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# Connected Auto Insurance - A Blueprint in Indian scenario

**KAMAL AGGARWAL**

SenSight Technologies Private Limited

**M**otor Insurance segment in India has seen significant growth in the last decade fueled by increase in the private vehicle ownership in India across 2-wheeler and 4-wheeler segment. Along with the increase in vehicle ownership, gradual increase in insurance premium per vehicle and Third-Party Insurance becoming mandatory has led to an average CAGR of roughly 15% in overall Auto premiums over the last 10 years in India.

However, this vibrancy in the market has also resulted in a high intensity of competition in the space with roughly 25 Insurers vying for the same customer. These Insurers include the legacy Public Insurers who have been steadily losing market share to the aggressive Private Insurers whose count has increased in the last few years.

Pandemic induced lockdowns have resulted in reduced mobility and slower sales of new vehicles sales. These have impacted the Auto Insurance premiums in the short term and several Non-life Insurers have focused their attention on the Health Insurance segment of their business in this time. Motor Insurance remains a large segment of the portfolio and with huge head room for long term growth, given the low vehicle ownership in India. Still the key challenges facing the Auto Insurance players include:

- High intensity of competition – Cost of attracting and retaining customer has been going up as indicated by the growing percentage of sales commission paid to agents and brokers. Insurers are competing across the physical and digital channels to attract and retain customers.

Separation of Third party and Own damage has further eroded the pricing flexibility.

- High Loss ratios - Net Incurred Claims Ratio have remained high resulting in overall underwriting losses for most Insurers. This also indicates a mispricing of true risk and other leakages in the system such as high claims fraud.
- Lack of differentiation - From a vehicle owner point of view, Motor Insurance is increasingly becoming a commodity product with similar offerings from different players. Apart from the occasional touch point when one is renewing the Insurance or filing a claim, there is hardly any engagement with the Insurer. While the process of selling and issuing Insurance has become digital, ongoing digital engagement between the



Insurer and the Insured is rare.

Connected Auto Insurance refers to the use of Telematics technologies to gather data from the Insured vehicle and offer innovative Insurance products and related services based on that. Most well-known product offering is known as Usage based Insurance (UBI), where the Insured is charged a premium based on how much and how safe he or she drives.

Globally, COVID-19 has led to increased adoption of Usage Based Insurance as people are driving less and would like to pay for insurance based on how much they drive.

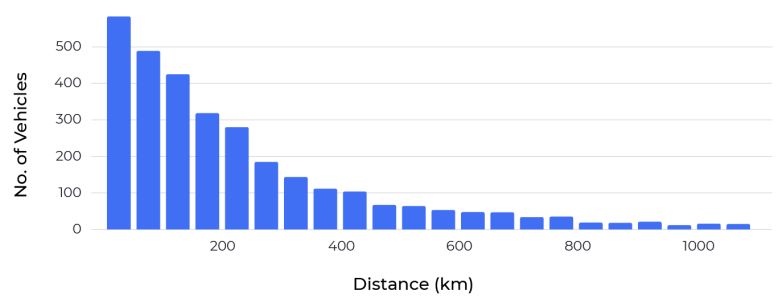
That and other competitive factors are driving strong growth forecasts for established UBI markets in North America, Europe and introduction of UBI in several emerging UBI markets in Rest of the World. In India, Insurance regulator has allowed certain Insurers to offer UBI related Insurance products as part of the regulatory sandbox regime. From our experience of offering Telematics in Indian market for several years to private vehicle owners and our discussions with several Auto Insurers, we believe that Usage Based Insurance and more broadly Connected Auto Insurance has huge potential in Indian scenario with benefits for both the vehicle owner and Insurers.

In this article, we outline the key factors that form the basis of our view.

**Better Risk pricing**

Since the Third-party premium is government mandated and fixed priced, underwriters price the Own Damage premium. Insurers typically use GLM models (using variables such as car make/model, engine size, car location, personal/commercial usage) to

Distribution of Average Weekly Distance



Distribution of Safe Driving Score

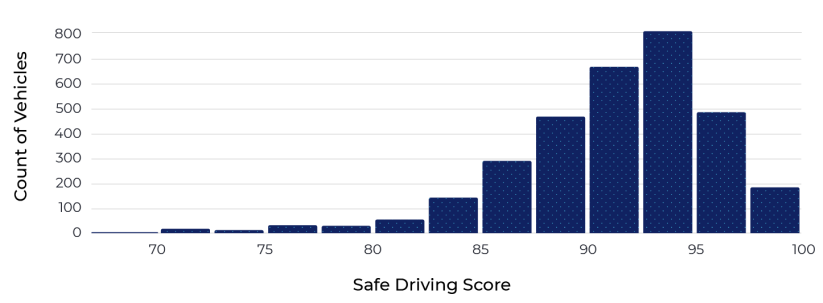


Figure1 : Wide variation is seen in the Vehicle Usage and Safe Driving Behavior of Indian car owners

Safe Driving Score VS Average Weekly Distance



Figure 2: Insurers can segment customers into distinct risk buckets and create offerings customized for these buckets

predict the frequency and severity of risk based on past claims. However, these models don't consider actual usage of the vehicle and the driving behavior of the driver, which

have higher predictive power for risk. We analyzed our telematics data from a pool of Indian car owners to see the variability in the Usage and Driving



behavior. As shown in figures below, there is a wide variation in the weekly distance covered and the Safe driving scores. Safe driving score is score out of 100 that rates the driving behavior of a driver across key rash driving variables such as over-speeding, hard acceleration, sudden braking and fast cornering. A higher score indicates a safer driver.

Fundamentally, this data indicates a need to segment the Auto owners in India into different segments defined by their true risk profile and offer differently priced products.

While designing Usage Based Insurance programs that model risk based on vehicle usage and driving behavior, Insurers should consider the psychology of end users. Insurers should design Connected Insurance program that is simple, transparent and builds trust with the customer. The program needs to communicate what data is being collected and when.

Generally, a program that rewards safe drivers while coaching rash drivers is likely to have higher end user acceptance as compared to a program with a zero-sum approach of reducing premium of safe drivers at expense of unsafe drivers. Based

on some of the global examples, we consider Reward as you drive type programs that reward safe drivers based on good driving behavior could be the right template for Indian market.

Telematics Insurance makes the driver aware of the areas of improvement and rewards safer driving. This leads to two effects: rash drivers improve driving and safer drivers move towards UBI programs to gain rewards. Both these effects have favorable impact on Loss ratios.

An interesting example of UBI product is the Switch Offering from Edelweiss General Insurance offered as part of the regulatory sandbox. Switch recognized the needs of a family segment owning two cars but usually using one of the two cars on a given day. Product allowed the insured to dynamically switch the coverage from one car to another based on daily usage and hence optimize the Insurance premium.

**Engaging and relevant services**

While better risk pricing remains a core benefit, Connected Auto Insurance also opens up the way for variety of value-added services and content that can drive digital

engagement and loyalty.

Using the telematics technologies, Insurers can detect crashes and offer emergency response services to the Insured such as an e-call on detection of a crash. At the same time, relevant crash related information can help streamline claims processing, weed out fraud and get upfront estimate for the repair estimates.

Information regarding miles driven and condition of the vehicle can be used to offer relevant and timely eco-system offerings such as car servicing, consumable top-ups and car cleaning.

Gamification and micro-rewards around safe driving behavior can help in engaging with vehicle owners in the App with weekly touchpoints, giving them a reason to keep the Insurer’s App on their phone. These games and rewards promote safe driving practices and thus reduce the overall risk of the book. Gradually, these build Insurer’s brand equity around care and increase retention.

**Smartphone Telematics drives scale**

In our discussion with several Insurers, cost of Telematics technology is often cited as a barrier for mass adoption in Indian

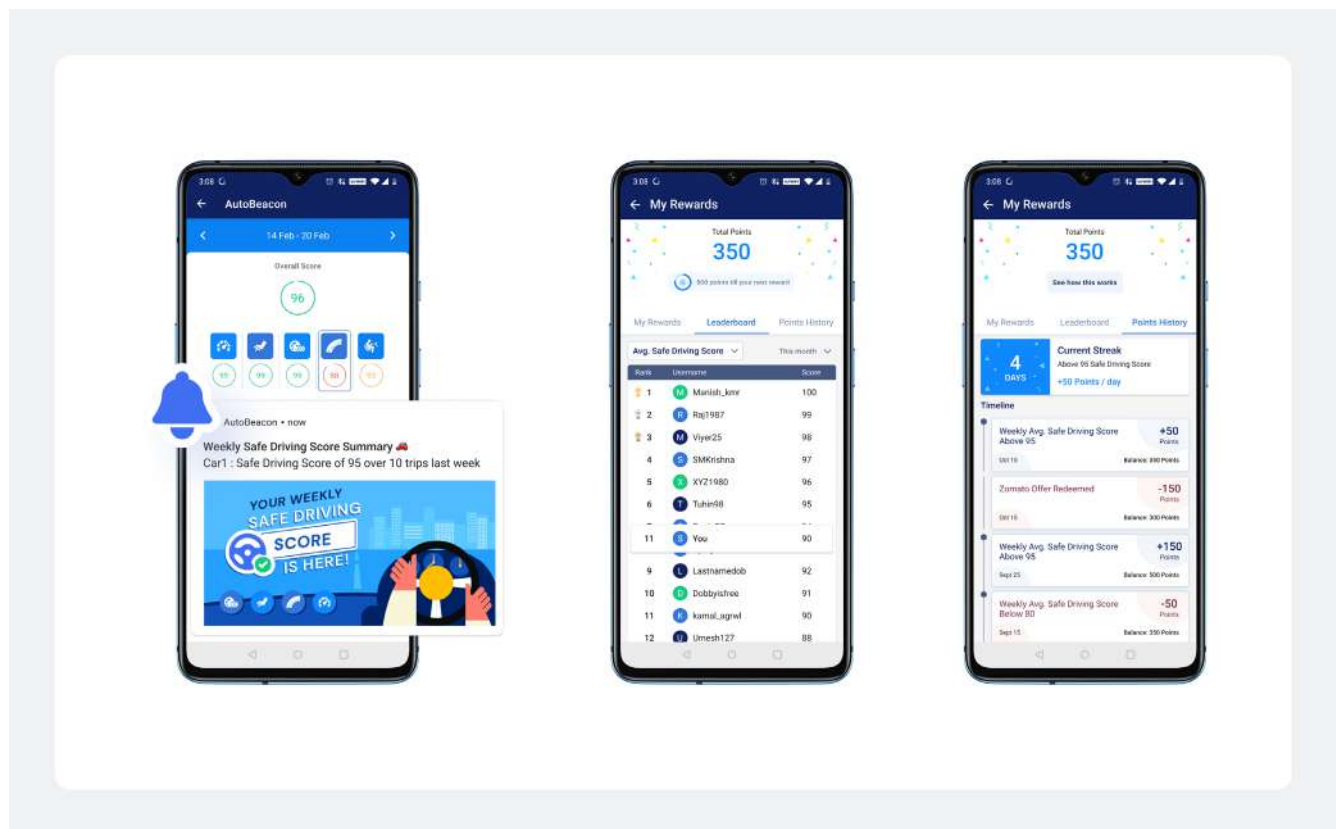


Figure 3: Connected Auto Insurance enables gamified content and rewards to engage with car owners

scenario, given the low premiums.

Here, we foresee Smartphone based Telematics as the technology option for Connected Auto Insurance in India. Conventional programs have relied on Wired GPS or OBD dongle based solutions to gather driving data from vehicles. These continue to be used due to their reliability of capturing data directly from the vehicle of the insured and work without driver's intervention.

But these come at a cost of adoption and logistical friction that has prevented mass adoption.

With Smartphone App based Telematics, one is measuring the driving behaviour indirectly using the sensor and GPS data gathered from driver's smartphone. With device out of the picture, the solution becomes instantly scalable, affordable and frictionless.

With advancement in sensor analytics and AI/ML technologies, the disadvantages of Smartphone Telematics in terms of loss of reliability of data have been largely addressed. One is able to accurately determine the driving behaviour irrespective of the orientation of the phone in the vehicle and also distinguish between driver's own trips vs those undertaken as a passenger. In fact, Smartphone based telematics enables one to additionally measure Distracted Driving (use of phone while driving), which is growing risk parameter and cause of collisions on the road.

Smartphone based Telematics is also well suited for offering Connected Auto Insurance to the large base of two wheelers in India that are currently under-insured.

#### Multiple Distribution models

While Insurers shall spearhead the introduction of Connected Auto Insurance, we see multiple players in the Auto and Insurance eco-system driving its growth.

Newer cars come with factory fitted

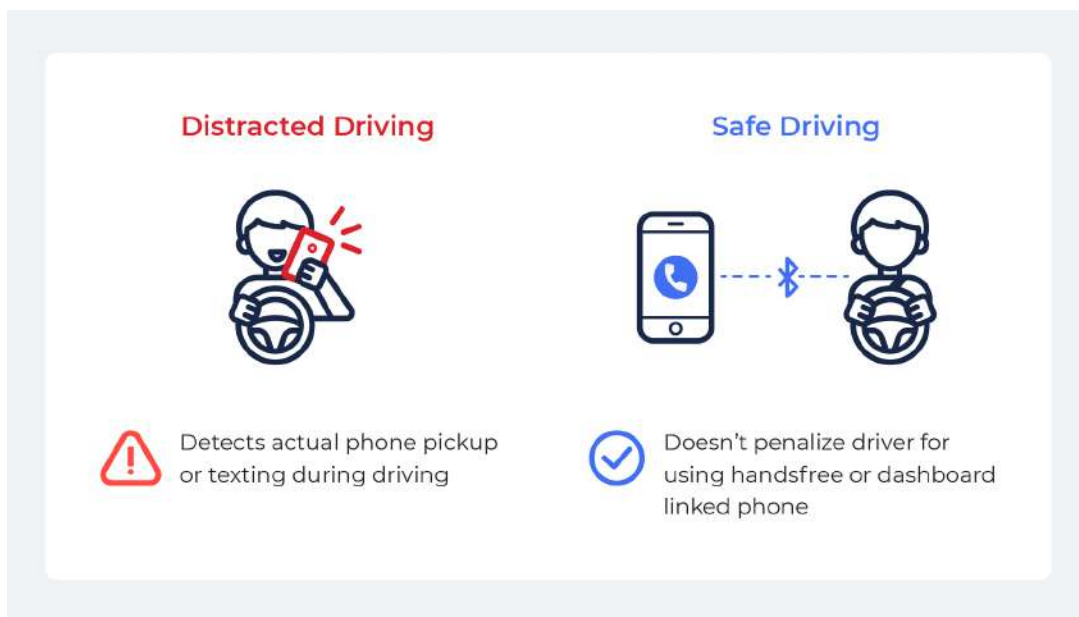


Figure 4: Smartphone Telematics can scale up Connected Auto Insurance while also measuring additional risk behavior such as Distracted Driving

Telematics devices that OEMs use to offer Connected Car features to car owners. As these numbers increase, we might see exchange of OEM's telematics data across OEMs that Insurers can use and offer Usage Based Insurance products in collaboration with vehicle OEMs.

New age Digital Insurance brokers, such as Payment and other "Super Apps", already have the digital engagement with hundreds of millions of vehicle owners. As regulatory environment permits, they are likely to offer Smartphone based Connected Insurance solutions underwritten by their partner Insurers.

Companies employing gig-economy workers such as ride hailing, food delivery and ecommerce/grocery delivery are increasingly going to be held responsible for the safety of their drivers/riders and covering for their accident Insurance. Connected Insurance Technologies can help them promote safe driving/riding practices and bargain for lower Insurance premiums

based on their aggregated risk profile.

Based on the above driving factors, we remain sanguine about the growth prospects of the Connected Auto Insurance in India. Subject to enabling regulation support, we foresee Connected Insurance in India catching up with the rest of the world quite quickly over the next 5 years.

#### About AutoWiz

AutoWiz offers Insurance Telematics solutions to Auto Insurers with multiple technology options as per the goals of their UBI program, including OBD and pure Smartphone-based solutions for Pay-as-you-drive or Pay-how-you-drive models. Our AutoBeacon solution is an advanced Smartphone-based UBI and crash detection solution. It features our accurate driving behavior monitoring engine (also available as an SDK that can be embedded inside your App) and is affordable for mass-market deployments. For more information visit [www.autowiz.in/insurer.html](http://www.autowiz.in/insurer.html) □

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# Building Vehicle Health Management Functions with SAE JA6268 Methodology

**BK RAMESH**  
IntelliPredikt Technologies

## Background

IVHM (integrated health management) systems are ushering in a new paradigm for diagnosis and prognosis with the concept of “Health Ready Component”

Presently, the vehicle systems are primarily operating in the diagnosis-only paradigm where the focus was to facilitate the detection and identification of the root cause(s) once a failure had occurred. This has found limitations in effective diagnostics resulting in No Trouble Found (NTF) cases adding to warranty cost and customer dissatisfaction. It is imperative to enhance the diagnostics coverage and support prognosis, to facilitate health monitoring and tracking of system degradation severity to prevent a given component from degrading to the point where it goes outside its operational performance envelope. This is possible with the big data cloud computing, predictive analytics and Advanced telematics for Connected Vehicles.

