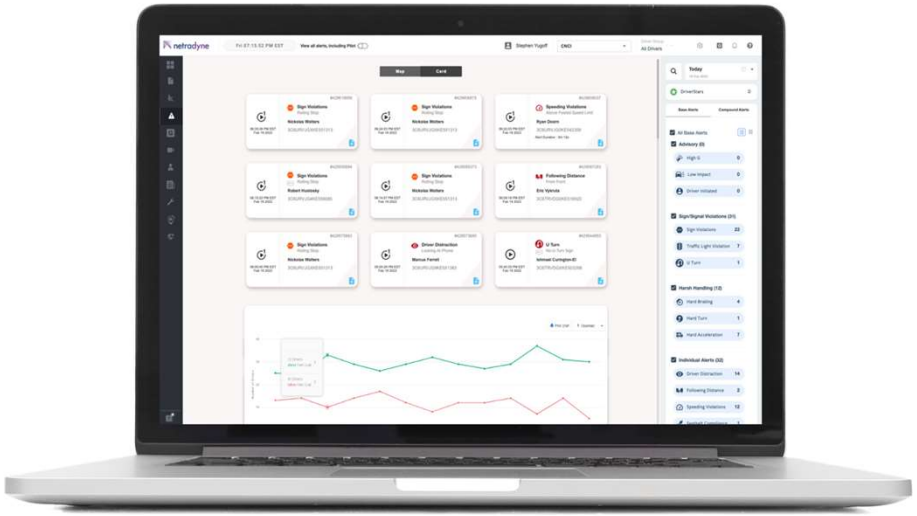
AI processor
Deep Learning Processor

Storage
Up to 80-200 Hours of Video on device

Dual/Quad HD Cameras
220 Degree,
85+ dB HDR

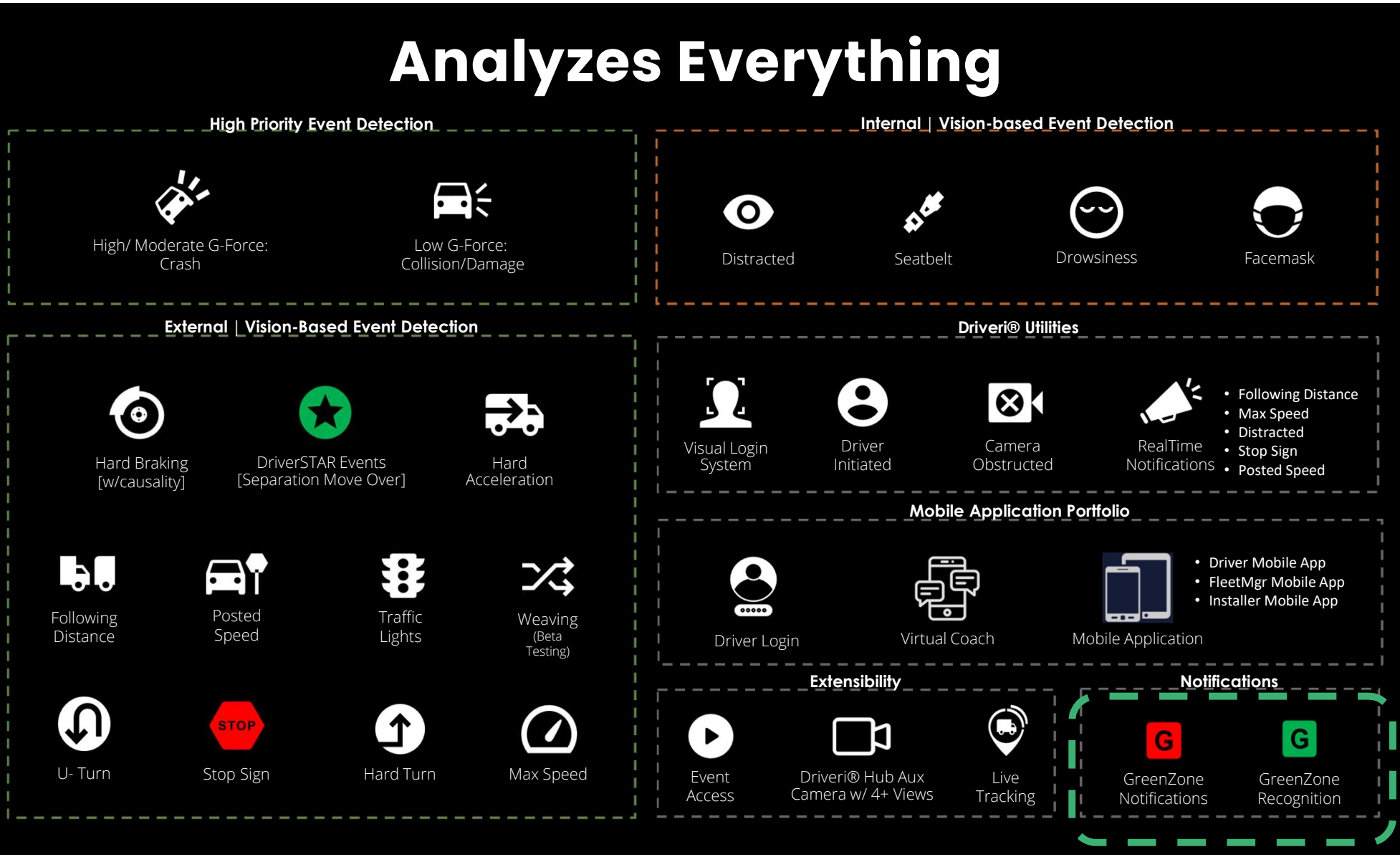
Communication Channels
4G LTE / Wi-Fi / BT / GPS
Integrated with CAN Bus (J1939/OBD II)

Inertial Sensors
Accelerometer, Gyro, and Magneto sensors



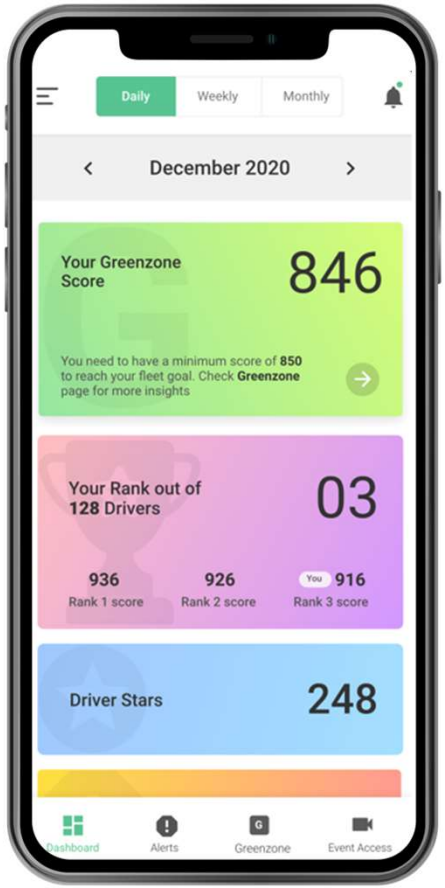
Driver•i™ uses **Edge Computing** to analyze every second of driving

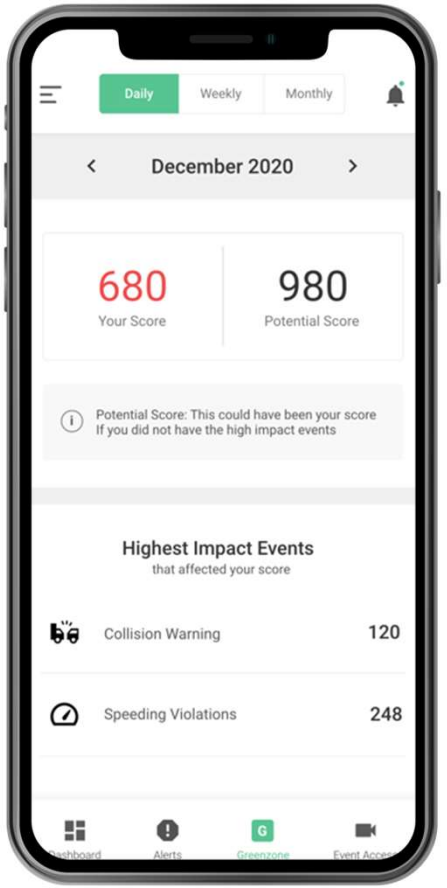
Analyzes Everything



GreenZone® - Scientific Approach to measure Driver Behavior

- GreenZone® score is a complex algorithm that calculates weighted scores based on events throughout the driving day
- Compares driver's score to fleet's average and notifies drivers of milestones and enables gamification
- Drivers use feedback to improve performance and increase their score
- Scores provide an easy way for managers to reward drivers with bonuses





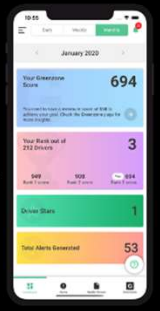
Driver Communication & Coaching

DRIVERI CAPTURES & ANALYZES 100% OF DRIVING TIME

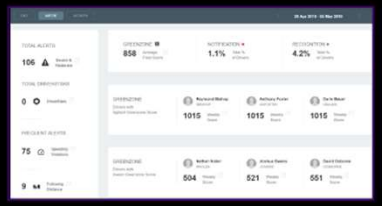
In-Cab Alerts

Driver App

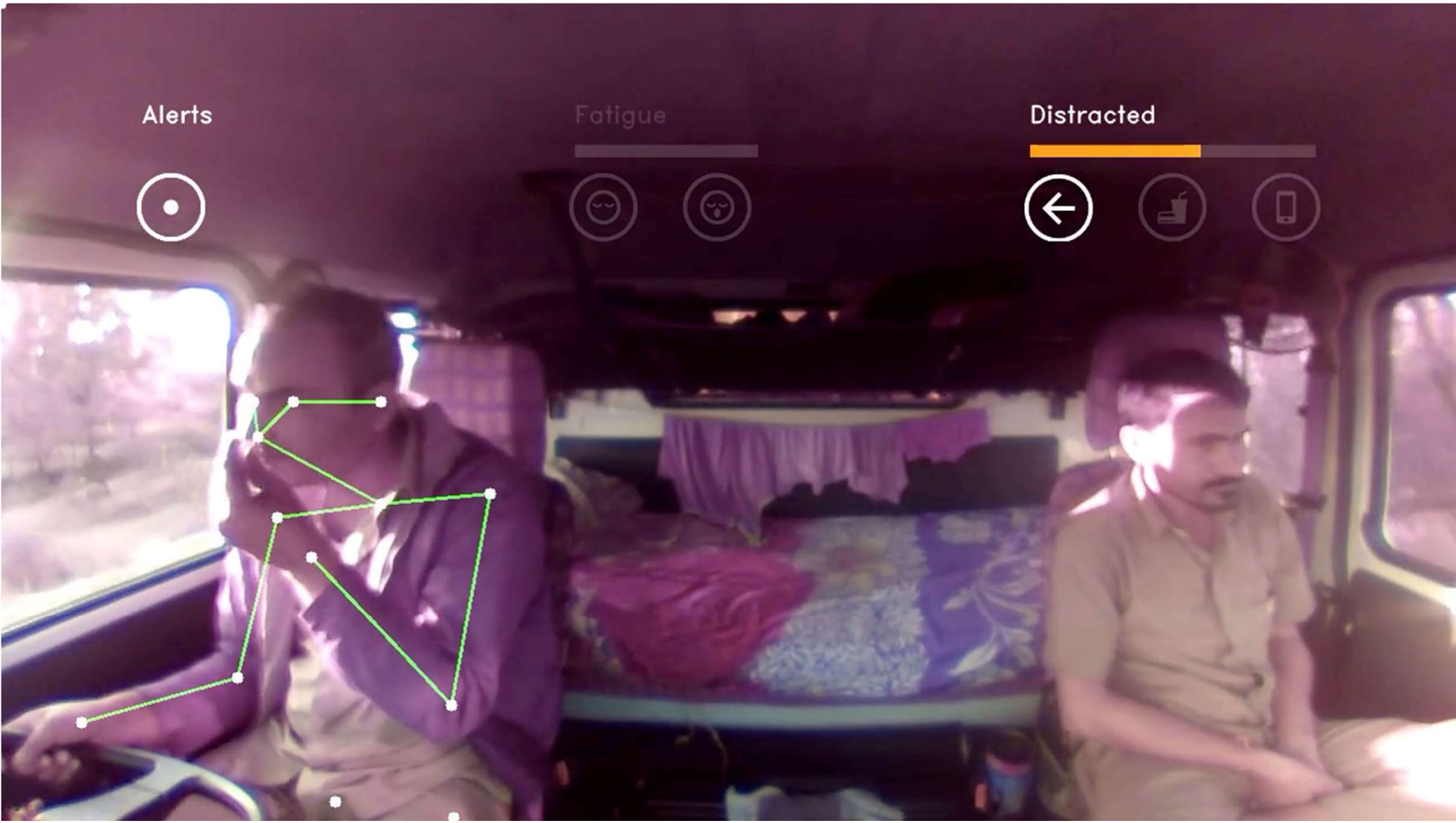
Management App/Portal



Virtual /Self Coaching



Manager/Driver Review


Alerts
Fatigue
Distracted

Feb 13 2020 (Thu) 12:32:31 AM IST
7KPH (Limit: -1KPH)
+0.75G
BKWD|LEFT
-0.75G
FWD|RIGHT

Jul 14 2020 (Tue) 05:53:13 PM IST
38KPH
4.4s
5.0s
5.7s
+0.75G
BKWD|LEFT
−0.75G
FWD|RIGHT

Jan 08 2023 (Sun) 04:01:12 PM IST
25KPH
4.3s
6.8s
PHILIPS
+0.75G
BKWD|LEFT
−0.75G
FWD|RIGHT

Feb 14 2020 (Fri) 02:37:04 PM PST
12MPH (Limit: 35MPH)
+0.75G
BKWD|LEFT
-0.75G
FWD RIGHT