There are barriers to implement this and mainly contributed by

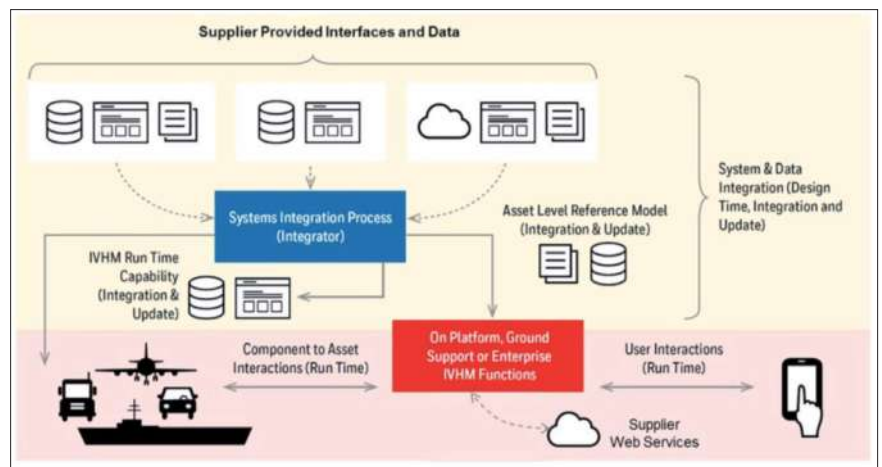


Figure 2: Source Ref: SAE JA6268 Specification: April 2018

- Multiple players: T1, T2, OEM, operators, individual owners and users
- Evolving vehicle architectures
- Multiple variants with potential low volume
- High variation of diagnostic and service procedures
- High variation in technician skills
- OEM customisation beyond standard
- Lack of uniformed signals, nomenclature

The above figure shows how the interoperability among the IVHM functions are hampered by differences in data exchange among the stake holders.

The SAE JA6268 specification from HRCS consortium addresses existing barriers to the successful implementation of IVHM technology for the automotive, commercial, and military vehicle sectors. Original Equipment Manufacturers (OEMs) in all these sectors are heavily dependent upon a large number of component and system suppliers, many of which are shared across these sectors.

The advent of IVHM technology has accentuated the need for a new model that encourages better coordination and communication between the OEM and its suppliers in order to achieve the operational, safety and economic benefits desired.

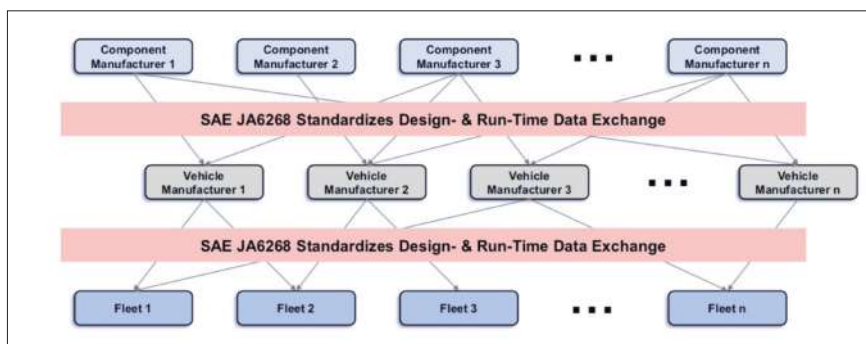


Figure 1: Source : T. Felke, Future of Vehicle Health Management with SAE JA6268

SAE JA 6268 seeks to provide uniform requirements, practices, and methods to address the sharing of critical component/subsystem run-time messages and supporting design-time information to facilitate real-time platform level communication and implementation of the supplemental IVHM functions.

### IVHM Process with SAE JA6268

IVHM Process from the figure above shows,

- The design and data integration process
- The integration of IVHM related run-time messages. Design-time integration uses data developed by suppliers and provided to the system integrator (highlighted in light beige) in order to provide more complete implementation of IVHM functionality and to facilitate the integration of this functionality.
- Run-time messages are collected by the

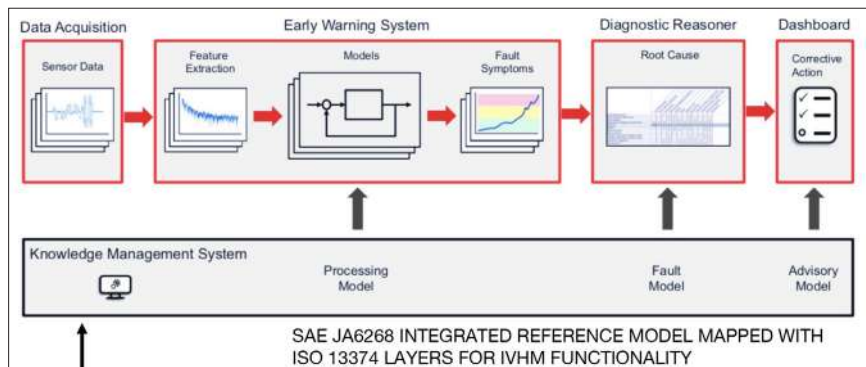


Figure 4: Source: Adapted from Nexteer end to end architecture and methods for VHM

rates and reduction in diagnostics time

### Evolving Industry Capabilities - Moving from Cloud based Monitoring to Vehicle Health Management

The above diagram shows the industry defined IVHM classification levels and the

### IMPLEMENTING IVHM FUNCTIONS USING SAE6268 METHODOLOGY

The information provided by the design-time data submittals as SAE JA6268 data sheet is used to build an IVHM Integrated Reference Model (IRM) as shown in the figure above, which consists of a Fault Model, a Processing Model and an Advisory Model. The design data integrated with ISO 13374 layers to develop run time processing and analysis to assess health, estimate time to failure and determine the root cause for fault..

SAE JA6268 IVHM Classification					
	SAE Level	Capability	Description	Data Resources	Models
Manual Diagnostics & Repair	0	Limited On-Vehicle Warning Indicators	Scheduled Maintenance or Operator Alert	On-Vehicle	Paper Manuals
	1	Enhanced Diagnostics	Service Technicians use Automated Scanners	+ Service Bay	-
	2	Telematics provides Remote Real-Time Data	Central Monitoring of Vehicle	+ Cloud	-
Augmented by Prognostics & Predictive Analytics	3	Proactive Component-level Alerts	Provide Health Status before Problem occurs	-	Component Health Models
	4	Integrated Vehicle Health Management	Estimate Remaining Useful Life	-	+ Vehicle-Level Health Models
	5	Self-Adaptive Health Management	Extend Vehicle Operation & enhance Safety	-	+ IVHM Capability integrated into Controls

↘ Industry Level Today

Figure 3: Source: Adapted nexteer end-end architectures and methods for chassis health management

Health Management System (red block) and used by higher level reasoning functions to provide the best possible component health state advisories and support services to the various user communities

### Benefits using SAE JA6268 Methodology

1. Engineering Cost Saving - Reduce the effort to develop high accurate diagnostics functions and health indicators
2. Improve diagnostics coverage, reduce diagnostics ambiguities leading to reduction in No Trouble Found (NTF)

way the industry is moving to adapt this. Current Level 3 and 4 are what the industry is targeting.

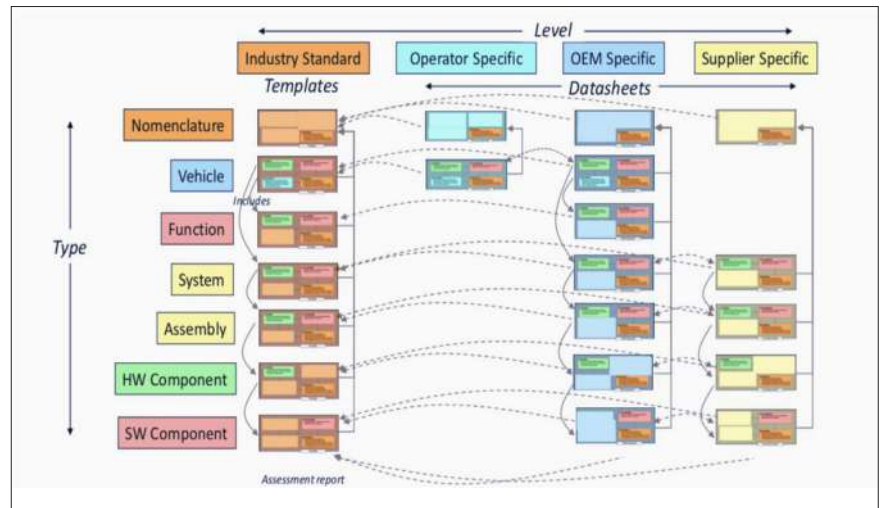
IVHM Functional Block	Description	IVHM Process Stage
Advisory Generation (AG)	This function provides actionable information to operational and maintenance personnel or external systems.	Act
Prognostics Assessment (PA)	This function provides future state of health, performance life remaining, or remaining useful life (usage) indicators.	Analyze
Health Assessment (HA)	This function provides information to determine the current state of health of equipment.	
State Detection (SD)	This function evaluates equipment state conditions against normal operating profiles and generates normal or abnormal condition indicators.	Transfer
Data Manipulation (DM)	This function processes and transforms the sensor data and health state information collected by the DA.	Acquire
Data Acquisition (DA)	This function collects the sensor data and health state information from the equipment internal monitors, the system data bus or data recorder.	Sense

Figure 5: Source Ref: SAE JA6268 Specification: April 2018



nostic and prognostic indicators as well as algorithms to generate prognostic estimates of “time to fail”, i.e., remaining useful life.

- The Advisory Model contains the information needed to interact with the user and the command system functions as required to isolate and correct any detected faults. Content of the Advisory Model includes links to repair procedures, manual test procedures, initiated test procedures and links to Option Codes to allow a single model to encode effectivity of entities based on versions and variants of the component, system, or platform.



**Figure 7 Source :** T. Felke, Future of Vehicle Health Management with SAE JA6268

### IVHM ISO 13374 Function Blocks

In the above model, DA is the lowest level block and acquires sensor output data. The next level, DM implements low-level signal processing of raw measurements from the DA block. The SD level supports modelling of normal operation and detection of operational abnormalities and creates a CI (Condition Indicator). A subsystem can generate multiple CIs depending on the number of sensors. The CIs are communicated to the next level, HA where the health of the system is established by creating a HI (Health Indicator). Depending on the type of subsystem and the complexity of interaction with other subsystems, HA might be performed at the subsystem or vehicle level.

The upper three functional blocks of the model provide decision support to operations and maintenance personnel based on the health of the target system.

Within this group, the HA function provides fault diagnostics and health condition assessment. The PA level is aimed at enabling the forecasting of future health conditions based on current state, projected usage and the operational envelope.

It is required to build reference model for IVHM using design data and map it to ISO 13374 function blocks. For this it is required to perform systems engineering analysis at the system, subsystem or component level to characterise their inherent IVHM capabilities. For existing components, these will typically consist of functions addressing the foundational layers of the model (DA, DM and SD) but in some cases, will also include the higher-level functions (HA, PA and AG). All areas where the existing implementation does not provide the required functions should be identified.

### Runtime Data Processing of JA6268 Component (Smart Pump Example)

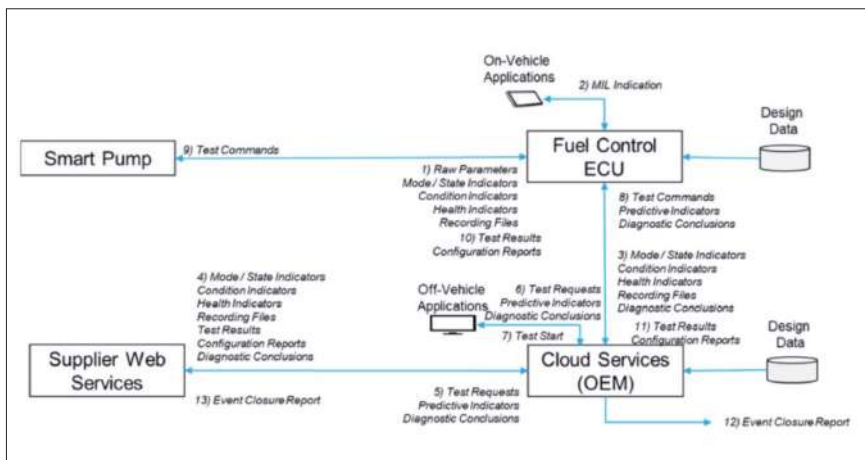
Above diagram shows the standard example of run time message data exchange between Health Ready Component (Smart Pump), ECU, OEM Cloud Services, Supplier Webservices.

Here Smart pump is a digital twin implementation of the pump by the component supplier using design data. The twin monitors the pump behaviour periodically logging the data exchanged with ECU and provides health indicators and root cause information. The OEM can use this information to provide cloud services for reporting trending of health indicators at vehicle and fleet level with recommended actions.

When there is ambiguity of diagnostic conclusion, data can be sent to supplier who will investigate the diagnostics conclusion with design data and update the diagnostics, predictive indicators and test methods.

To resolve the ambiguity via the web services to OEM cloud service which will inform the maintainer or service technician.

To use the information provided supplier to test and update the cloud services of the fix and close the issue.



**Figure 6: Source:** SAE JA6268 Design run time data exchange for health ready component

### JA6268 TEMPLATES AND DATA SHEETS

SAE HRCS is developing Templates for Stage 3 to Reduce Effort, Improve Accuracy and Ensure Interoperability. The stage 3 template is

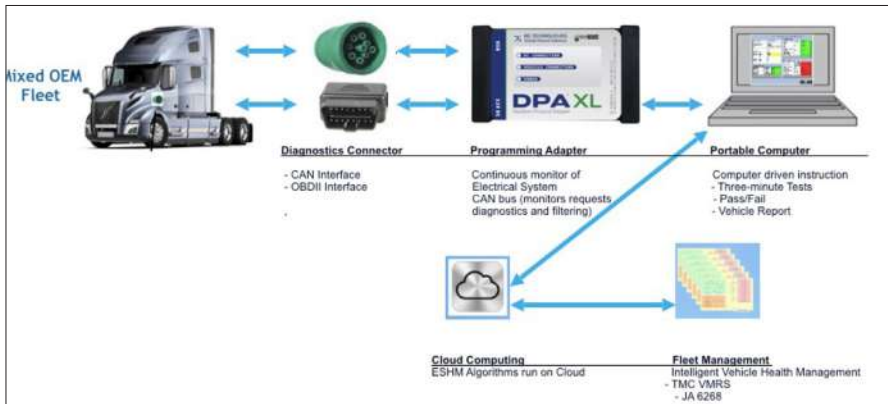


Figure 8: Source : ATA TMC JA6268 SEFL/DG/SAFERIDE PHASE1 PILOT OVERVIEW

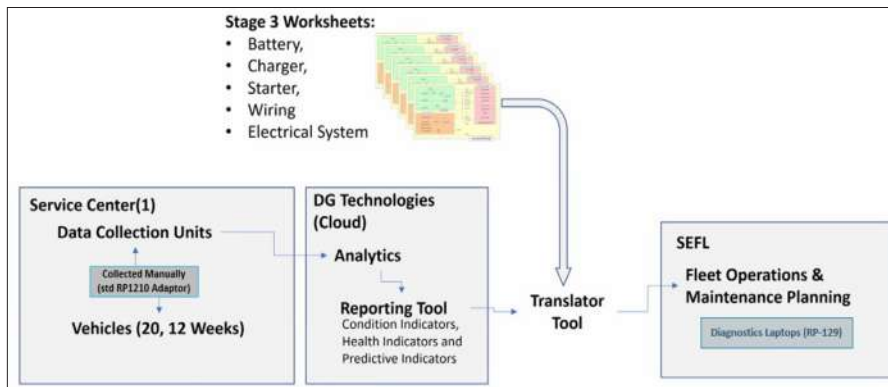


Figure 9: Source : ATA TMC JA6268 SEFL/DG/SAFERIDE PHASE1 PILOT OVERVIEW

**Starter Motor Impending Fault - VERIFIED**

eTrak Truck Electrical System Health Monitor			
<b>Battery Pack</b>			
Date of Test	13/01/2021	Battery Voltage, initial	
Vehicle Number	J1470	12.46 v	GOOD
VIN	4V4N991G3FN	State of Health (SoH)	71% GOOD
Odometer	854864	Rated CCA per battery	660 GOOD
Engine Hours	4007	Estimated CCA per battery	465 GOOD
Inactive Faults	NAN		
Active Faults	0		
Ambient Temp	67		
Coolant Temp - initial	75		
<b>Charging Circuit</b>			
Alternator Output	data not in specification	GOOD	
Voltage & battery	data not in specification	GOOD	
<b>Starting Circuit</b>			
Waveform	data not in specification	SUSPECT	
Min Cranking Voltage	9.82 v	SUSPECT	
Avg Cranking Voltage	10.50 v	SUSPECT	
Cranking time	1.70 sec	SUSPECT	

Figure 10: Source : ATA TMC JA6268 SEFL/DG/SAFERIDE PHASE1 PILOT OVERVIEW

for component design data submittals. Only the common signals are shared while the proprietary signal and the design data is shared by the supplier with OEM..

### JA6268 VHM Functions Development Tool Chain

There are companies who have developed toolchain for developing Health indicators from JA628 data sheets for Advanced Diagnostics and Prognostics. The tool

integrates Design Time and Run-Time Data to Greatly Reduce the Cost to Deploy Predictive Maintenance Solutions. IntelliPredikt has come up with such a tool that enables development of VHM using run time and design data for the cost effective development of VHM functions.

### Use Case for using SAEJA6268 for commercial trucking Pilot and Results obtained

This provides a uses case of our partner company DG Technologies participation in Commercial Trucking Phase 1 Pilot program with SEFL trucks with SAE / ATC

They Demonstrated validating JA628 generated health indicators and diagnostics time reduction for Truck Electrical Starting System and used JA6268 stage 3 data sheets to create Fault models and produce health indicators. Below shows the process followed.

### RESULTS

For the above Experiment:

- Efficiency gain:
  - RP129 maintenance procedure is **45 minutes**
  - Pilot project demonstrated a system test time of **less than 3 minutes** to isolate path to hard failure
- Identified an opportunity to reduce regularly scheduled maintenance (ONLY when conditions warrant)
- Provide an off-board diagnostic solution of the primary electrical system
  - Battery, starter, alternator and cable)
- Utilise JA6268 Stage 3 Data sheet / signal mappings to develop a non-intrusive systems test
- Dmonstrated interoperability with Mixed OEM Fleet. □

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#### BK RAMESH

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BK Ramesh is Co-Founder and Director of AI at IntelliPredikt Technologies actively involved in implementing prognostics technology and business strategies for IntelliPredikt and closely working with Global research universities, Data Scientists and Consortiums, Partners ecosystem and Customers which include OEMs and Tier1 suppliers.





# Towards a Domain-Centralized Automotive E/E Architecture

JYOTSANA SINGH & SREEJA KS  
Tata Elxsi

The automotive industry is gradually moving away from a traditional E/E architecture consisting of several ECUs over a multi-bus gateway to a centralized high-performance computer with a zone-based architecture to accomplish a software-defined vehicle concept. Heterogeneous technologies running on hardware with high-end computing power, software features partitioned across different execution environments, over-the-air update, communication to backend-systems, service-oriented architecture, high-speed Ethernet interfaces with AVB/TSN support, etc. are key technologies for transitioning to the future. This necessitates the development of sophisticated, flexible, and scalable platform solutions for ECUs in vehicles. A domain controller platform can be designed considering requirements for moving towards a cross-domain controller platform, thus fulfilling the ECU consolidation concept.

## Challenges that lie ahead & Current Trends

Legacy E/E architectures are getting more and more complex when it comes to bringing in new vehicle functions. ECUs will reach their tipping point in due course for resources, and it calls for hardware and software level changes to meet the performance KPIs and future application needs. Numerous hardware-level changes necessitate platform migration, including increased performance of the uC/SoC and other components in terms of memory, power consumption, the number of parallel processing cores available, compliance with functional safety standards, the availability of hardware accelerators such as powerful GPUs, and high-speed communication interfaces such as CAN FD, Ethernet or

PCIe.

In addition, the semiconductor vendor has no explicit roadmap agreement, resulting in hardware dependencies. Compliance with cybersecurity standards, such as availability of HSM peripheral and interfaces such as I2C, SPI, and UART, must also be considered when migrating to a new platform. At the very least, some of these factors must be considered when selecting hardware for the new E/E architecture.

To address scalability with newer functions, more H/W resources such as additional CPU cores, powerful processing engines, hardware accelerators, etc., are required. This adds to the overall H/W complexity since additional controllers' external ASICs need to be interfaced.

Such complexities can be resolved by moving towards a single multi/many-core SoC-based architecture from multi-chip solutions.

There are challenges when introducing new features and their deployment in the vehicle throughout the vehicle lifecycle when it comes to function-based ECU architecture. This has led to a transition towards Service Oriented Architecture. Services can exist in multiple ECUs, other vehicles, and external infrastructure devices. The migration strategy needs to be defined when moving away from function-based ECUs, such as identifying services and defining service catalog.

The more complex the overall

hardware architecture, longer the system's processing time and thus the more latency the system exhibits. This interferes with the real-time requirements. ECU consolidation eliminates, to some extent, timing performance issues.

The unrestricted access of network interfaces to the outside world exposes them to various security threats. On one hand, Ethernet as a backbone increases speed and introduces quality of service (QoS), determinism, time-sensitive networking (TSN), and fault-tolerant communication, thereby mitigating safety and security vulnerabilities. On the other hand, software development cost increases in the function-based ECU approach, and S/W redundancy cannot be eliminated when functions are distributed. Therefore, adopting a structured S/W architecture approach in a Centralized system also reduces software development costs.

## Possible Future

Traditionally, in-vehicle architectures consist of a single ECU, performing a single function. Unfortunately, this has resulted in current architectures

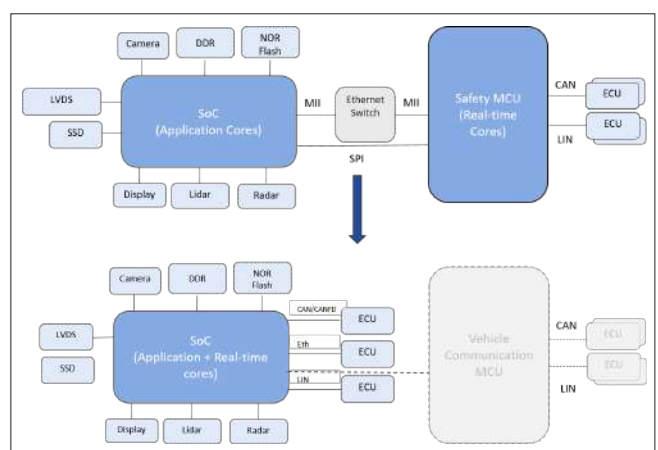


Figure 1: Multi-chip to Single-chip Solution

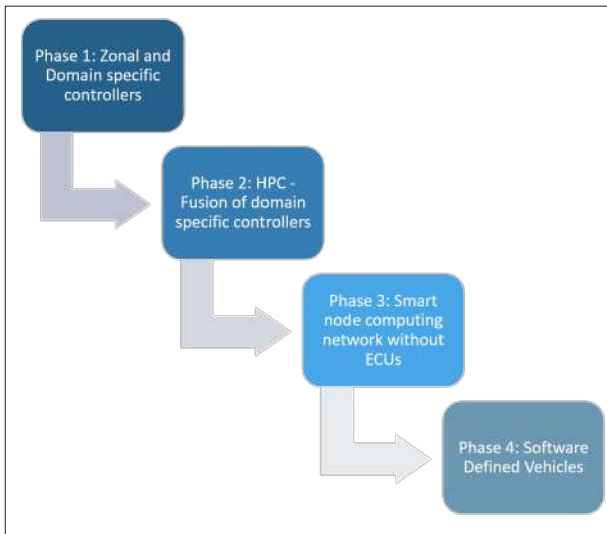


Figure 2: Phased Approach

becoming cumbersome, complicated, non-standardized, costly to implement, and difficult to package. In addition, digitalization and ACES (autonomous, connectivity, electrification, and shared mobility) are gaining traction, necessitating significantly increased computational power and intelligence. As a result, high-performance computers will be a critical component of the futuristic server-based E/E architecture.

Due to the challenges mentioned above, OEMs seek solutions that shift the in-vehicle design philosophy away from a single-function ECU and towards the consolidation of domain-specific controllers or supercomputers. This gradual consolidation of ECUs will be guided by zonal and DC-based architectures that simplify design sufficiently to serve as a precursor to a truly centralized architecture, thus a software-centric vehicle architecture.

This centralized architecture provides several benefits, including hardware/software separation, abstraction from hardware via a middleware layer, high-speed data interfacing, and virtualization support. Additionally, this architecture enables software upgrades or flashing of new software at any time, cost savings and wiring harness reduction, increased safety and connectivity. Thus, a centralized architecture will serve as the foundation for a software-defined vehicle architecture.

Some challenges come along with the new trend such as a change in System Engineering process, development and integration process, interoperability

between various suppliers, a new standard for Diagnostics of HPCs (High-Performance Computers), Service access restriction mechanism in Service-Oriented architecture, Continuous Integration framework, expensive component replacement in case of hardware damage, thermal management, etc.

Model-based System Engineering approach, including behavioral, structural & real-time modeling, is highly recommended for the next generation vehicle architecture.

### Road Ahead

The automotive industry is heading towards the new, emerging paradigm of next-gen vehicle architecture. Accelerated development of a production-ready solution, portability to different hardware platforms, ease of adding more applications, easy upgrade of any application, and migration to a domain-controller architecture will be critical aspects

of the transition to a software-defined in-vehicle architecture.

Moreover, features like ECU consolidation, safety-critical ECUs with increased computational power, smart sensors, cloud connectivity, and remote diagnostics will enable the true evolution towards the vehicle of the future, where each vehicle will be smart, secure, stable, and software-driven. Therefore, the industry must wake up to the potential of integrated platforms and smoothen the path ahead.

Realizing the need for a scalable integrated platform, we recently collaborated with Green HILLS Software to demonstrate an integrated platform solution called V.O.E.O.S.Y.S – Vehicle Operator Environment Observation System, in which Tata Elxsi’s Functional Safety Compliant AUTOSAR Adaptive and Driver Monitoring System are integrated on GHS INTEGRITY RTOS to realize futuristic concepts of domain controllers/HPC/software-defined vehicles. With experienced technology partners in tow, OEMs can truly and confidently propel themselves towards a future where technology aids customer-centric innovations. □

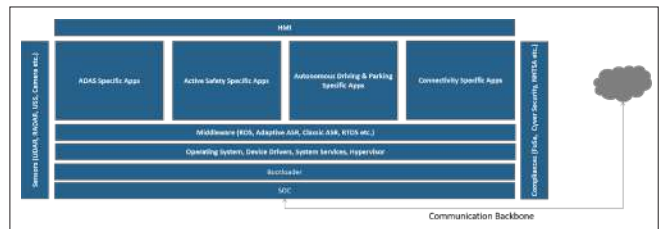


Figure 3: Centralized Architecture

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# Charging: How to overcome a key speedbump on the road to electric future

**MARTIN ELEXA**  
Sygic a.s.

The electric revolution in road transportation is underway. Even though internal combustion engines (ICE) have powered vehicles almost exclusively for the past 130+ years, electric motors now seem to be finally taking over. Yet, an essential limitation still flies under the radar.

## EVs already overtaking ICEs

Strides in battery technology along with the greater simplicity of electric motors (less parts and complex integrated systems; easier to assemble and service), not to mention their environmental benefits, are the chief factors behind their speedy rise over the last five years.

So speedy in fact, that the number of new fully electric and plug-in hybrid cars registered in the European Union has reached over 20% and exceeded diesel-powered cars for the first time in August 2021.

With petrol cars holding about 60% of the European market share, electric vehicles (EV) still have a long way to go. But in 2011, diesel accounted for 55% of new car sales in Europe. Last August? Barely 20%. And petrol car sales have also already started to decline.

## Truck manufacturers join the party

Electric power seems to be prevailing not only on the expense of ICEs in passenger cars. Clean hydrogen has also been pushed as the only sustainable green solution for long-distance trucking – based on claims that batteries won't be able to provide the power and driving range required.

However, one of the world's largest truck manufacturers, Scania, has stated last year

that hydrogen will be too inefficient and expensive for long-haul transportation. The company has already produced both electric and hydrogen vehicles. Currently, it is the only manufacturer with hydrogen-powered commercial vehicles in operations with customers.

“Going forward the use of hydrogen will be limited, since three times as much renewable electricity is needed to power a hydrogen truck compared to a battery electric truck. A great deal of energy is lost in the production, distribution, and conversion back to electricity. Repair and maintenance also need to be considered. The cost for a hydrogen vehicle will be higher than for a battery electric vehicle as its systems are more complex, such as an extensive cooling system. Furthermore, hydrogen is an explosive gas which requires more maintenance to ensure safety,” Scania explained in a statement.

In addition, battery technology is fast advancing, with charging time, cycles, and economics per kilogram improving rapidly. “This means that electric solutions will become more cost effective, primarily in repetitive and predictable applications. They will gradually overtake Scania's industry-leading fossil and biofuel-powered solutions,” the company added.

## A truly global push – but with a twist

EVs have been strongly backed also at last November's COP26 in Glasgow, during the summit's Transport Day. A group of more than 100 countries, states, cities, and companies have committed to phasing out petrol and diesel car sales by 2040, some even as soon as 2035.

Major signatories from the automotive industry include Ford, General Motors,

Volvo, Mercedes-Benz, Jaguar Land Rover and BYD Co. Governments of the UK, Canada New Zealand, Mexico, India and numerous European countries, individual cities such as Buenos Aires and Rio de Janeiro, states of California and New York, as well as major fleet owners and corporations with large purchasing power have declared their commitment.

With all of the above going electromobility's way, there's one significant bottleneck that could hold up and spread doubt about the adoption of EVs: Where, when, and for how much will all these cars get charged?

## Expanding the charging network

The shift needs to take into account much more than just the vehicles themselves. And not even many of those looking to purchase their very first electric car are sufficiently aware of the challenge. Governments are only waking up to the problem and manufacturers and charging providers have been all approaching it on their own terms – so far.

There are approximately 1.3 million public EV charging points around the globe at the moment. Yet if the world aims to reach carbon neutrality halfway through the 21st century, by 2030 two thirds of the global car market must consist of EV sales. And then that number has to grow to 100% by 2050.

According to an estimate by the International Energy Agency (IEA) to satisfy this charging demand, 40 million public charging points would be needed. That translates to a \$90 billion investment every year until the end of the current decade. And five times as many to achieve carbon neutrality 20 years later.

Bloomberg predicts that in case of a

slower scenario, in which EVs reach just under a third of all vehicles sold by 2030, approximately \$600 billion investment in charging infrastructure would still be required by 2040. That would result in a total of 24 million public charging points around the globe. Although both estimates assume that virtually all of these chargers will be operational at all times, which in real-world conditions is rarely – if ever – the case.

## “Charge Wars” on the horizon?

This ties in directly with 4 out of top 5 major customer concerns when considering an EV purchase. In two words: charging anxiety – the fear of running out of power. The good news is that most of these concerns can be resolved by providing drivers with proper information regarding their available driving range, the compatibility and availability of charging points, and by tailoring each route to the specific electric vehicle.

So what exactly have been the 5 most frequent concerns of potential EV buyers in 2021? According to a research by AlixPartners it has been:

- Battery driving range
- Not enough charging points
- Higher cost compared to traditional vehicles
- Length of charging
- Unable to charge the vehicle at home

EVs can be charged overnight at home or during the day at a workplace (if employers install chargers). However, this will only get us so far. As EV ownership spreads from wealthier households to people living in flats or housing without their own parking space, a public charging network becomes crucial. Otherwise EVs would be virtually useless for a large portion of the population.

## The road ahead

Public charging points come in different shapes and sizes, equipped with various charging technology. A common kind is curbside charging, where cars can park and top up overnight. Then there is “destination” charging, becoming increasingly popular at car parks by shopping centers, restaurants, cinemas, and so on. And finally, fast charging points are vital on main roads for making long inter-city trips as well as in cities, when drivers need to extend their range fast.

Building up this network won't happen

overnight. The need to co-ordinate with and get permission from many parties adds to the time required. Furthermore, the market is rather fragmented, dominated mostly by three different kinds of business approaches.