Make In India.....for the World

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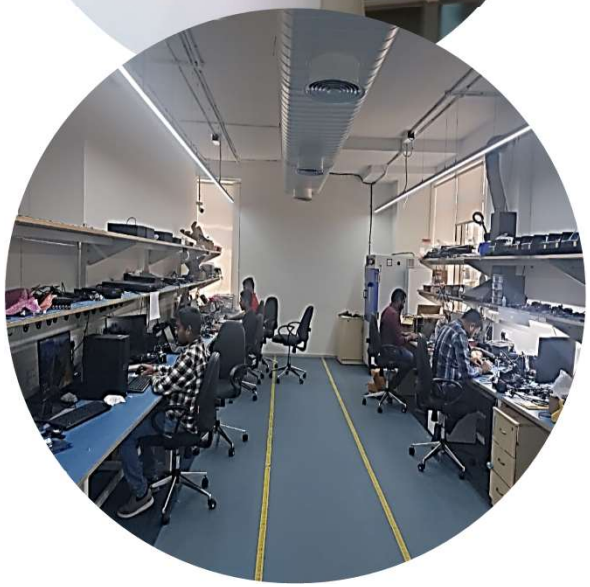
Entire Designing and R&D is in-house

- 500+ engineering resources in Bangalore
- State of the art manufacturing facility in Gurgaon



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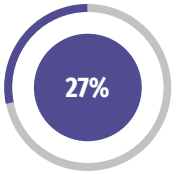
IISc Study with ZoomCar Reported a 51% Reduction in the Speeding Behavior

500

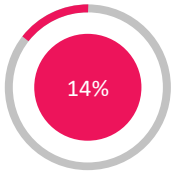
Zoomcars equipped with Driver•I

52k trips over 1 year
250 vehicles with alerts activated
10.6 million miles
5 lakh driving hours



27% decline seen in 6 of the 20+ driving metrics analysed by Driver•I

Metrics included: speeding, acceleration, hard braking, hard turning, collision warning and maintaining distance



Cars with voice-activated alerts compared to those without audio alerts showed a 14% reduction in accidents

RESULTS WITH OUTWARD FACING FUNCTIONALITIES ONLY

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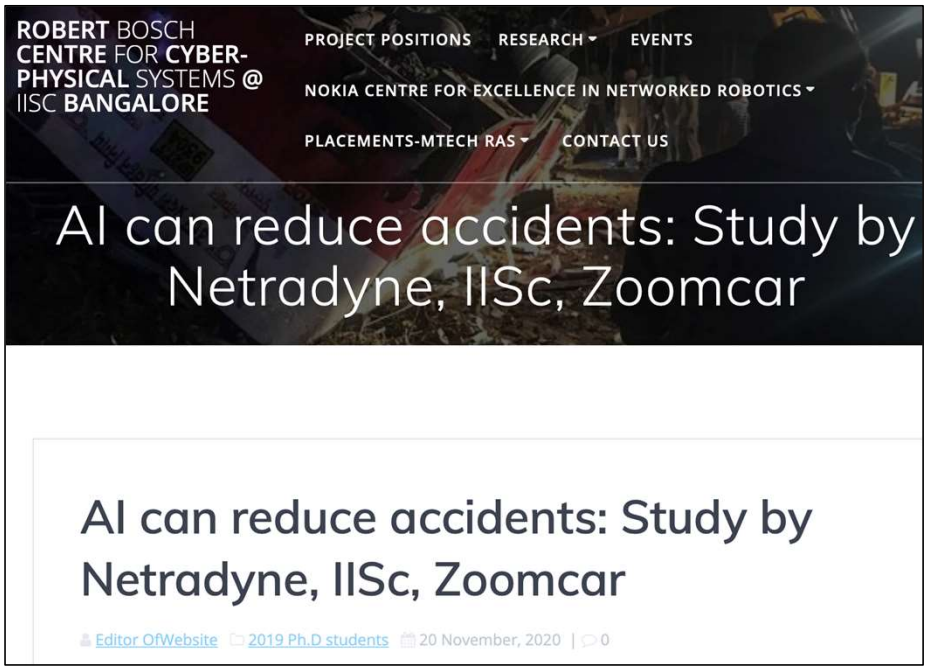


https://www.deccanherald.com/city/top-bengaluru-stories/ai-can-reduce-accidents-study-by-netradyne-iisc-zoomcar-917301.html

Vehicles Across Segments Are Leveraging it Already

FARM HOUSE
FARM LAND
SALE
CMR UNIVERSITY
9342900666
CASBY

CNBC

Forbes India
322,695 followers
4w · Edited

Is it possible for technology to contribute a 50% reduction in road accidents?

An Indian cash management company, Writer Safeguard, claims to have achieved this through the use of Netradyne's AI-based fleet and driver safety solutions.

In addition, by utilizing the GreenZone Driver Scoring System, the company can analyse every second of driving, and build an ecosystem of rewarding good practices while having automated coaching for the ones who need to get better.

Enabling Safe Transportation With AI - Powered Solutions | Forbes India
forbesindia.com

Forbes INDIA

BRAND CONNECT

ENABLING SAFE TRANSPORTATION WITH AI-POWERED SOLUTIONS - A CASE STUDY BY NETRADYNE AND WRITER SAFEGUARD

Road accidents are a major public concern in developing countries and India is no exception. Reports find that the country accounts for nearly 11% of road accidents globally, with more than 1.53 lakh deaths recorded in 2021. The government aims to work towards reducing road accidents by 50% over the next two years, ably supported by applying technological solutions.

With a similar vision in mind, two futuristic executives from Qualcomm, Avneesh Agrawal and David Julian, incorporated Netradyne in 2015. The startup harnesses the power of Computer-Vision and Edge-Computing to revolutionize the modern-day transport ecosystem. The result is their flagship product, Driver•i™, which captures every second of driving, both inside the cabin as well as outside, on the road. This is similar to the autonomous vehicle technology, however, in this scenario, the control remains with the driver.

Driver•i™ detects road signs, traffic lights, weather conditions, and other vehicles on the road, while also analysing driver behaviour, drowsiness, fatigue, and several other parameters which lead to accidents. In addition, fleet managers are provided a cloud dashboard to monitor individual driving behavior and related trends, as well as the overall fleet performance across various safety and compliance protocols. The company also introduced the industry's first driver scoring system, the GreenZone. This assigns scores based on driving indicators and helps fleet owners identify good drivers and those who require coaching.

Writer Safeguard, one of India's foremost cash management companies, was looking to enhance its driver and van safety standards to ensure that it serves world class services to its customers. It operates more than 1,600 cash vans that service over 23,000 ATMs and more than 20,000 retail points across the country. The company's cash vans are constantly on the road and are prone to accidents that can be attributed to unsafe driving practices including impaired reaction time stemming from fatigue, over-speeding, and tailgating.

In addition to road accidents, Manosh Bhattacharya, Country Head, and Prashant Joshi, Chief Operating Officer with Writer Safeguard, were keen to use the technology to address other operational challenges. They intended to be assured that the cash is safe and accounted for, while being compliant with MHA and RBI norms for cash carrying vehicles.

> *Technology is playing a vital role in the Government of India's efforts to reduce road accidents, thus, aligning with the nation's vision for safer roads." Durgadutt Nedungadi, SVP – India & International Business, Netradyne*

In 2022, as part of phase-1 of their engagement with Netradyne, Writer installed Driver•i™ in about 50% of their vehicles. The device captured and analysed several hundred data-points using sensors and vision-based technology. Within six months of deployment, Writer reported a tangible impact on KPIs set for this partnership including a 50% reduction in accidents. The company has been able to imbibe a culture of safe driving amongst their drivers.