One is the vertically integrated automakers, such as Tesla, which are able to build their own charging network. Then there are the established energy giants, fearful of losing revenue streams from petrol stations – e.g. Royal Dutch Shell which plans to roll out half a million charging points around the world by 2025. And finally, there are specialist charging businesses like ChargePoint or EVBox. However, these companies have yet to find business models that will reliably produce profit even after governments cut their current subsidies.

Ultimately, most of potential EV owners are initially unaware of the scope of challenges that charging presents. They simply expect to re-charge whenever required. However, once they understand the charging requirements, market fragmentation, the still-developing infrastructure, and charging anxiety become major roadblocks en route to mass EV adoption.

## Navigating towards a solution

Yet automakers can provide a built-in solution that will provide peace of mind and always help drivers find a fitting and available charger.

This solution's foundation is a navigation that includes an always up-to-date network of charging points and utilizes real-time data from the vehicle itself (telematics) to calculate the optimal routes, including charging stops.

With a few exceptions, many of today's EVs still use the same or only slightly modified software as ICE cars. The route is often calculated assuming a fully charged battery and does not take into consideration how the driver actually drives, external

factors like the weather and traffic situation, or whether compatible chargers are available along the way.


These are the 5 key factors a reliable navigation solution of any electric car should take into account:

- Essential car and battery information: Essential vehicle and battery details; e.g. power output, battery capacity, age, etc.
- Charging connectivity: What modes (AC/DC) and types of adapters can be used to charge the vehicle?
- Real-time charging network availability: Where can the car get charged along the way and is the chosen charger available right now or used by another vehicle?
- Car telematics and driver behavior: Actual power consumption, driving style based on real-time telemetry and historical data.
- External information affecting the driving experience: Weather, traffic, charging costs, etc.

Sygyic offers a proven navigation solution that integrates directly with the electric vehicles' telematic data to eliminate charging anxiety and bring a premium driving experience.

Automakers can integrate Sygyic GPS Navigation SDK, including a dedicated EV Mode, with any type of electric vehicle – from passenger cars and light commercial vehicles (LCVs) to heavy-duty trucks (incorporating truck-specific parameters and restrictions).

Accessible directly from the car's infotainment dashboard, it further eliminates the need to reach for a phone while behind the wheel. The look & feel of the application can be also easily tailored thanks to predefined templates. Its public charging points network also provides real-time insight on charger availability and can be extended with private charging points as well.

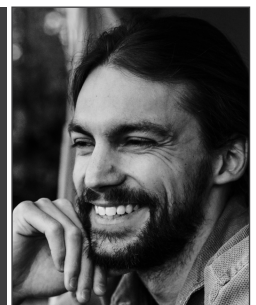
Accelerate the EV revolution and make charging anxiety history. 

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Sygyic has been actively involved in the global automotive market since 2004. Martin joined the company in 2017 aiming to enlarge the global footprint of navigation services provided by Sygyic to various OEMs and Tier1s in the segment of embedded and smartphone navigation for passenger vehicles, trucks and 2-wheelers. In the most recent years his focus has heavily shifted towards the segment of EV and its solutions.





# Connectivity platform enables central remote access

## How the eSIM Hub helps enterprises to centrally control global IoT applications

AVNEESH PRAKASH

Tata Communications

Manufacturing is constantly pushing boundaries and becoming global, while production processes are becoming more and more connected. Against this backdrop, reliable and secure connectivity plays a crucial role. Therefore, manufacturing companies need their devices to interact across the borders. To enable manufacturers leverage seamless global connectivity without engaging with different network operators in every region, the digital ecosystem enabler, Tata Communications has developed a platform: Tata Communications MOVE™ eSIM Hub. It enables companies to remotely commission and configure IoT applications worldwide and thereby improve their service.

In connected production environments, a constant flow of data is the be-all and end-all. When machines and plants communicate with each other and with the cloud, completely new possibilities open up for manufacturers. By collecting and analysing relevant data, manufacturers can increase efficiency and offer enhanced experiences to the end consumers. Services such as condition monitoring and predictive maintenance are creating new revenue models that are changing the role of machine manufacturers. From mere producers, they are becoming service providers that play a key role within their customers' production processes. The prerequisite for this, however, is reliable connectivity. This is the key to a manufacturer's ability to deliver on its promises. Increasing dependency on connectivity is also associated with risks, because a connection failure can quickly

cost several thousand euros per minute, depending on the production volume.

Organisations with production sites in different countries face additional challenges. They have to deal with different legal processes and mobile network providers in each country. In addition, more and more IoT-enabled devices are mobile. Asset tracking devices or connected vehicles, for example, must remain permanently connected even when crossing borders in order to perform their tasks and receive necessary software updates.

### SIM technology inhibits IoT applications

For a long time, companies used exchangeable SIM cards to connect and authenticate Internet-enabled devices with a local mobile network operator (MNO) in each region. However, this solution is no more practical with increasing mobility. It is not easily scalable, i.e., engaging with different MNOs in each country will need companies to insert different SIM cards in their devices every time or exchange them for international transfers. This can prove to be very expensive.

On the other hand, SIM cards require space in the product itself, which must be taken into account in the design. All of this takes place against the backdrop of elaborate business processes during their manufacture. For example, after production, a chip must first be recorded with information such as profile data and certificates before it is sold as a SIM card via the mobile communications provider to the machine builder or device manufacturer, who in turn passes it on to system

integrators or the end user. Since each company involved adds its profit margin, this production chain generates high costs.

### eSIM facilitates integrated connectivity

The eSIM technology has proven to be a solution to all these challenges. An eSIM is an embedded SIM that connects the device to the mobile network from the beginning, making it 'born connected'. Manufacturers and users thus benefit from 'out-of-the-box' connectivity that enables rapid, location-independent deployment of the device in question.

As a zero-touch solution, eSIMs allow updates such as operator profile changes to be applied remotely. This means that the relevant devices do not have to be configured by a technician on site every time a change is made, saving time and money. New devices can also be activated and managed online throughout their lifecycle, right from their manufacture. This means that companies can also put a large number of geographically widely distributed applications into operation at the same time and thus expand their capacities in an uncomplicated manner. At the same time, this 'over-the-air' configuration allows companies to quickly adapt their services to new circumstances worldwide.

With all this, eSIM technology simplifies product management, shortens time-to-market and improves service quality. At the same time, the fixed integration of the eSIM into the device in question increases data security, as it cannot be removed and stolen. Plus, companies can better control device access and usage as a result.

## Central control via eSIM Hub

To give enterprises centralized access to the eSIM technology, providers such as Tata Communications have launched platform solutions. The Tata Communications MOVE™ eSIM Hub, for example, enables seamless connectivity across different mobile networks and SIM providers. Through a single, comprehensive portal, enterprises can manage all their IoT connections and subscriptions globally during different stages of the product lifecycle, regardless of the connectivity technology or service provider used.

With its associations with over 600 MNOs across more than 190 countries, Tata Communications works closely with local MNOs to ensure maximum network reach and availability for connected services. In each case, data transfer is handled via the nearest point-of-presence to ensure the best possible connection quality. Meanwhile, preset connectivity with leading cloud providers ensures secure mobile connectivity over private networks. As the interface between hardware and software, the eSIM Hub thus enables IoT-enabled devices to securely and reliably dial into the mobile network anywhere in the world - regardless of which network they are on and which SIM provider they use. This greatly simplifies the implementation of IoT applications.

## More flexibility for global manufacturing

International companies in particular benefit from switching to such a platform. While it was previously necessary to conclude access and roaming agreements with the respective local network operators, the eSIM Hub now offers centrally regulated access to hundreds of networks in a large number of countries. It complies with current GSMA (Group Special Mobile Association) standards for eSIMs, making it possible to switch between different connectivity service providers and data tariffs - even if the device in question is already in use.

The straightforward onboarding of new profiles also gives companies more flexibility. This means they can also take existing mobile contracts with them when they switch to the eSIM Hub. To this end, the installed eSIMs are equipped with a bootstrap profile from the outset, which facilitates the download of new operating profiles and their migration. It also ensures

the connectivity of the respective device in the event of a fault.

## Integrated connectivity as a paradigm shift

The complicated deployment of traditional SIM cards and the associated infrastructural hurdles currently represent the bottleneck in the seamless connectivity amongst the different pillars of this ecosystem. Integrated connectivity with eSIM technology can change this. Combined with platform solutions such as the eSIM Hub, it acts as a door opener and paves the way to globally connected smart manufacturing. This gives machine and component manufacturers the necessary flexibility to commission, control and optimise IoT applications across borders. The eSIM technology thus promises nothing less than a paradigm shift in connected production. □

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## Industry Response to Budget 2022

*Along awaited step to setup international 'Arbitration Centre' in is highly welcomed from Ease of Doing Business point of view to reduce timeframe to resolve 'Commercial Disputes' on international pace and competence. This budget brings productivity in various sectors of economy with REFORMS to provide actual Ease like duty concessions for electronics, revoked anti-dumping duty on steel, reduced duty on chemicals etc. It's equally focused on Structural & Digital Infrastructure both to hold upcoming multi-trillion-dollar economy projections of India*

*Policy on Battery Swapping is being seen as highly needed for standardization of batteries to upgrade 'Charging' with 'Swapping' facilities to for faster adoption and energy-efficient mobility.*

*Robust expansion of Highways upto 25000 KMS by 2023 with new 100 cargo terminals in next 3 years, Budget also envisioned an ultra-modern logistical framework with encouragement to Startups to promote 'Drone Shakti' like 'Gati Shakti' for infra to address export. The government clearly intends to harvest recent growth in export during pandemic years by strengthening logistic sector with clear directions to Rail, POST to work together on logistics and also bringing Post Offices on core banking systems by 2022 is a masterstroke showing both intent and competence of union government to extend digital infra to include rural and semi urban in export economy.*

Abhijeet Sinha,  
National Program Director of Ease of Doing Business and National Highways for EV





# Advanced Driver Assistance Systems (ADAS) Testing Equipment - An Innovation in Automation

**NIKHIL KAITWADE**  
Future Market Insights

New trends and innovations are entering the automotive industry almost every day. As the world moves towards technologically advanced electric and autonomous vehicles, concerns regarding driver safety and driving efficiency are growing.

Engineers and scientists from all around the world are working to make driving comfortable and safe. Advanced driver assistance systems (ADAS) are the result of years of hard work. They are designed to automate, adapt, and upgrade automotive technology to increase driving safety.

Here the question arises, how will you test these systems before using them in real life applications?

As manufacturers strive to meet the safety norms, a holistic view of the software and hardware validation workflow is required for quickly recognizing test scenarios necessary for testing. Modern testing hardware and software are designed to test these systems for an almost endless number of scenarios.

In this article, we will look at some of the most important tests, simulation and trends that are expected to define the worldwide testing equipment market's future.

## What's the purpose of testing equipment?

Driver error is the leading cause of accident around the world. According to the National Highway Traffic Safety Administration (NHTSA), driver error is responsible for 94% of traffic accidents, with recognition errors being the most common cause. By using advanced driver-assistance systems

(ADAS) we can reduce accidents, injuries, and fatalities and eliminate human error.

For a system to perform efficiently, sensors, cameras, software, lighting, and audio components of the system must be tested thoroughly, so that they recognize obstructions and defects quickly and take necessary actions.

The testing system must be flexible enough to test passive or active systems, alerting mechanisms, and safety features without hindering the driver in parking and driving duties.

## Why is simulated testing becoming popular?

Test drives are a convenient and fool-proof method for evaluating a car's performance. We can do it on roads, in cities, or on designated test tracks. Real-life testing is beneficial since they enable the evaluation of a vehicle's performance in real-world circumstances.

Autonomous vehicle testing is a different ball game. Many unexpected circumstances that an autonomous car may experience cannot be covered in real-world testing. As a result, examining an autonomous vehicle's systems on-road isn't a viable choice.

Virtual simulation testing solves this issue. By creating a virtual environment for the system, we can simulate a whole driving situation and test the system using software. It allows self-driving automobiles to be tested in a variety of settings. Manufacturers are switching towards testing software as they provide hazard-free, accurate and less-cost testing options.

For instance, Alphabet subsidiary, Waymo utilizes computer simulation to

test its self-driving robot taxis. The company creates virtual city models and uses them to test its system. Every day, Waymo collects data on virtual journeys. Using that data, the firm incorporates information into its 600 minivans, which are then field tested to ensure that they are safe to drive on public roads.

Nvidia has also embraced virtual simulation for testing of autonomous cars and to boost vehicle security.

As simulation technology improves to meet the essential driving challenges, testing will become more prevalent in the virtual world. This effort will be crucial in furthering the evolution of autonomous technology, testing and validation in the actual world.

## Market Analysis of testing equipment's

The surge in technical advancements and innovation in the field of systems is expected to boost the market for its testing equipment in coming years. As per Future Market Insights report of Advanced Driver Assistance System (ADAS) Testing Equipment Market, sales are expected to grow at a 12.1% compound annual growth rate (CAGR) until 2031.

Rapid automation and the advent of self-driving vehicles are the key factors influencing the testing equipment market. As they contain electronic components which require regular calibration and testing, the demand for testing equipment's will remain steady in upcoming years.

Companies are collaborating to pool their resources for intensive research and development purposes. This strategy will

produce new integrated testing solutions and assist engineers in reducing the testing cost. Collaboration will seamlessly integrate test data and tools across the software verification with validation workflow system.

For instance, AVL, a leading company for providing test systems and the Netherlands Organization for Applied Scientific Research (TNO) are working together to speed up the validation of self-driving car technologies. AVL is creating a scenario-based open verification and validation tool chain that allows for fast test design and execution in a variety of testing scenarios. TNO has created a proprietary system for extracting scenarios and statistics from real-world driving data.

The AVL Test Case Generator will generate test cases and plans based on TNO StreetWise database circumstances. The simulation generator and open testing environments provided by AVL make it feasible to combine virtual and actual testing in a test plan that is optimal. Both aspects help us get closer to the smart testing of functionality that we all want.

## Future of testing equipment in United States

Future Market Insights report that, Advanced Driver Assistance System (ADAS) Testing Equipment Market, in North America is expected to grow at a staggering rate of 11.3% CAGR through 2031.

Automotive giants like Tesla, GM Motors, and Nissan has shown preference towards testing equipment's for testing their self-driving passenger vehicles and robo-taxis. United States being the epicenter of technical breakthroughs in the automobile sector will offer ideal conditions for testing equipment market to flourish in upcoming years.

The National Highway Traffic Safety Administration (NHTSA) is devising updated guidelines and imposing several road safety and vehicle assistance rules and regulations. With imposition of such state and national regulations, the demand for testing setups will increase over the decade.

Manufacturers and partnering with regional testing facilities for development and evaluation till the new NHTSA rules are finalized.

## What does the future behold?

The area of application for software-based test equipment will be vast in the coming years. As autonomy becomes a hot topic, automakers will be leveraging test software,

sensor fusion, and driver state awareness systems to ensure the safety of drivers, pedestrians, property, and vehicles. In addition, testing the system will become mandatory in upcoming years.

Automakers will be relying on state-of-the-art sensors to test the performance of driver assistance systems. As accuracy and reproducibility becomes the cornerstone of the global test equipment market, manufacturers are working on the development of automated calibration and configuration systems to reduce overall test time during the verification and debugging process.

The lack of in-house testing infrastructure and regulatory challenges for self-driving cars will enable manufacturers and OEMs to collaborate with testing centers to accelerate the development of system.

In the future, more and more testing will be performed in virtual environments as test equipment technology is being modified for simulating demanding driving scenarios. Such bold innovations will usher in a new era of modern automobiles. □

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## Industry Response to Budget 2022

*Budget 2022 is an articulation of purposeful intent enabled by a clear action plan. Building on the excellent budget of last year, the government has wisely continued on the path of prioritizing economic growth with calibrated fiscal prudence. For the Indian automobile sector, which is a significant contributor to the nation's GDP, the budget offers continuity and also additional opportunities to drive multi-year growth.*

*Specifically, the robust increase in capex by 35.4% to Rs. 7.5 lakh crore and a comprehensive investment plan for infrastructure is a significant growth booster. Additionally, the launch of the well-conceived PM Gati Shakti program for multi modal transport including 100 cargo terminals and investments in 25000Kms of highways, apart from investments in ports and metros is an excellent development that will help create a world class transport infrastructure in the country. This will reduce logistics costs and transit times, increase employment and make us globally competitive with avenues for better and efficient mobility solutions. Additionally, plans to create EV charging infrastructure including national policy for battery swapping which when combined with the already announced Automotive PLI scheme, furthers the agenda for green mobility. Tata Motors welcomes this balanced, thought through budget.*

P B Balaji, Group CFO, Tata Motors





# We need to change our strategy!

MOHAN SATYARANJAN

Taqanal Energy Pvt. Ltd.

To have less than 3% market share for something that is clearly acknowledged to be the most socially responsible A total of 50,866 vehicle were sold in India in the month of Dec. 2021 . While it was a 239% increase YoY (14, 978 EVs were sold in Dec. 2020), it was less than 3% of the total vehicles sold in the same month. In other words, India is still not buying EVs. thing to do, and despite a lot of government support, is puzzling.

In the year 2019 (the last pre-Covid year) the total number of vehicles old in India was 24.58 million, including 21.18 million two-wheelers. The total number of vehicles sold between 2011, and 2021 I higher than 200 million.

A closer look at the data corroborates the obvious fact that more than 80% of all vehicles in India is in the 2W segment. Among EVs, more than 98% of the volume is in the 2Wheeler & 3Wheeler (roughly equal numbers). Among E3Wheeler, significantly more passenger vehicles (~90%) are sold than cargo vehicles (~10%).

Very low penetration of EVs despite subsidies, high petrol/diesel prices, and serious promotional efforts is beginning to cause worry to players in the eco-system.

ICE vehicles (Petrol/Diesel/CNG/LPG) continue to sell in much larger numbers (about 40x). The supply chain of ICE vehicle parts is already well developed, and ICE technology has reached a stage of maturity that has evolved over 100 years.

Six out of the top 10 most polluted cities in the world are in India . Healthcare cost (public as well as private) are rising due to diseases caused by pollution. There is very good general awareness about the ill-effects of pollution, and the fact that vehicular pollution contributes to 40% or more of the total pollution. Electrification of transportation will make a significant different to pollution levels.

India's oil import bill in FY22 reached

67% of that in FY21 in just 5 months! India's oil bill in FY22 may exceed \$100 Billion (more than 800000 crore Rupees)!

## Why is it a problem?

India needs to be electrifying its transportation on a war-footing to be able repurpose the oil-import dollars to something more socially beneficial, and also significantly reduce pollution. EV sales need to go up significantly.

ICE vehicles have a well-developed supply-chain, and high volumes have brought costs down over the years. The current gap of 40x between ICE vehicle sales, and EV will continue to keep ICE vehicles more attractive unless extraordinary efforts are made.

Low volumes of EVs will prevent supply-chain for the EV specific parts (Motors, Controller, Batteries) from developing. Poor economics of scale will inhibit success.

Governments (state as well as central) have been providing incentives for last several years. Sincere efforts have been made to create demand as well as help the supply side. However, a less than 3% share of the pie after years of hype, and hope is certainly not good enough.

Hype collapses are typically catastrophic: public interest nosedives if the higher hopes created due to the hype are not delivered.

Collapse of public interest in EVs will be catastrophic: Pollution will continue to increase, and oil import bills will continue to swell.

## Why are so few EVs selling?

The commonly cited inhibitors of EV adoption are:

**Range Anxiety:** While more than 90% of the vehicles seldom do more than 40 Kms a day (65% of two-wheeler rides are less than 5 Km!), fear of getting stuck in the middle of nowhere on a rainy day with no charging stations nearby prompts people to look

for higher, and higher range in the vehicle. OEMs fit bigger, and bigger batteries to increase the range. Batteries are expensive, and heavy. Bigger batteries make the vehicle expensive, and need higher powered motors to move the heavy battery around. Higher powered motors consume more battery power, and OEMs have been experimenting to find the sweet-spot.

**High Initial Cost:** Bigger batteries increase the cost, and it is common to find the battery costing 50% or more of the cost of the EV (you can buy two ICE TATA Nexons for the price of one TATA Nexon EV, and still have money left for an international vacation!). Over the life of the EV, more energy would have been spent carrying the battery around that the occupants or the cargo!

**Safety Concerns:** EVs are in infancy, and the technology is still evolving. Fire incidents have happened, and they do create panic. OEMs are challenged to meet price expectations, and cheap, poor-quality imports have to be considered. The regulatory framework does not enforce high quality standards on all batteries.

**Maintenance Concerns/Reliability Issues:** With extremely low penetration of EVs, spare part availability is non-existent. Trained technicians are also not available everywhere. Even minor failures cause the vehicle to be unusable for long-periods of time. Bad news spreads fast, and as everybody fears being stranded, a lot of people want to wait till EVs become as reliable as ICE vehicles.

**Lack of Finance Options:** Vehicle purchase financing institutions have been hesitant in financing EVs, as there is no established & universally accepted method of determining the 'Remaining Useful Life' of an EV. Battery being the most expensive part, causes the maximum concern.

**Resale Value/Durability Concerns:** Lack of an established method to determine, 'Remaining Useful Life', also makes it

difficult to determine the fair market value of an EV.

**Brand Trust:** Trusted vehicle brands have been slow in their half-hearted attempts at EVs. New brands don't have matching, confidence inspiring showrooms, and service network.

**Charging Challenges:** It will take a while before chargers are ubiquitous in a country like India. Apartment dwellers are particularly challenged, as majority of them were built before the advent of EVs, and do not allow EV charging in areas where a large number of ICE vehicles are also parked is very risky. There have been scary stories of people charging their vehicle in their kitchen as that was the only place a 15A socket was available! Safety of EV charging in close vicinity of LPG pipes is not established yet, and must be avoided.

**Fear of job losses:** While apart from the engine, every other part or its equivalent is also there in corresponding EV, a fear psychosis around job losses has persisted. This is highly exaggerated. Service intervals in ICE vehicle too have been increasing. The only service requirement that EVs will not have, is the periodic oil-change.

**Subsidy on batteries:** While the government provides subsidy on batteries with all good intentions, subsidizing anything leads to problems: Innovation gets constrained, subsidy gets exploited, and the long-term goal gets compromised. In the author's personal opinion, it is immoral to give a few lakhs each, to a few thousand rich people, buying electric cars. It will not make a difference to them if they did not get the subsidy, and it will not make a difference if they did not buy their Electric Car. Subsidy, if at all, should be given to solutions that help the masses (such as Battery Swapping, Retrofitting as described later).

**No, "Killer Product" yet:** Despite a lot of hope, and hype there is no EV yet that everybody wants to buy. In the Passenger Car segment, a large number of good options have emerged, but they are a lot more expensive. Looking at the numbers, it appears that cycle-rickshaw replacement market has embraced electrification: E-Rickshaws have become popular in many parts of the country. However, in a country, where two-wheelers create more than 80% of the volume, despite a very large number of players, big announcements, hypes, hopes, it has been hell.

There is consensus that for EVs to start selling in large numbers, products rivaling in performance will need to be affordable, address range-anxiety, be safe, reliable, and it should be easy (read finance availability) to own, and service.

### A Silver Lining

Battery-Swapping/Leasing solutions have started emerging, and their adoption rates are encouraging. They offer the following advantages:

**Faster than Fastest-Charging:** Swap of the battery can be done in much less time than filling Petrol/Diesel/CNG/LPG. As the batteries are pre-charged, there is no need to wait for them to get charged up.

**No Range-Anxiety:** While currently, Battery Swapping Services are mostly expanding in private networks to cater to logistics companies (last-mile delivery), confidence has built-up that there is a viable solution to address Range-Anxiety". India, being a land of Frugal Innovations, 'Dial-A-



Petrol two-wheeler converted to Hybrid by retrofitting



Swap' kind of services are emerging (A djinn appears with a charged battery to swap your depleted battery, wherever you are!).

**Significantly Lower Initial Cost:** Once the battery is not part of the vehicle, its initial cost drops dramatically. Vehicles become affordable. Availing finance gets easier (less concern about 'Remaining Useful Life' sans the battery). Users pay per use (by Swap or by Kms or an equivalent model)

**Higher Reliability/Safety:** As the batteries are owned by the Swapping Service company, they benefit by building sturdier, longer-lasting, safer batteries for their business success. The end-user can always claim a replacement if not satisfied with the battery.

**No Charging Challenges:** The Battery Swapping company takes care of charging the batteries, and making them available where they are needed. Authors is aware of business models where the Swapping Solution Operators lease building roof-tops, install Solar, and use that to charge batteries

**Easier Financing:** EV batteries are expensive, and there are concerns about how long they will really last. With the battery out of the equation, financing gets easier.

While Battery-Swapping appears to be a panacea, specially for two-wheelers, and three-wheelers, concerns have started emerging:

**Lack of Standards:** While it would be utopia to have every vehicle use the same battery, that is not going to be possible as vehicles have different power requirements. Even in Petrol/Diesel vehicles all vehicles have different shape/size of the fuel tank. Batteries are analogous to fuel tanks of ICE vehicles. Given the high volume of vehicles, multiple viable swapping solutions are likely to co-exist profitably, each offering swappable batteries of different sizes, capacities, and voltages.

**Lack of subsidy:** While Battery Swapping has the potential of kick-starting

rapid adoption of EVs, there is no active support from the government.

## Elephant in the room

Even if all new vehicle sales turn 100% electric from tomorrow, we will still have more than 200 million Bharat Stage-III, and Bharat Stage-IV vehicles on Indian roads. While close to 2 million ICE vehicles will retire every year, as overall percentage of vehicles they will continue to be large. Being older, they will continue to pollute more than newer vehicles, and they will keep consuming Petrol/Diesel/LPG/CNG in large quantities, keeping our import bills high.

A reasonable solution needs to be offered to owners of such vehicles too. It is in everybody's interest that the older legacy vehicles reduce their fuel consumption, and significantly reduce pollution they cause.

## A solution

The most viable option is RETROFITTING the vehicle. There two possible ways:

1. Replace the ICE Drive Train with Electric
2. Retrofit an additional Electric Drive Train to an ICE Vehicle (convert an ICE vehicle to Hybrid)

A lot of successful retrofits of ICE vehicle into pure EV have been reported in India, including those for buses. Quite a few of them are already approved, and road legal. They are very attractive for the following reasons:

1. Significantly reduced cost per KM: On an average the operational cost per KM for an ICE vehicle becomes at least one third when converted to pure EV. For example, cost per KM of Diesel TATA Ace is approximately Rs. 10 pe Km., and post conversion to Electric, it is about one rupee per KM. The maintenance costs also come down.
2. There is NO noise or vibration

3. Helps grow the EV supply chain (each retrofit needs at least a motor, at least a controller, and at least a battery) that would eventually make EVs more viable.

The cost of conversion can be significant with a large battery. However, if battery swapping options are used, the solution becomes very attractive financially.

The ideal solution appears to be fitting an Electric Drive Train in addition to the exiting ICE train (conversion to Hybrid). Such vehicles can be used as an EV till the battery runs out, and then revert to the original drive train. Approved solutions for two-wheelers have started appearing, and solutions or other class of vehicles are under development at a variety of places.

As one has the option of reverting to the ICE engine mode at any point of time, there is absolutely NO Range-Anxiety in such vehicles. Lack of Range-Anxiety eliminates the need for big batteries, and the solution can be quite affordable with a relatively smaller battery.

Such conversions are a little more complex than complete conversion to electric, but have the added advantage that one can revert back at any point of time.

## Summary

Despite obvious benefits, and possibility of faster adoption, such solutions have not received any encouragement from the government. These options need to be covered under the various incentive schemes. Despite a lot of hope, hype, government encouragement, EV adoption continues to be a mirage in India.

Close to 97% of all vehicles sold, continue to be ICE vehicles. Introduction of Battery Swapping services has the potential to remove most of the inhibitors. There are already more than 20 million ICE vehicles on India roads, and a good solution needs to be found for them to start reducing fuel consumption, cost of travel, and pollution levels rapidly.

Retrofit is emerging as a new class of viable solutions for such vehicles. However, there is no active support to facilitate the adoption of such solutions. It is important to promote viable solutions to help establish the EV supply-chain. Battery Swapping, and Retrofitment need to be actively promoted to initiate the electrification of transportation. □



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# THE DAWN OF CONNECTIVITY MONETIZATION: WHAT IS VEHICLE LOCATION-BASED SERVICES (VLBS)?

 ANKIT BHATIA  
Sheeva.AI

## Current Trends in Connected Vehicle Monetization

Connectivity has been offering an immense value to the vehicle owners via a new universe of connected features and services across critical consumer needs: safety, convenience, security, entertainment, and vehicle diagnostics. Almost all of India's OEMs have started offering these features and services as a part of their connected vehicle strategy; prominent examples include Suzuki Connect, Hyundai blueLink, Tata iRA/ZConnect, Mahindra AdrenoX, and MG iSmart.

The automotive industry in India is going through a digital transformation. The vehicle is not merely a commodity for OEMs and Tier-1s. Its architectures are increasingly becoming software-defined to offer customization and monetize safety-critical features and infotainment to, ultimately, vehicle performance.

Though the monetization prospects in this segment are huge -- and they are gradually being tapped across the entire automotive value chain in India -- the features and services are still limited to the vehicle platform. The true disruption in monetization avenues and business models is happening outside the vehicle platform, where the vehicle becomes a part of either the *driver's digital ecosystem* or a *vehicle-centric services infrastructure*.

By integrating the driver's existing digital ecosystem, including smart devices, voice assistants, and other content and apps, a *seamless user experience* is being created to derive new value from the

vehicle. At the same time, the utility of these new platforms is being analyzed for infrastructure-based services and solutions, like traffic management, city planning, usage-based insurance (UBI), shared mobility, and GNSS tolling. As well, it can enable easier access to essential services like fueling, parking and curbside pick-up/drive-thru.

Once the vehicle becomes a part of a larger ecosystem, the value perceived and derived can be transformational. To leverage these opportunities of the connected ecosystem around the vehicle, an extensive amount of data is being generated, gathered, stored, and analyzed to extract actionable insights. This data can have several attributes centred around driver preferences, services patterns, and many others, but the most significant among these attributes is *location intelligence*. The insights derived from other attributes remain static but when coupled with vehicle location, such attributes become dynamic and offer rich context. Vehicle Location Based Services (VLBS) encompasses the whole spectrum of services associated with position accuracy, including fueling, parking, tolling, curbside service, insurance, fleet management, along with smart city planning.

## What enables VLBS?

Vehicle location has the power to transform the way transactions occur and services are delivered, collectively termed "in-vehicle commerce" or v-commerce. In the 1990s and 2000s, the boom in personal computers and the internet connected

retailers and buyers directly, which was the first form of e-commerce. As smartphones proliferated in the late 2000s, commerce shifted to these new mobile computers we all carried in our pockets, and m-commerce was born. But through the history of these digital commerce formats, the following enablers, which are dubbed "*LIPUN*," remained critical at each stage:

- **Location (L):** Source and destination of goods
- **Identity (I):** Know your customer (KYC)
- **Presence (P):** Customer authentication
- **Ubiquitous Notifications (UN):** Around-the-clock ability to connect

The next frontier of digital commerce will see integration into the vehicle, but the core enablers of "*LIPUN*" will remain the same. To create a seamless user experience akin to e-commerce & m-commerce, the vehicle platform needs to deliver on all these enablers simultaneously.

## The Path to VLBS Monetization

The current set of solutions around VLBS are being delivered primarily in two modes -- the latent service layer and the real-time service layer.

With the *latent service layer*, the data from the connected vehicles are stored over the cloud in a raw format. The conventional means of data cleaning, mining, and analysis are conducted to provide meaning. The solution providers have created aggregation and software platforms following data privacy

## FASTag: VLBS Enablers

Enablers	Active	Remarks
Location	✓	FASTag & NETC Mapper
Identity	✓	NETC Mapper
Presence	✓	FASTag
Ubiquitous Notifications	×	Lacking due to No Connectivity

compliances to perform the objective of deriving meaningful insights.

These insights can be categorized into various group, like vehicle location, vehicle operations, vehicle performance, traffic management and planning, and driving patterns. These insights are then integrated into Application Programming Interfaces (APIs) that are made open to partners or third-party application developers on licensing or subscription basis.

Through the latent service layer, few of the location-based services such as UBI, traffic management, fleet management, and service asset layout are leveraged extensively to create revenue streams for service partners. But due to the lack of real-time context, the direct value creation for customers and the inherent experience remains limited.

To create a direct value for customers/drivers, **understanding their needs and wants are essential**. And this can happen only if services can satisfy those needs and wants on a real-time basis or - as the marketing world likes to call it - in the **“Moment of Truth.”** The objective of the **real-time service layer** is not only to become aware of the real-time needs of a driver but also to connect those services directly to the driver.

The differentiating factor here is the use of location intelligence to provide **real-time context** to the service provider and not merely insight about their needs. In India, one service that comes close to the real-time service layer is the National

Electronic Toll Collection (NETC) or FASTag. Though the toll payments are not in real-time, the service is delivered in real-time, with few of the VLBS enablers still at play.