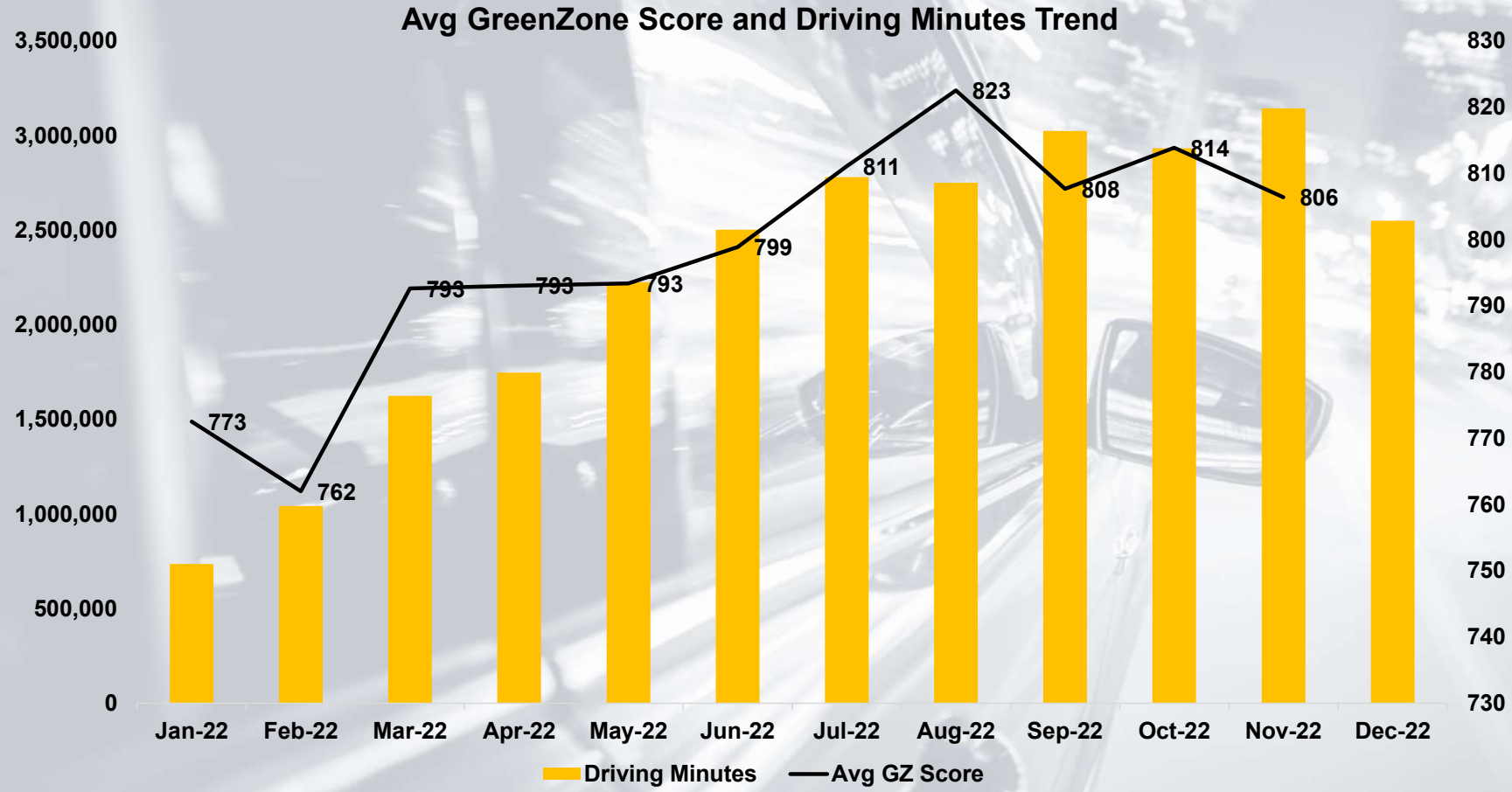
A colossal drop of 74% in drowsy driver instances was experienced, along with a 38% reduction in distracted driving. GreenZone scores have significantly improved with the help of automated, virtual and in-person coaching enabled by Driver•i™.

Netradyne's smart cameras also provide an extra layer of security to Writer's safety protocols. As a result, the company was able to track its cash van during an attempted theft.

As traffic density increases, with it grows the number of road accidents. The adoption of technologically robust safety systems, like Netradyne's Driver•i™, have become essential to bring about a decrease in road accidents.

> *"We are glad to contribute towards making Indian roads safer by leveraging next-gen technologies in our fleets" Manosh Bhattacharya, Country Head, Writer Safeguard*

GreenZone Score Enables the Culture of Safe Driving



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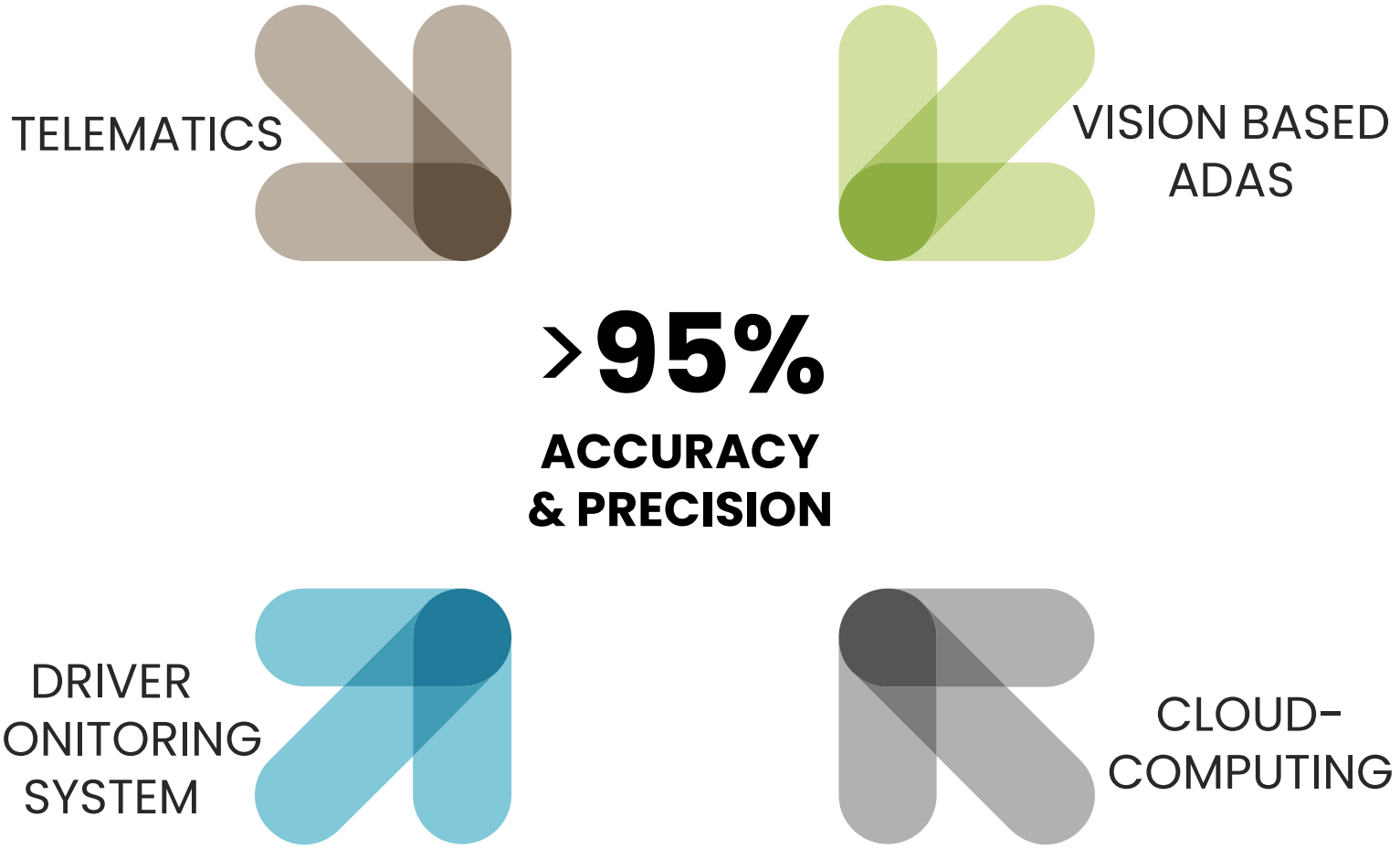
Early Adopters in India