The real-time context immediately unpacks opportunities, from becoming aware of driver needs, to triggering contextual alerts, and actively engaging the driver at every touchpoint across the entire user journey. This approach does not limit the service provider and driver to only service discovery and delivery. It pushes the frontier into the realm of digital payment, thus completing the entire transaction loop.

For drivers, the perceived value is in terms of convenience and seamless experience, while for service providers the real-time service layer offers an unmatched opportunity to enhance the user journey and experience. The user touchpoints can be personalized subjected to a driver profile while offering a premium solution for **marketing attribution** and **customer loyalty**, which are limited with other smart devices.

Akin to the latent service layer, the real-time service layer also deploys APIs customized for different services, with vehicle data and driver profiles analyzed and focused on delivering just-in-time services. This range of services can be bundled to create a new marketplace, enabling new business models to monetize connectivity.

## The Sheeva.AI Solution

The ecosystem for real-time services in the automotive industry is continuously evolving and more so, due to the innovations in safety-critical applications like Advanced Driver Assistance Systems (ADAS), V2X Connectivity, and Autonomous Vehicles. Such technologies are pushing the boundaries for real-time vehicle connectivity and data processing. With VLBS, various technologies and solutions have reached a certain level of maturity in the market; one of the prominent solution providers in the space is Sheeva.AI.

The Sheeva.AI solution matches location intelligence and vehicle/driver needs with cloud-based services. The main upfront advantage for the OEMs/Tier-1s is that there is **no need to modify the vehicle architecture**. For the service providers, there is **no need to install additional infrastructure** to identify the driver and contextual needs. All the service assets (fuel stations, parking lots, toll plazas and retail locations) are geofenced on the Sheeva server as an integrated use case that interacts with service providers & payment processors via a **“Single-API.”**

Location intelligence is derived from Sheeva’s patented geolocation algorithm that can integrate into the vehicle’s telematics control unit (TCU) or in-vehicle infotainment (IVI) system, with access to CAN messages and the ability to detect vehicles with sub 2-meter accuracy and precision. This accurate vehicle location is automatically mapped to the integrated use case and addresses four core questions:

- Who is driving? (payment security and authentication)
- What do they need to pay for? (payment routing and point-of-sale notification)
- How much do they need to pay?

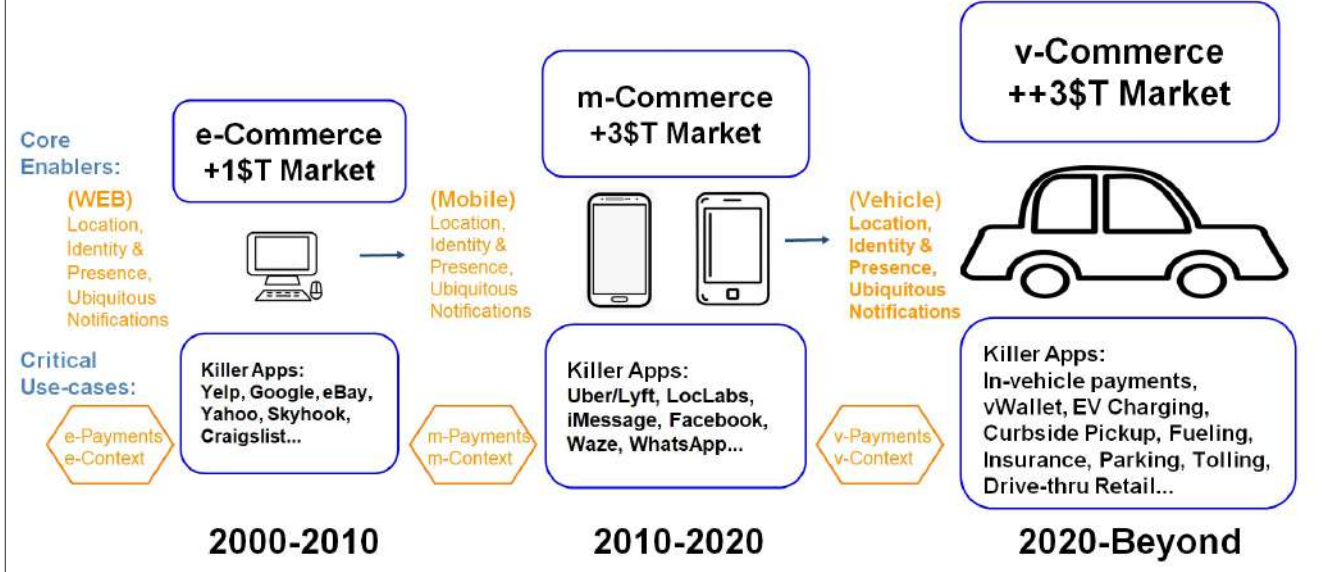




# x-Commerce All Over Again

The Problem: Core Enablers are necessary for a new digital ecosystem to thrive, and no platform today delivers these to market.

The pattern is consistent: location-enabled v-Commerce is the next big thing!



(payment/invoice reconciliation)

- Who do they need to pay to? (payment transmission and settlement)

As opposed to a pull API, Sheeva's Single-API is a push structure that can be utilized to proactively identify the driver's needs and send context-driven alerts for a particular use case. Service providers can handle such alerts on their server for pushing targeted ads and automating the payment, which is routinely handled manually by the user. The structure provides an inexpensive means to build **user stickiness** and **foster loyalty**.

## "LIPUN" Is Here To Stay

While Sheeva.AI distinctively makes use of location intelligence with its own set of infrastructure-agnostic solutions, other providers are also expanding the frontiers of VLBS in their own ways. But for the

future of VLBS enablers, Sheeva.AI is the only platform that covers "LIPUN" factors comprehensively.

Today, automotive stakeholders often put the smartphone at the core of their location-based services offerings, as they see the ubiquity of these devices and the built-up app ecosystem. They also see the challenges associated with altering user behaviour away from their ingrained smartphone routines.

But take a closer look at the power of VLBS versus the smartphone. The smartphone's location is inherently dynamic, inaccurate, power-hungry, and expensive, and they tend to be present with the user as opposed to the vehicle. This makes it impossible to proactively identify driver needs and complete an in-vehicle transaction loop with ease and speed to provide the best customer experience. It's

clear that you need to put the vehicle at the core when identifying the services or other driver needs and servicing them in a way that compliments the user journey on a smartphone.

Sheeva.AI's goal is to remove any frictions in the user journey for vehicle-centric services such as fueling, tolling, parking, and curbside pick-up/drive-thru. Instead of a smartphone, use the vehicle to identify the need for such services while using push APIs to interact with the underlying smartphone application ecosystem to authorize, authenticate, and pay for the service. For example, if an oil marketing company (OMC) already has an active mobile application that drivers can use to pay for petrol, Sheeva will use existing endpoints of the service provider API to automate the part of the transaction that is typically handled by the user, including entering the fuel pump number and choosing the payment method when the user arrives at the fueling station to activate fueling.

VLBS is the much-needed paradigm shift aimed at building services around the vehicle while simultaneously **leveraging the existing mobile application ecosystem** to reinforce customer loyalty, a common Achilles heel for OEMs and service providers alike. □



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# Everything you need to know about Intelligent Speed Adaptation Systems

**TUSHAR BHAGAT**  
Uffizio India Pvt. Ltd.

## The actual cost of over-speeding

It is no news that the speed of your fleet influences the probability and severity of road accidents. The relationship between speed and severity of road crashes has been long recognized. In high-income countries, speed contributes to about 30% of deaths on the road while in some middle-income countries, the speed of the fleet at the time of the crash is quite pertinent to about half of all road fatalities. This relationship has proved critical for vulnerable road users like pedestrians and cyclists as well. Pedestrians have been shown to have a 90% chance of survival when struck by a car traveling at 30 km/h. However, the survival rates dip to 50% with a mere 15km/h increase in the car's speed.

The fatality risk (%) vs. speed of a car (km/h) is plotted as seen in the graph above. One can easily trace the dramatic increase in pedestrian fatality with the slightest increase in the car's speed. The above data throws light on how regulating speed limits can help reduce the contingency and impact of road crashes. Road crashes don't just impose a threat to human lives but also adversely affect productivity and travel times. The

cost of these road crashes averages 3% of the GNP (gross national product) for a majority of mid and high-income countries. This cost is nothing compared to the 1.2 million people who die and 50 million people who get injured every year because of road accidents all around the world. For businesses, a road accident means a hike in insurance premiums, thousands of bucks in legal fees, and expensive post-accidental repairs. Needless to say, a broken down fleet and an injured driver are not the only loss—the business also loses its precious money-making hours.

## Intelligent Speed Adaptation (ISA)

Over-speeding and its adverse effects have created a need for sustainable speed-monitoring solutions. Several nations are looking up to the automotive telematics industry for help. By the end of next year, the European legislation requires carmakers to install GPS-enabled technologies that can warn drivers if they're going above the speed limit on any road. They are popularly known as Intelligent Speed Adaptation systems and are a part of the intelligent transport system (ITS). Quickly reaching their technological maturity, they are here

to reduce the incidence and trauma of road accidents. The intelligent speed adaptation systems are hence referred to as a class of ITS in which the driver is warned of over-speeding. Recent developments have also made it possible for ISA

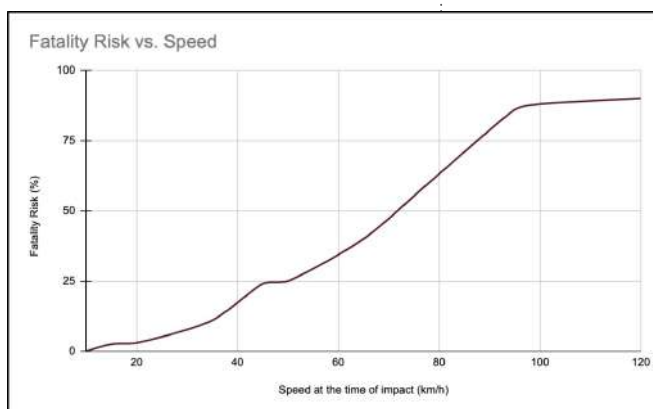
to interfere and restrict speeding when the driver is traveling over the limit.

There are two dominant classes of intelligent adaptation systems: speed alerting and speed limiting. With the speeding alerts, the system warns the drivers when they go over the speed limit. The warning can be visual as well as auditory. Whereas the speed-limiting systems give the drivers a "haptic" warning. In it, the driver will face increased upward pressure on the accelerator pedal. Thus, making it difficult for the driver to accelerate until the speed of the fleet returns within the complaint limits.

For both classes, the maximum speed at which travel can be permitted depends on the posted speed limits. For this to happen, information regarding the location and current speed of the vehicle is required. This is obtained primarily via global positioning systems or GPS technology. With its help, information regarding the road network, speed, and road infrastructure is stored in a digital database. An on-board computer continuously analyzes the location of the vehicle and compares the permissible speed limit with the current speed limit. Then, visual, auditory, or haptic warnings get issued.

## Impact on Safety

For a very long time, ISAs were feared and seen as speed limiters. However, the true nature of intelligent speed adaptation systems is rather intricate and nuanced. In reality, the only intention of ISA systems is to enhance on-road safety. The society of automotive engineers cites that when ISA is used along with active safety features, the chances of a collision incident go down by 30%. The primary purpose of equipping cars with intelligent speed adaptation systems is to prevent speeding. These systems make sure that all fleet drivers





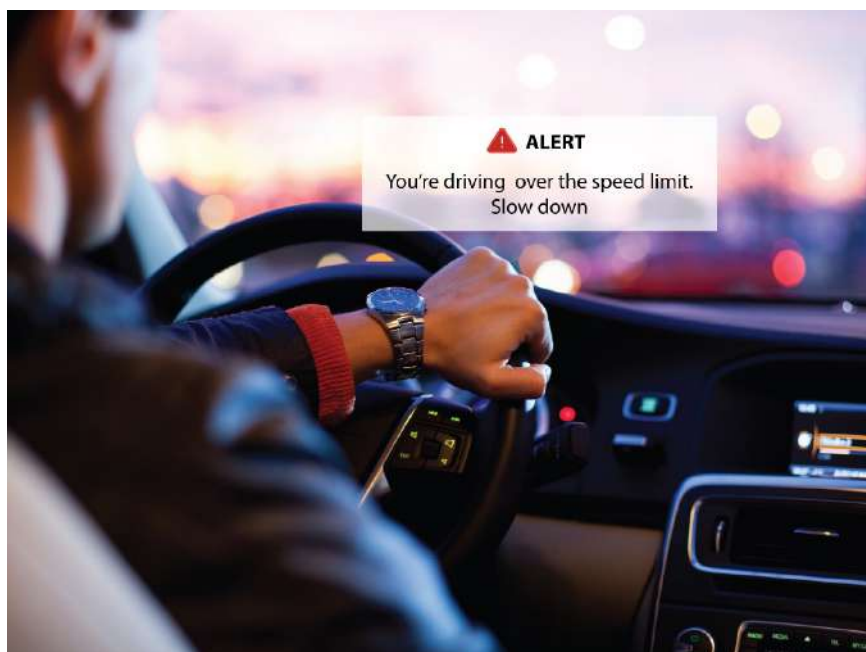
oblige to speed limits. While advisory ISA systems are already available and deployed. However, fully intervening ISA systems are being tested and tried extensively. Trials conducted at the Norwegian Institute of Transport and Research show that the widespread adoption of ISAs will reduce pedestrian fatalities by 20%.

However, ISA systems do more than just reduce the occurrences of collisions. They increase driver alertness. It is very common for drivers to lose sight of the speed limits when traveling across long distances. With ISA, not only will the fleet be brought back to a compliant speed limit, but also the driver's level of alertness will increase. Spiking up drivers' attention can help prevent accidents that happen because of reckless overtaking or lane changing. Hence, these intelligent speed adaptation systems are designed to combat distracted or drowsy drivers as well. The complete realization of ISA systems is important to boost the safety and productivity of the fleet and its drivers. Once we do that, we'll see how quickly we mitigate COAs (the cost of accidents). Any business that depends on logistics or transportation would greatly benefit from these ISA systems.

### Studies and Trials

Several Asian and European countries like China, Malaysia, Netherlands, Denmark, the UK, and Finland are funding research and permitting trials of speed-alerting ISA systems. For instance, trials conducted by the University of Denmark involved twenty-four participants. These participants received a visual and auditory warning every time they exceeded the speed limits by 5km/h. The results of this trial were pretty astounding. Average speeds were lower when the participants drove with ISA systems. Additionally, 75% of participants held a positive response to the speed-monitoring device.

Similar results were seen in the trials conducted in Malaysia. 11 participants were required to drive vehicles that were fitted with ISA systems. The participants were asked how they felt about the speed monitoring system. In response, 9 out of 11 participants felt confident driving with a speed-limiting device. They said it helped them drive confidently—for they'll always know when they exceed speed limits.



### What's Next for ISA systems?

It is understandable why businesses and the governments of the world would like to adhere to speed limits. Following speed limits means lesser human fatalities. It means a dramatic decrease in the socio-economic costs of accidents. This is why ISA systems should be mandated. Intelligent speed adaptation systems (ISA) are in-vehicle systems that compare the current speed of the vehicles with the permitted speed limit and send notifications accordingly. The intervening ISA systems, an advanced class of ISA, put upward pressure on the gas pedals—thus making it difficult for drivers to accelerate. The pressure is taken off once the fleet reaches a compliant speed limit. Studies and trials in multiple European countries have proved that ISA systems are effective in altering driver behavior. As an added advantage, these ISA systems are also successful in increasing driver alertness. As a consequence, driving behaviors, on the whole, were enhanced. Alert drivers

seem to change lanes cautiously, stop at intersections, and don't tailgate. Therefore, the complete realization of ISA systems is going to yield many benefits and their large-scale adoption is pertinent to on-road safety and efficient logistics. □

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#### AUTHOR

##### TUSHAR BHAGAT

Director  
Uffizio India Pvt. Ltd.

Tushar Bhagat is the CEO of Uffizio. He has simmered 15 years worth of informatics knowledge & experience into a one-of-a-kind telematics platform. This fleet management system has been acclaimed and widely used by businesses in over 60 countries. Mr. Bhagat firmly believes in finding creative solutions to everyday challenges—so businesses can bloom into their full potential.



# SKODA KODIAQ

## L&K

Skoda relaunched the Kodiaq in India on January 10. The updated Kodiaq will be available in Style, Sportline and Laurin & Klement (L&K) trim levels. Price for Skoda Kodiaq starts at Rs 34.99 lakh, ex-showroom. The Sportline and L&K trims are priced at Rs 35.99 lakh and Rs 37.99 lakh.







## SPECIFICATIONS

### Safety Features:

- ◆ Overspeed Warning - 1 beep over 80kmph, Continuous beeps over 120kmph
- ◆ Airbags - 9 Airbags (Driver, Front Passenger, 2 Curtain, Driver Knee, Driver Side, Front Passenger Side, 2 Rear Passenger Side)
- ◆ Middle rear three-point seatbelt
- ◆ Middle Rear Head Rest
- ◆ Tyre Pressure Monitoring System (TPMS)
- ◆ Child Seat Anchor Points
- ◆ Seat Belt Warning

### Engine & Transmission:

- ◆ Engine Type - Turbocharged Petrol Engine
- ◆ Fuel Type - Petrol
- ◆ Max Power - 188 bhp @ 4200 rpm
- ◆ Max Torque - 320 Nm @ 1500 rpm
- ◆ Drivetrain - 4WD/AWD
- ◆ Transmission - Automatic - 7 Gears, Manual Override & Paddle Shift, Sport Mode
- ◆ Emission Standard - BS6
- ◆ Turbocharged

### Braking & Traction:

- ◆ Anti-Lock Braking System (ABS)
- ◆ Electronic Brake-force Distribution (EBD)

- ◆ Brake Assist (BA)
- ◆ Electronic Stability Program (ESP)
- ◆ Four-Wheel-Drive - Manual Shift - Electronic
- ◆ Hill Hold Control
- ◆ Traction Control System (TC/TCS)
- ◆ Hill Descent Control
- ◆ Differential Lock

### Locks & Security Features:

- ◆ Engine immobilizer
- ◆ Central Locking - Keyless
- ◆ Speed Sensing Door Lock
- ◆ Child Safety Lock

### Telematics Features:

- ◆ Find My Car
- ◆ Check Vehicle Status Via App
- ◆ Geo-Fence
- ◆ Emergency Call
- ◆ Over The Air (OTA) Updates
- ◆ Remote AC On/Off Via app
- ◆ Remote Car Lock/Unlock Via app
- ◆ Remote Sunroof Open/Close Via app
- ◆ Remote Car Light Flashing & Honking Via app

### Entertainment, Information & Communication Features:

- ◆ Wireless Charger

- ◆ Smart Connectivity - Android Auto, Apple Car Play
- ◆ Integrated (in-dash) Music System
- ◆ Touch-screen Display
- ◆ GPS Navigation System
- ◆ 6+ Speakers
- ◆ USB Compatibility
- ◆ Aux Compatibility
- ◆ Bluetooth Compatibility (Phone & Audio Streaming)
- ◆ AM/FM Radio
- ◆ iPod Compatibility
- ◆ Internal Hard-drive
- ◆ Steering mounted controls
- ◆ Voice Command

### Instrumentation:

- ◆ Digital Instrument Cluster
- ◆ Electronic 2 Trips Meter
- ◆ Average Fuel Consumption
- ◆ Average Speed
- ◆ Distance to Empty
- ◆ Digital Clock
- ◆ Low Fuel Level Warning
- ◆ Door Ajar Warning
- ◆ Adjustable Cluster Brightness
- ◆ Gear Indicator
- ◆ Shift Indicator
- ◆ Digital - Tachometer
- ◆ Instantaneous Consumption



# TATA SAFARI

## XZA Plus Dark Edition

Tata Motors has now expanded the features on offer with the standard Tata Safari with the launch of Tata Safari Dark Edition on 17th January. Prices for the Tata Safari start from Rs 14.99 lakh for the base XE version. The standard Safari XZA Plus is priced at Rs 21.94 lakh while the XZ Plus starts from Rs 20.64 lakh.



# SPECIFICATIONS

## Safety Features:

- ◆ Overspeed Warning - 1 beep over 80kmph, Continuous beeps over 120kmph
- ◆ Airbags – 6 Airbags (Driver, Front Passenger, 2 Curtain, Driver Side, Front Passenger Side)
- ◆ Tyre Pressure Monitoring System (TPMS)
- ◆ Child Seat Anchor Points
- ◆ Seat Belt Warning

## Engine & Transmission:

- ◆ Engine Type – 2.0 L Kryotec
- ◆ Fuel Type – Diesel
- ◆ Max Power - 168 bhp @ 3750 rpm
- ◆ Max Torque - 350 Nm @ 1750 rpm
- ◆ Drivetrain – FWD
- ◆ Transmission - Automatic (Torque Converter) - 6 Gears, Manual Override, Sport Mode
- ◆ Emission Standard – BS6
- ◆ Turbocharged

## Braking & Traction:

- ◆ Anti-Lock Braking System (ABS)

- ◆ Electronic Brake-force Distribution (EBD)
- ◆ Brake Assist (BA)
- ◆ Electronic Stability Program (ESP)
- ◆ Hill Hold Control
- ◆ Traction Control System (TC/TCS)
- ◆ Hill Descent Control

### Locks & Security Features:

- ◆ Engine immobilizer
- ◆ Central Locking - Keyless
- ◆ Speed Sensing Door Lock
- ◆ Child Safety Lock
- ◆ Telematics Features:
  - ◆ Find My Car
  - ◆ Check Vehicle Status Via App
  - ◆ Geo-Fence
  - ◆ Over The Air (OTA) Updates
  - ◆ Remote AC On/Off Via app
  - ◆ Remote Car Lock/Unlock Via app
  - ◆ Remote Car Light Flashing & Honking Via app

## Entertainment, Information & Communication Features:

- ◆ Wireless Charger
- ◆ Smart Connectivity - Android Auto,

- Apple Car Play
- ◆ Integrated (in-dash) Music System
- ◆ Touch-screen Display
- ◆ 6+ Speakers
- ◆ USB Compatibility
- ◆ Aux Compatibility
- ◆ Bluetooth Compatibility (Phone & Audio Streaming)
- ◆ AM/FM Radio
- ◆ iPod Compatibility
- ◆ Steering mounted controls
- ◆ Voice Command

## Instrumentation:

- ◆ Analogue - Digital Instrument Cluster
- ◆ Electronic 2 Trips Meter
- ◆ Average Fuel Consumption
- ◆ Average Speed
- ◆ Distance to Empty
- ◆ Digital Clock
- ◆ Low Fuel Level Warning
- ◆ Door Ajar Warning
- ◆ Adjustable Cluster Brightness
- ◆ Gear Indicator
- ◆ Shift Indicator
- ◆ Digital – Tachometer
- ◆ Instantaneous Consumption



# Aftermarket Telematics - The Real Revolution yet to Begin

 **FEROZ REHMAN**  
Transight Systems Pvt. Ltd

**A**ftermarket telematics, as its name suggest is a Telematics Solution which gets retrofitted by the Vehicle Owner primarily for vehicle tracking, fuel monitoring, driver monitoring etc. Hence its done purely based on an actual need and not just a feature coming fitted in a vehicle.

The Aftermarket telematics got its significance in the early 2000s when Big Fleet companies, large Oil and Mining Corporations made it mandatory to track their vehicles. Earlier, it was just to ensure the security of passengers as well as checking speed limits in big campuses and oil fields. Later, the product evolved and were tailor made according to the variety of requirements of individual customers and industries. This paved the way for much wider penetration of the product into smaller Fleets.

The evolution of industry has been so rapid that the quantum of data captured from vehicles has changed from simple locations and speed to the minute of its detail including engine parameters, fuel economy and even the exact information of the cargo being transported.

Generally, aftermarket telematics solutions are implemented by local system integrators or dealers. Hence every time a customer brings up a different use case, SIs are ready to tweak their software by adding different features like new dashboards and reports. In many cases, hardware customisations are also implemented by integrating different type of sensors to the main unit; fuel, temperature, humidity, light, contact, pressure, weight, and tyre, to name a few

The addressable market for aftermarket telematics solutions is significant. At the end of 2019 just before pandemic, there were an estimated 1.12 billion passenger cars and

light trucks registered worldwide. Even though aftermarket car telematics services face competition from smartphone- only solutions and OEM solutions, it is noted that the aftermarket telematics market is in a phase of strong growth. In a recent study report published by Berg Insights, it is estimated that total shipments of aftermarket telematics systems reached almost 24.7 million units worldwide in 2019. Growing at a compound annual growth rate of 14.4 percent, the shipments are expected to reach 48.5 million units in 2024. The number of aftermarket car telematics systems in active use is forecasted to grow at a compound annual growth rate of 14.6 percent from 77.1 million in 2019 to 152.1 million worldwide in 2024. The penetration rate will at the same time grow from 6.4 percent in 2019 to 11.1 percent at the end of the forecast period.

Stolen vehicle recovery and security-related telematics applications are mature aftermarket car telematics applications whereas other direct-to-consumer car telematics solutions have more recently started to emerge. Regional market conditions such as a high level of vehicle crime influence the demand for stolen vehicle tracking and have made SVT solutions popular in countries such as Brazil, Argentina, China, Israel, Russia and South Africa. The number of dedicated active aftermarket SVT units in use is forecasted to reach 68.6 million in 2024, up from 47.1 million at year-end 2019.

## Challenges and Competition

As the market and demand grows for Telematics, its not just contributing to Aftermarket segments, OEMs and Smart Phone options are also equally emerging in the same way. However, the Aftermarket

options make its value proposition distinct to others and hence it has build a different segment with its unique advantages

### **OEM Fitted and Aftermarket**

Since the dawn of m2m revolution, it has become a priority for the OEMs also to have their part in Telematics, Volvos and Daimlers were the pioneers to add it to their vehicles. Volvo Dynafleet is an extensive and comprehensive solution, which captures even the minutest data from their vehicles and brings intelligent analytics out of it.

But now even simple scooters have become connected! They give their best information to the owners through a concise mobile application.

However, in a bigger picture this will not suffice the actual Telematics requirements of a Fleet Manager or an Organisation who really wants to use it efficiently. Prime reasons being

- Almost all major fleet companies and organisations operate multi-brand fleet. Hence its not possible to get everything under one umbrella. In simple words, Volvos doesn't want to share their info to Daimler platform or even to a third party fleet management software. So, if a company with 5 different branded vehicles have to use 5 software platforms, which becomes really difficult to get meaningful reports and analysis out of it.
- After sales service and support is also a big challenge for OEM Telematics. For each and every support cases, customers need to bring the vehicle to dealerships and in many cases a dealer doesn't have a proper service support team to solve customers queries about telematics software. On the other hand, aftermarket guys would be at your door steps for any service support and many cases they are ready to travel to remote locations where



vehicles are currently placed.

- Customisation and Integration is also one of the biggest limitations of OEM options. Mostly all large fleet companies would have their way of operations and priorities. For example, some of them would need driver identification some other need passenger security options or in some cases it would be cargo monitoring options like temperature, pressure, weight etc. Here no OEMs are going to customise their solution for such requirements. Hence aftermarket telematics is the only space where you can get your requirements clearly addressed.

### **Smart Phone Replacing Device Telematics**

Since the Uber revolution began, Taxi aggregation concepts have changed the entire perspective of transportation, now days this concept have placed its strong foot prints in commercial transportation also. Here the entire show is apparently run by Smart Phones, and hence it is being said, this can be a big threat for Aftermarket Telematics Industry. But on the contrary, when we analyse the exact value proposition offered by two options, we can see a clear distinction in the very basic use cases itself.

- One of the main reasons for installing an external Location Tracking or fuel sensing device is to minimize the dependency in Drivers and hence make the entire fleet management operations automated. So to get this data from the very drivers phone doesn't make any sense here!
- Majority of fleet managers prefer to install telematics solution not just to track the location of vehicles. They have much higher priorities like to get the engine status, idling conditions, Trip information, fuel levels etc. Such details cannot be pulled through a smart phone because this information depends on different inputs from the vehicle, which is not accessible by a phone.
- Confidentiality and Durability is another main reason for making device telematics distinct. Majority of the fleet companies wants the device to be inaccessible by the driver and has to be full time powered, so in most cases the devices are planted inside the vehicle body where it is kept well hidden and

directly connected to the vehicle battery. Phones need to be recharged!

Hence such priorities will completely rule out the possibility of replacing device telematics with Phones!

### **The Real Revolution is only beginning**

Although Aftermarket Telematics have been here for over 2 decades, its penetration and numbers compared to the total market size, is still very lean. Just consider the Indian market, still over 90% vehicles belongs to unorganised segment where things are happening very conventionally. Although we saw a slight change in this owing to the smartphone revolution, major crowd including individual vehicle owners still find it unappealing to adapt to the telematics age.

However, things took a drastic turn when governments started to make it mandatory to install Vehicle Location Trackers(VLT) in all vehicles, this brought a very big revolution in the market. Now that VLTs installation and service are seen as a basic need, it is becoming available even in very basic auto-electric shops. Since such rules have become new standards, people started to think what all options can we get on top of this, thus it is paving the way for further integration like fuel, temperature, OBD etc. and there by exponentially growing different segments of telematics.

Outside of India, even countries like UAE, Saudi Arabia, Sri Lanka etc. are working on such legislations and even large corporations both public and private is following this way. So, by 2025 atleast 10 countries would be in its way to implement such rules followed by others shortly.

Although such implementations are done mostly for the security purpose, Telematics Solution providers and System Integrators are trying to add too many icings on the cake in-terms of features and value additions there by securing higher

subscriptions with VAS. Many vehicle owners also feel they could get much higher value proposition by just spending 20-30% extra over the mandatory devices.

### **2G Sunset**

As we all know, 2G spectrums are getting outdated and telcos have really started to think of their ROIs in maintaining this spectrum since usage of 2G mobile phones have slowed down drastically. So for them its better to convert them to 4G and 5G for better ROIs. In many countries 2G have become a memory literally! In some other they have declared the shutdown timeline and have asked customers to adapt to 4G or NBIoT.

This instigated another big revolution since all existing IoT installations have happened in 2G. Telematics being holding a major share in such installations gives a new opportunity for companies to replace such devices with 4G or other newer spectrum devices and hence add many great features like camera, hotspots, better battery life etc.

Recently a country happened to declare 2G-spectrum shutdown in 2023. Around 250,000 vehicles running in a single project have been ordered to change all its 2G devices with CATM1 standard models. This shows the kind opportunity being opening up across the world in next few years.

To summarise, its going to be a real revolution in next few years! As per a recent report, the number or vehicles with aftermarket telematics is going to become 150 million by 2024. Though post corona supply chain hassles for semiconductors have brought some headaches to the Telematics manufacturers, a new normal in post pandemic is quite promising for the Aftermarket Players.

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#### **AUTHOR**

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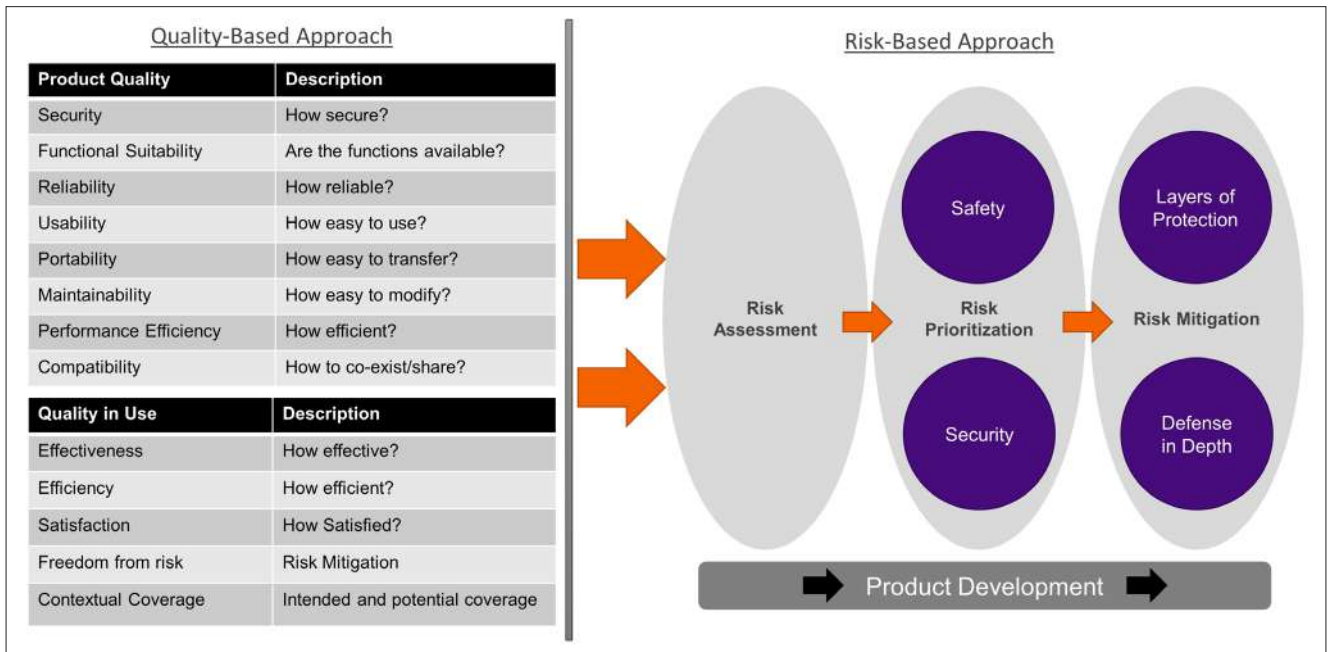
**Transight Systems Pvt. Ltd**

He Co-founded Transight Systems with Mr. Gis George, which has turned to be a Multimillion Dollar Telematics Device Development and Manufacturing company from South India. He is keener on the Research and Development of new products, International Markets and formulation of business strategies in the company.