India needs Proven Make-In-India Technology to Achieve the Goal of 50% Reduction in Accidents



Game-Changing Technology
Slashes Road-Accidents by
50%

Thank you

Netradyne-VVDN Manufacturing Facility

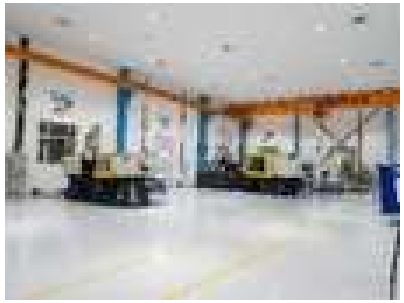
Global Innovation Park
SMT Facility, Product Assembly Lines, Testing Labs

Mechanical Innovation Park
Mechanical Design, Tooling for Die casting, Sheet metal and Injection molds, Injection Molding Production

Die Casting Park
Pressure die casting for aluminum, Prototype Manufacturing, Powder Coating

Entire Design, R&D, and Development is in-house
- 500+ engineering resources in Bangalore
- State of the art manufacturing facility in Gurgaon

Product Manufacturing Park
Product Assembly Lines



Manufacturing Facility overview

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SMT

- 10 SMT Lines
- PoP Chip mounting and Fine Pitch BGA Capability, Rated CPH 750,000+ Robust Inspection: In-line - 3D AOI, In Line -3D SPI, X-Ray and Dot Dispensing, Conformal Coating
- SMT Environment: Clean room
- Controlled Nitrogen environment in Reflow Oven
- De-panelling setup

MECHANICAL PRODUCTION

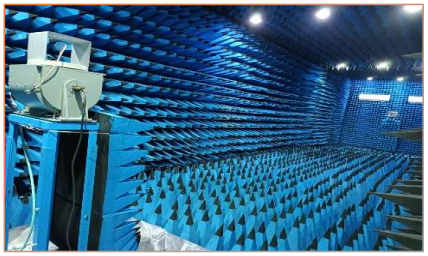
- Mold Making, Sheet Metal, Injection Molding, Die Casting, Machining, Powder Coating

ASSEMBLY & TESTING

- Dedicated assembly lines
- Production Test Setup, Automation, OTA and Air Leakage Testing
- Multiple Wireless I/F Testing
- ICT & FCT machine

RELIABILITY TESTING

- Thermal, UV/Solar, Vibration, IP, Salt Spray, and Mechanical Shock Testing



Product Assembly & Testing Line

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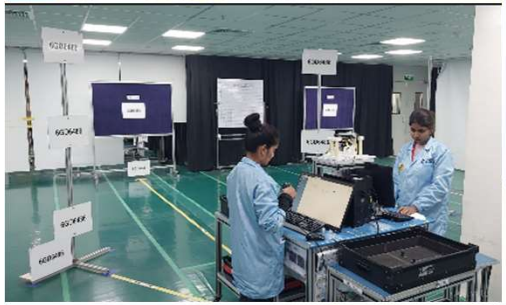
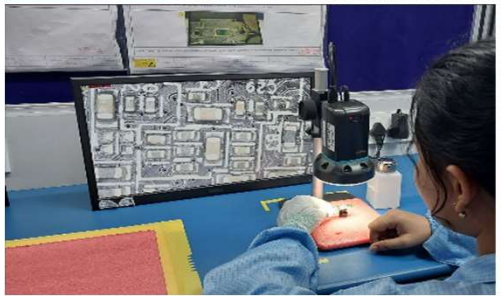
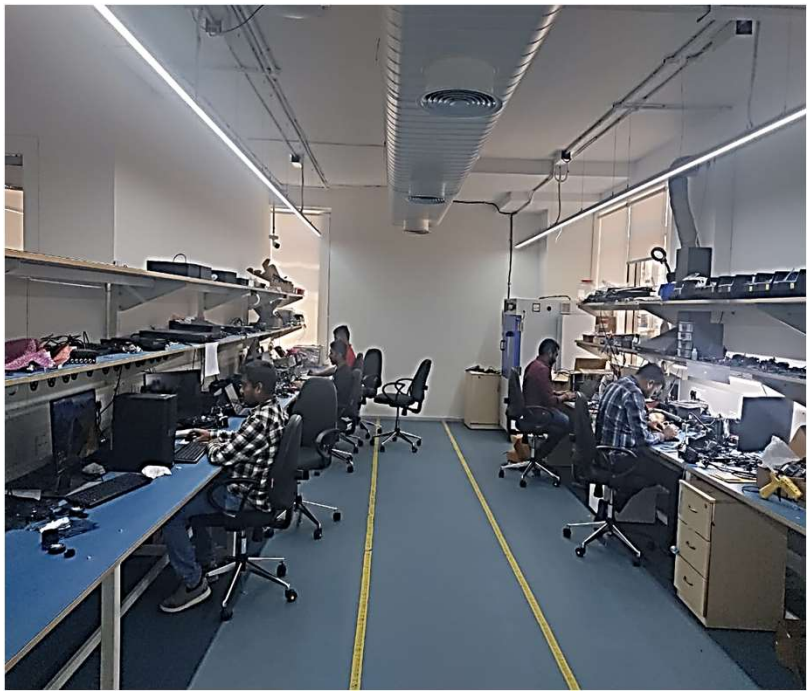




Netradyne Testing Facilities

Environmental testing simulates the different climatic conditions and mechanical stress that products are exposed to during their lifetime. Environmental testing will expose weaknesses in a product's design or performance that could occur in service, particularly at extreme levels.



Environmental chamber
(-15 to + 90) C

Vibration tester
(3-Axis up to 600 kgf)

* Sequence and duration of the test differs product to product

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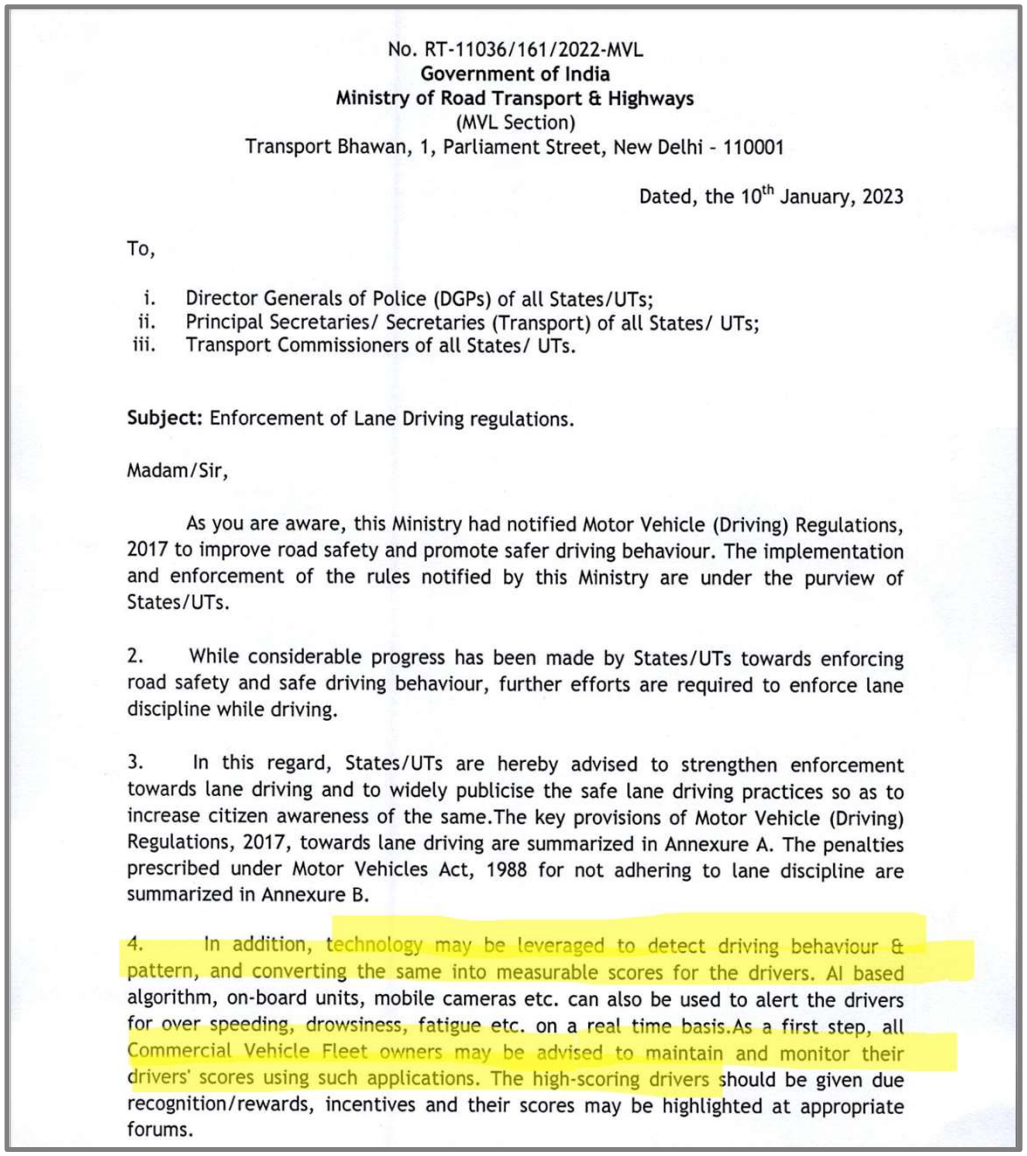
Where can India make a Quick Difference



No. RT-11036/161/2022-MVL
Government of India
Ministry of Road Transport & Highways
(MVL Section)
Transport Bhawan, 1, Parliament Street, New Delhi - 110001

Dated, the 10th January, 2023

To,

i. Director Generals of Police (DGPs) of all States/UTs;
ii. Principal Secretaries/ Secretaries (Transport) of all States/ UTs;
iii. Transport Commissioners of all States/ UTs.

Subject: Enforcement of Lane Driving regulations.

Madam/Sir,

As you are aware, this Ministry had notified Motor Vehicle (Driving) Regulations, 2017 to improve road safety and promote safer driving behaviour. The implementation and enforcement of the rules notified by this Ministry are under the purview of States/UTs.

2. While considerable progress has been made by States/UTs towards enforcing road safety and safe driving behaviour, further efforts are required to enforce lane discipline while driving.

3. In this regard, States/UTs are hereby advised to strengthen enforcement towards lane driving and to widely publicise the safe lane driving practices so as to increase citizen awareness of the same.The key provisions of Motor Vehicle (Driving) Regulations, 2017, towards lane driving are summarized in Annexure A. The penalties prescribed under Motor Vehicles Act, 1988 for not adhering to lane discipline are summarized in Annexure B.

4. In addition, technology may be leveraged to detect driving behaviour & pattern, and converting the same into measurable scores for the drivers. AI based algorithm, on-board units, mobile cameras etc. can also be used to alert the drivers for over speeding, drowsiness, fatigue etc. on a real time basis.As a first step, all Commercial Vehicle Fleet owners may be advised to maintain and monitor their drivers' scores using such applications. The high-scoring drivers should be given due recognition/rewards, incentives and their scores may be highlighted at appropriate forums.

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Technology may be leveraged to detect driving behaviour & pattern and converting the same into measurable scores for the drivers.

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Strong Adoption in India

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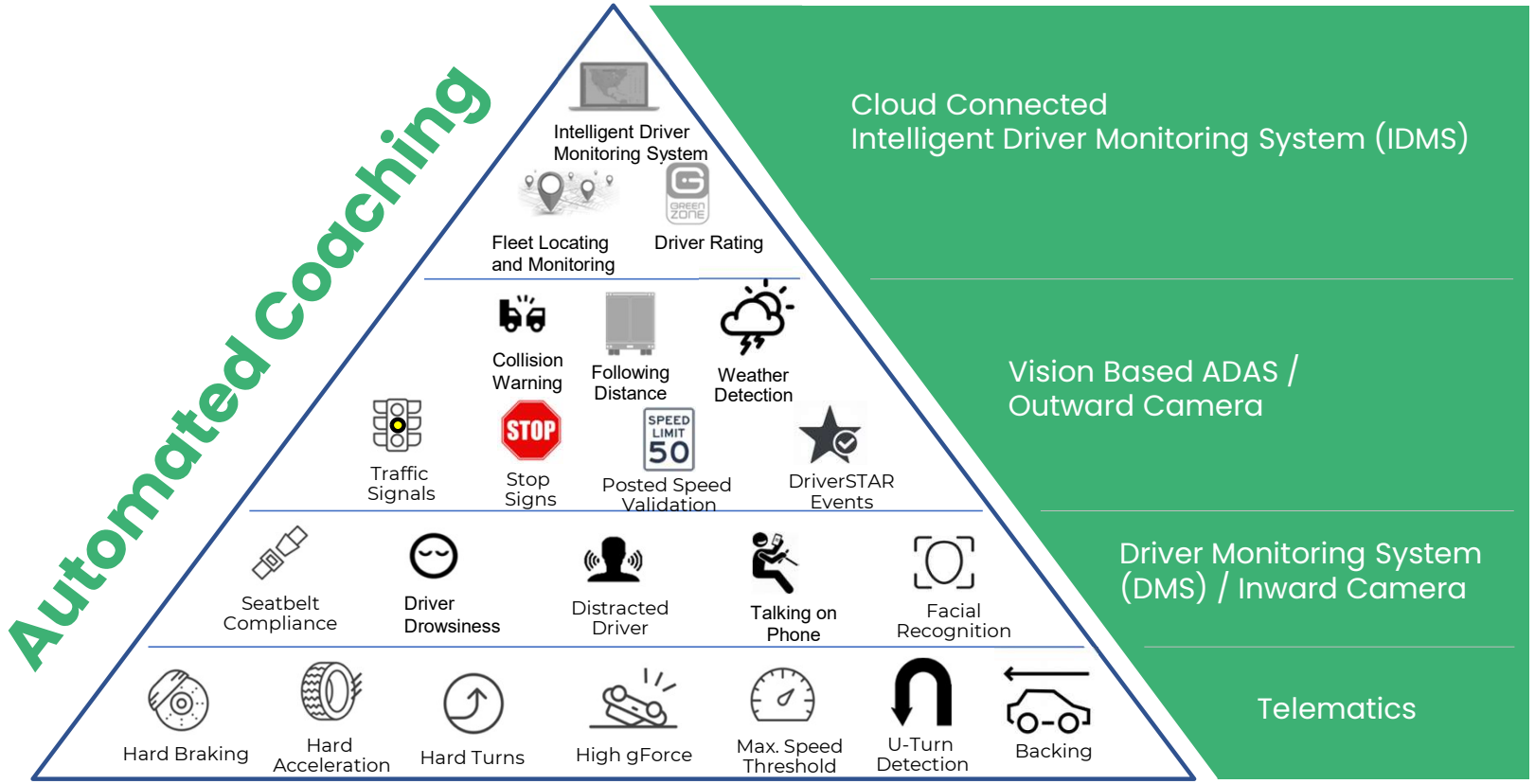
Commercial & Organized Segment is Key to Start with

- ✓ Logistics vehicles
- ✓ E-Commerce & Retail
- ✓ Hazardous Material
- ✓ Pharma
- ✓ Manufacturing & heavy material
- ✓ Precious goods

- ✓ State Rransport
- ✓ School Buses,
- ✓ Local Providers
- ✓ Employee Transport

- ✓ Taxis
- ✓ Employee Transportation

Comprehensive & Integrated Road Safety Ecosystem



AI-Powered Edge Plug-n-Play Processor

Enhanced Edge Computing

Nvidia TX2 - Double efficiency, double computing power for better machine learning, minutes/mile analysis

Quad HD Camera

Front: HDR / 1080p / 30fps/120dB HDR
Inward: HD / 1080P /30FPS
Side: HD/720P

Storage

Event access: Up to 100 hours of real-time searchable video stored on device

Driver Alerts

Driver initiated alerts

Connectivity

Wi-Fi and Bluetooth

Vehicle Data

J1939 / OBDII
Data integrity
API / Data Integration

Internal Sensors

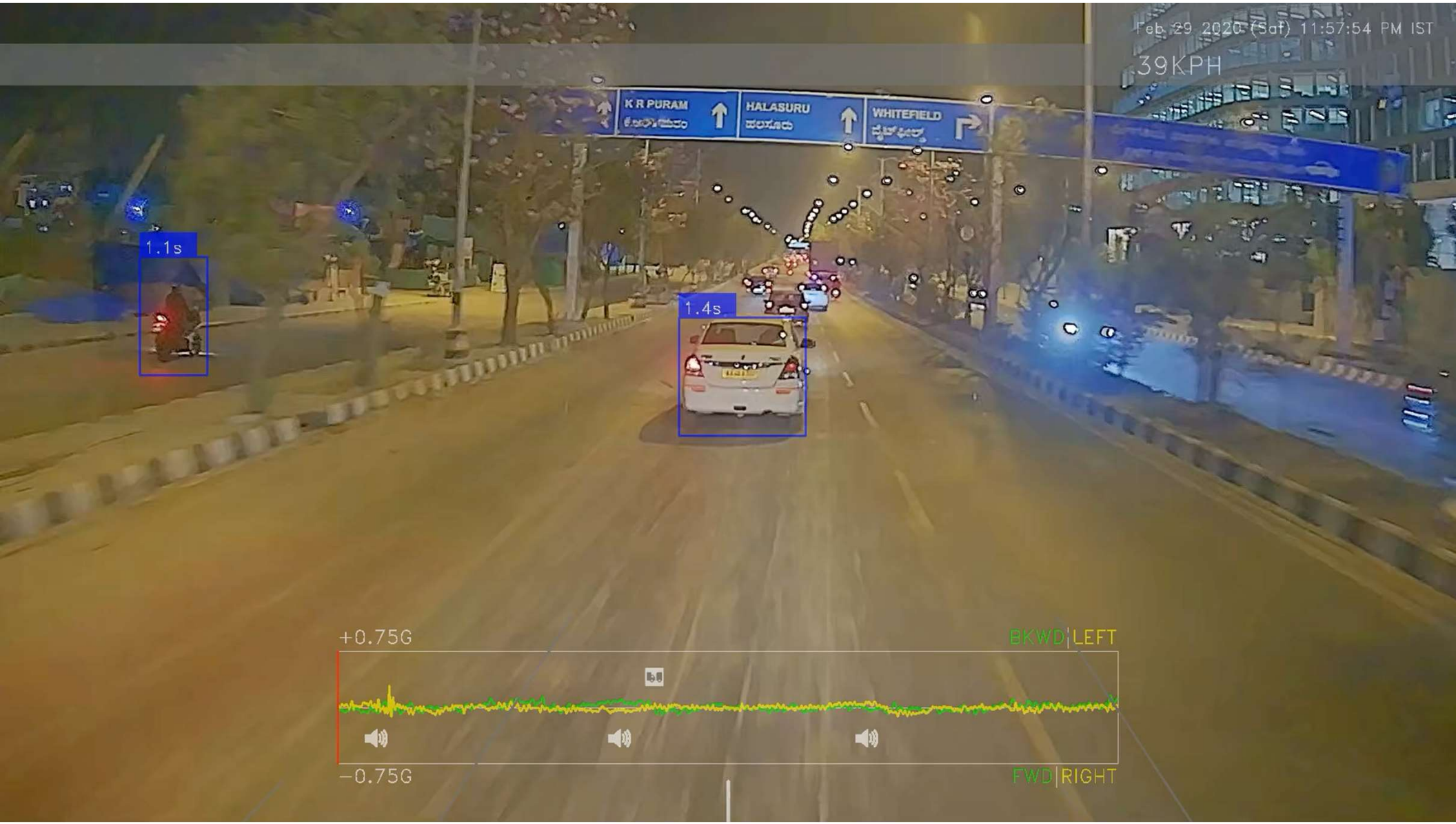
9 Axis accelerometer best-in-class low-light performance image sensor designed for a wide range of automotive imaging

Machine Learning

Periodic Update of Alert Algorithms. System Gets Smarter with Additional Utilization (MINUTES/MILES)

Audio Real Time Notifications

Speeding / Following Distance / Distracted / Seatbelt / Drowsy


Feb 29 2020 (Sat) 11:57:54 PM IST
39KPH
K R PURAM
HALASURU
WHITEFIELD
1.1s
1.4s
+0.75G
BKWD|LEFT
−0.75G
FWD|RIGHT

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Amazon driver surveillance reduces accidents by half

15 November 2022 Transport / Logistics Services

Amazon has announced that surveillance of its delivery drivers has cut road accidents by 48% over the two years it has been in operation.

The online giant has rolled out the driver surveillance technology in the US and UK. It has reduced risky behaviour including not wearing a seatbelt and speeding. Real time alerts to the driver also prevents other issues from occurring.

Source: Apex Insight

Safer Mobility | Why & How

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80% of road accidents happen due to

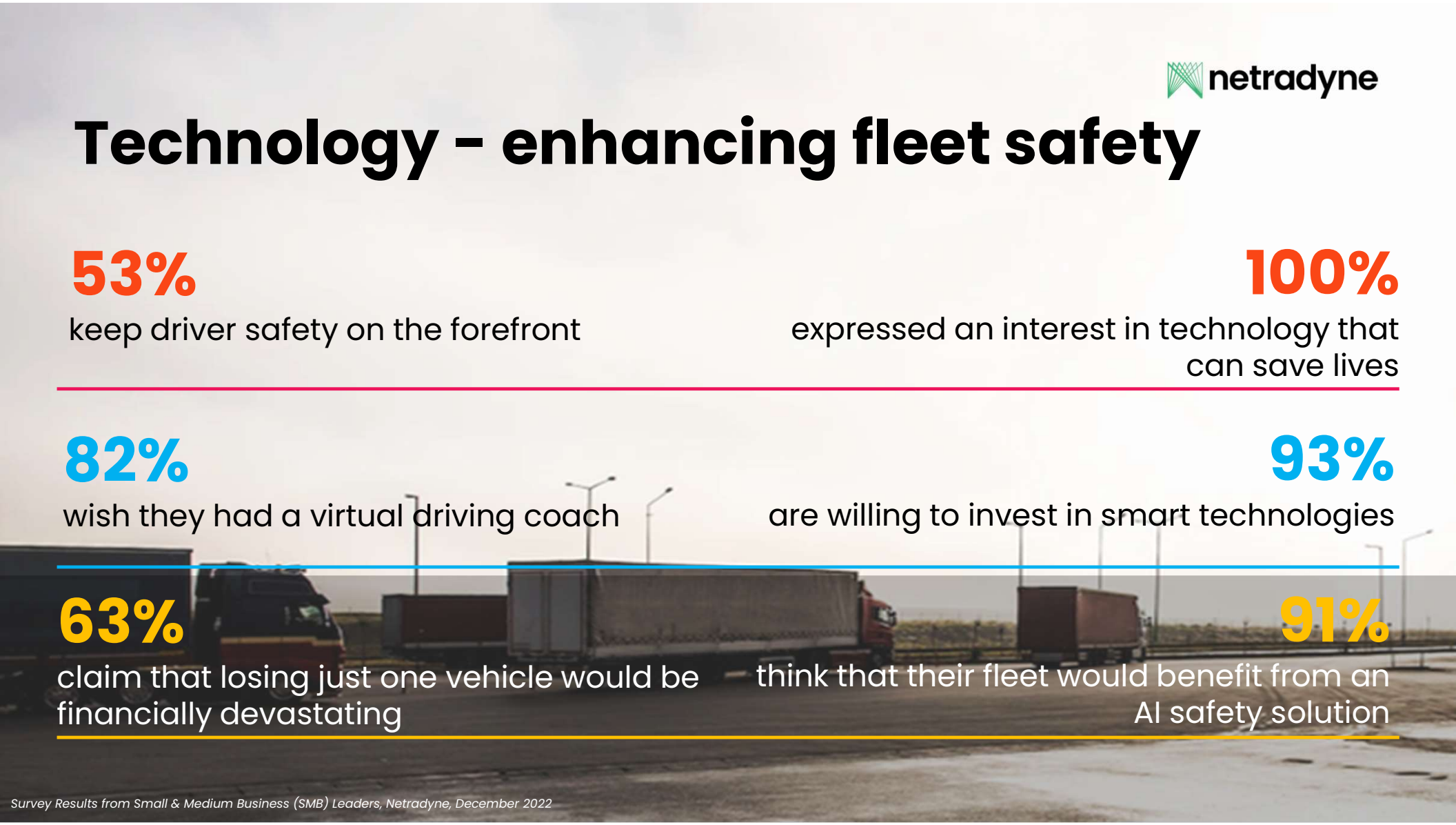
- Over-Speeding
- Driver's distraction or fatigue
- Tailgating
- Maneuvers

Why to invest in safety culture and practices?

- Danger to people's lives
- High operational cost
- Compensation claims & high insurance cost
- Costs incurred when vehicles are off the road or being repaired

What technology can help with?

- Driver behaviour
- Driver assistance
- Realtime data on breaching any driving safety norms
- Vehicle tracking
- Realtime alert system
- Reduce operational cost



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Technology – enhancing fleet safety

53%
keep driver safety on the forefront

100%
expressed an interest in technology that can save lives

82%
wish they had a virtual driving coach

93%
are willing to invest in smart technologies

63%
claim that losing just one vehicle would be financially devastating

91%
think that their fleet would benefit from an AI safety solution

Survey Results from Small & Medium Business (SMB) Leaders, Netradyne, December 2022

Driver•I | Vision-based Driver Safety System

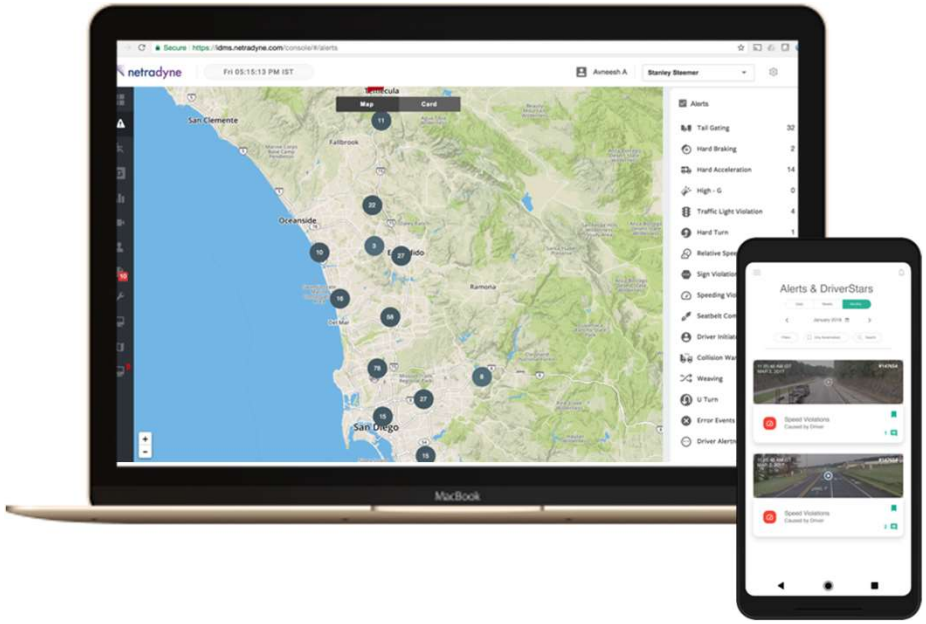
AI processor
Deep Learning Processor

Storage
Up to 40-200 Hours of Video on device

Dual/Quad HD Cameras
220 Degree, 85+ dB HDR

Communication Channels
4G LTE / Wi-Fi / BT / GPS
Integrated with CAN Bus (J1939/OBD II)

Inertial Sensors
Accelerometer, Gyro, and Magneto sensors



Driver•i uses **Edge Computing** to analyze every second of driving