# Paradigm Shift of Skill Development in the Automotive Industry

SHINTO JOSEPH  
LDRA



## 360 Degree Digitization of Automotive Industry

The concept of 360 Degree Digitization is an extension of industry 4.0, where the entire value chain of product design, development, testing, certification, sales, business promotion, after-sales, and customer engagement is digitized. Digital Twin simulation tools and automated testing tools accelerated this transition, helping in cost reduction and Time to Market. With the digital twin, we can now predict the behaviour of a new car throughout its life cycle.

Test automation tools significantly impacted saving time and handling the complexities of multiple technologies and tools in the development environment. This transition brings the concept called 'software-defined cars, like the 'software-defined things' emerging in today's connected smart world.

## Quality vs. Risk-Based Approach

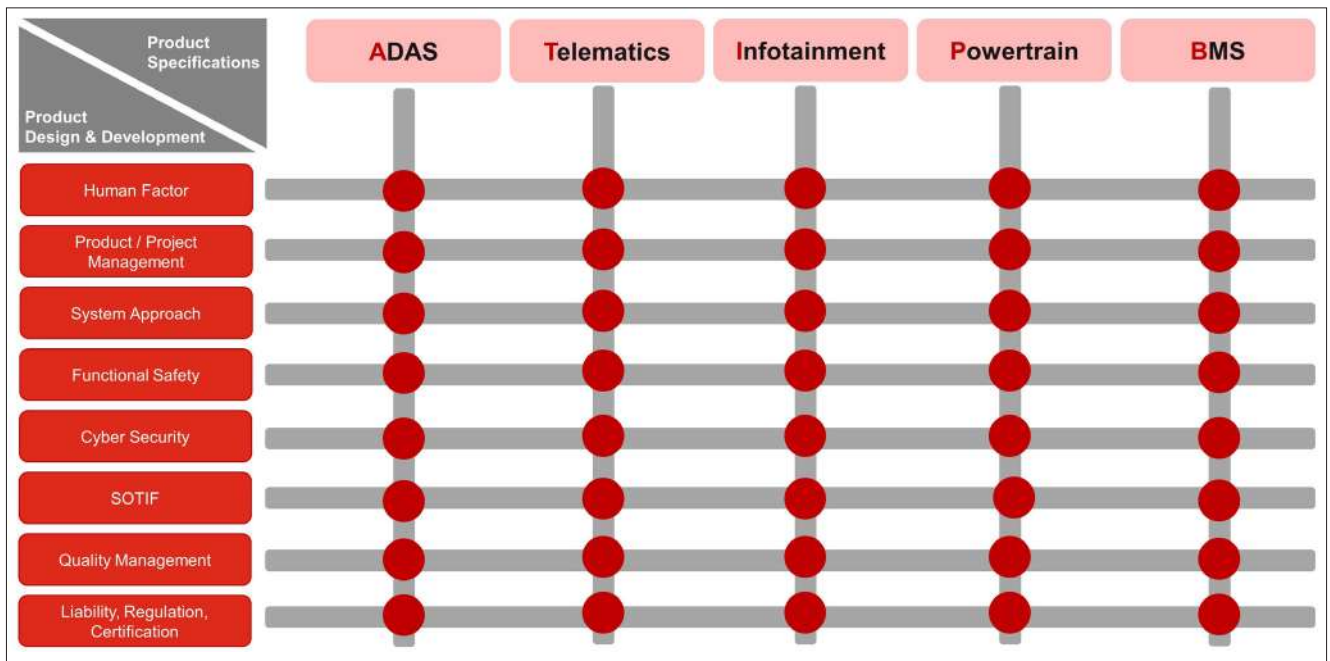
Traditionally, the automotive industry has got one of the best quality processes to ensure that every car produced is consistent with quality and reliability. Along with Six Sigma certifications, we also saw the introduction of the Automotive Spice model getting implemented during the last couple of years. But with the increasing use of electronics and software, we see more challenges to Auto OEMs from the risks originating from ECU (Electronic Control Units) failures. We also found the assurance levels gained by quality models are not fully addressing the design, development, and testing challenges of electronic components and embedded software-based systems.

## Software – A challenge and opportunity

Software usage is exponentially growing due

to increasing demand from customers to have more functionalities, comforts, and ease of driving. Many modern cars have a code size more than in an Airbus 380! Electric and conventional IC engine models are competing on this front. As the fully level 5 autonomous cars race is catching up, the software will be the central focus in modern cars. Of course, the hardware complexities are equally catching up as many chip manufacturers have already implemented AI/ML algorithms with better computing power at the hardware level. Centralized hardware architecture also reduces the number of ECUs and brings better power optimization, especially in electric vehicles.

We all know the advantages and the flexibilities software brings in. With a software update, the car could behave in a totally different way, giving customers the feeling of a new car, something OEMs could never promise in the olden days. However, increased software usage also brings in additional safety



and security concerns.

Industry came together to address this issue to develop standards and regulations. The underlying principle of most of these discussions was how to bring in risk-based thinking in the design, development, testing, and certification of automotive systems. Based on the impact of failures, each subsystem is classified from high to low risks, following systems engineering's recommended risk assessment process. In fact, the aerospace industry used to follow these ARP (Aerospace Recommended Practices) processes for several decades, as they got their safety certification process matured over a period to meet stringent global safety regulations.

Governments worldwide came together and started working together with global standards organizations like ISO, IEC, and professional bodies like SAE. We saw a new series of standards like ISO 26262 for functional safety and ISO/SAE 21434 for cyber security completely changing the industry.

Risk assessment processes fully drive these standards to address safety and security failure implications. The new EU WP 29 cyber security regulation would accelerate this transition as governments have identified automotive cyber security as an immediate national security issue. Hence there is direct pressure on the industry to act now.

### Skills Development - the immediate priority for the industry

As the industry is undergoing a massive

transformation, we need the right skills for safe, secure, connected, and intelligent car development by strictly following the existing automotive quality standards and emerging emission and sustainability regulatory guidelines. The majority of our existing automotive industry skills initiatives are designed for our traditional cars in mind, where the focus is more on mechanical, engine technologies and, to some extent, simulation techniques.

We are now seeing the shift in the outlook of CXOs at OEMs, Tire 1 and Tire 2 players towards this new skills paradigm, even though the majority of them come with traditional mechanical background and mindset. Reskilling the existing workforce in design, development, shopfloor, showrooms, and maintenance workshops will be the biggest challenge on their table.

For every system we develop, like, BMS, Telematics etc would need an array of skills ranging from quality, safety, security, AI/ML, testing, certification, regulation etc.

### Skills upgrade for all in the ecosystem - A need of the hour

While we focus our energy on reskilling the existing workforce and upgrading the curriculum in our universities, every other stakeholder in the industry is also essential. We need to engage industry regulators, standards bodies, test facilities, related ministries, skills councils, media, professional and industry bodies, along academia.

Industry and Academia leaders should spread this message to achieve scalability in our skilling and reskilling initiatives. Driven by my passion for skilling in industry and academia, personally as well as through LDRA's skill development programs, I have been involved with many initiatives. I would be keen to work with like-minded organizations and individuals to achieve this goal together. □

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Shinto Joseph is currently working as Director – Southeast Asia Operations at LDRA Technology Pvt. Ltd. With over 24 years of experience in handling Embedded Software Life Cycle solutions, he has built many teams and companies in the embedded systems field. Working with cross-border delivery teams, technology partners, and industry regulators in the defence, aerospace, automotive, industrial, medical, rail and nuclear sectors are his unique advantage.







# Exploring Additional Revenue Streams through Vehicle Embedded Connectivity

**TIRTHANKAR GUHA**  
Ericsson Canada

The global connected vehicle market is growing and is expected to reach 200B USD by 2027. A connected vehicle by definition has the ability to connect to a network for bi-directional communication between vehicles, mobile devices, and IT infrastructure to facilitate triggering of important communication and events. Intelligence gathered through connectivity leads to diverse use cases in

the connected vehicles space that results in safe driving environment, efficiency in vehicle performance and better consumer experience. In this article, we are going to focus on how connected vehicle can offer better consumer experience which would open the doors for Automotive OEMs to additional revenue streams.

Firstly, let understand the types of connectivity available in a connected vehicle. There are primarily two types of

connected mobility solutions – tethered and embedded. Tethered connection would mean connecting the vehicle to a mobile phone or device through which the user can get services limited to the ones available in the mobile phone or device like GPS navigation and hands free calling. The connectivity in a tethered connection is managed by the mobile phone or device, which means the connectivity would be lost if the mobile phone or device goes

out of network range. Contrary to tethered connectivity, embedded connectivity as the name suggests is not dependent on an external mobile phone or device. Instead, the connectivity is provided through the modem of the telematics control unit (TCU) built inside the vehicle that ensures a constant steady connection to the cellular network leading to better user experience through additional use cases. This guarantee of constant connectivity coupled with enriching user experience is leading to increased adoption of embedded connectivity globally. The uptake of embedded connectivity in the connected vehicle space is leading Automotive OEMs to embed additional services like music streaming, GPS navigation, video players, hands-free calling, WiFi hotspot, usage based insurance, concierge services, and many others that provide a more richer user experience. Let's explore some of these services:

- WiFi hotspot – Automotive OEMs are offering in-vehicle embedded WiFi hotspots which enable passengers to connect their devices to the internet without using their mobile data connectivity. Passengers have the option

of choosing the data plan based on their consumption requirements which enable them to have the at home WiFi experience inside their vehicle

- GPS Navigation – Instead of depending on the mobile handset for navigation, GPS navigation systems are being embedded in the vehicle which uses the vehicle's embedded connectivity to provide navigation support to the passenger towards their desired destination. The embedded navigation system also provides access to real time traffic information, weather, and local search.
- Marketplace Services – Automotive OEMs are embedding applications which provides a marketplace on the passenger's vehicle dashboard which enables the passenger to download white-label or 3rd party applications related to music streaming, audio books, social network, and location sharing. It is possible for the passenger to even order coffee, pay for the fuel at selected gas stations, and able to make a travel booking with their chosen travel service provider
- Usage Based Insurance (UBI) – The

service incentivizes the user for safe driving practices where the insurance price is dependent on the driving behavior. The UBI device embedded in the vehicle tracks the driver's driving behavior and pattern, based on which the insurer provides reduced premium for customers and can automate the claim process thus providing a better customer experience

- Concierge Services – With a steady connectivity channel that can support terabytes of data exchange, the connected vehicle industry is paving the way for driver concierge services. A few examples of such services are as follows:
  - a) Dispatching emergency service first responder to the vehicle that has got into accident, where the vehicle reports its location and status of the different parts of the car
  - b) Remotely analyze the attributes of a vehicle that has broken down and recommend the necessary action without towing the car to a nearby garage
  - c) Ability to receive package delivery at the trunk of the car without the driver being physically present
  - d) On demand services like car wash





## The promising growth of the Connected Vehicles market provides an opportunity for the Automotive OEMs to provide a richer consumer experience which would open doors for additional revenue streams

and fueling where the vehicle doesn't need to drive to the service and instead the service comes to the vehicle based on preordering of such services

With a clear value proposition of these services towards the consumers, Automotive OEMs have an opportunity to create additional revenue streams by monetizing such services. In this section of the article, we will explore the technical landscape required by the Automotive OEMs to offer such services as well explore how these services can be monetized in an effective manner

From a technology enablement point of view, Automotive OEMs need to look at the following:

- Isolating the infotainment data channel – Data generated by a connected vehicle can be categorized broadly into 2 categories – telematics, and infotainment. Telematics data primarily provide information related to vehicle diagnostics and are directed towards the Automotive OEMs' connected vehicle cloud. Infotainment data on the other hand is directed towards cloud services

that offer the respective infotainment services. From the perspective of cellular network, the destination of the connected vehicle data is guided by the Access Point Name, commonly known as APN. This means that telemetry data will be sent to the APN representing the Automotive OEMs' connected vehicle cloud and infotainment data will be sent to the APN representing the cloud service of the respective infotainment services. This capability to extract the infotainment data channel provides an opportunity to the Automotive OEM to innovatively monetize this data channel for additional revenue streams

- Payment GW integration – This would allow the user to purchase a connectivity plan or a service on the spot from their vehicle dashboard by using their credit card information. Depending on the country of operation, Automotive OEMs need to ensure that the payment GW is compliant with the local regulatory requirement
- Creating partnerships – In order to provide bundled services with connectivity, Automotive OEMs need to establish partnerships with multiple service providers across different services. Alternatively, they can build partnerships with connected car service providers that offer a single stop shop for multiple infotainment services. The richness of this partnership ecosystem will help the Automotive OEMs to provide a unique differentiator towards their consumers
- Building a Consumer Storefront – Automotive OEMs need to provide a consumer storefront through which it is going to display the bundle connectivity plans and services to the target user. The storefront will be integrated with the backend CRM system where the bundle connectivity plans and services would be

managed and provides tools for revenue reconciliation between different service providers of that particular service ecosystem

From a monetization standpoint, Automotive OEMs can explore the following possibilities:

- Reselling connectivity – Automotive OEMs would get into a wholesale connectivity agreement with the telecom service provider and independently price connectivity plans to the consumers. As part of the service contract with the consumer, the Automotive OEM would be responsible to offer connectivity services and its associated bundled services to the consumer
- Automotive OEMs can explore revenue share plans with the Telecom Service Providers for the following scenarios:
  - a) Prepaid Data – The telecom service provider can present bundled connectivity prepaid plans to consumers who are not their existing customers, which they can purchase and use till the balance and/or validity expires
  - b) Shared Mobile Data – The telecom service provider can offer mobile data sharing plans to their existing customers, which will allow them to allocate a certain portion of their allocated data to automotive connectivity
  - c) Sponsored Data – Automotive OEMs can offer data and bundled services to consumers that are sponsored by different merchants. While the merchant pays the telecom service provider for this data, Automotive OEMs can negotiate a revenue share with the telecom service provider for this data consumption

There lies a clear value proposition for these consumer connectivity services. In addition to new revenue streams, these services enable the Automotive OEMs to increase consumer stickiness through enhanced consumer experience and create a unique differentiator in the market. With increase in connected vehicle rollout, increased adoption of embedded connectivity, and a rising demand of entertainment on the go, Automotive OEMs are uniquely positioned to rollout innovative consumer connectivity services which they can effectively monetize to create additional revenue streams for themselves. □



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Tirthankar is the Go to Market Manager at Ericsson for the IoT Connectivity portfolio based in Montreal, Canada. He is responsible for driving the global Go to Market strategy for some of the key offerings within Ericsson's IoT Connectivity portfolio towards Ericsson's CSP Partners and Enterprise Customers across different industry verticals.



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# Data Annotation for Autonomous Vehicle Technology

 **RADHA BASU**  
iMerit

The number of players innovating and developing autonomous vehicle (AV) technology is on the rise. This is a significant indication of the immense potential of AV technology globally. The recent Autonomous Vehicles Readiness Index (AVRI) ranked the US fourth, behind Singapore, the Netherlands and Norway. However, it ranked second in innovation behind only Israel. India is at a nascent stage, but striving with great potential to explore AV technology. This further justifies the number of startups and companies building AV technology across the globe, especially in countries like the US.

AVRI is a score devised by KPMG assessing a country's current readiness for incorporating AVs onto their roadways. The AVRI rates countries on several different aspects, from innovation to infrastructure.

Many countries are taking note of the rising need for and potential of AV technology, and building initiatives to nurture its growth. For example, the US rolled out a \$1 trillion infrastructure bill that makes numerous suggestions for modernizing infrastructure to facilitate widespread adoption of AVs and mobility. Still, manufacturers and innovators need to master the art of crafting models to perform on any road.

AV needs to navigate a highly dynamic environment and face numerous unique challenges referred to as 'edge case scenarios'. Thus, along with infrastructure, key to the success of AVs, innovators must focus on high-quality data and expertly implemented artificial intelligence (AI) models to predict and assess edge cases.

## Heightened focus on AV safety

You might wonder about the need for AV

technology. To understand the rationale, it is important to look at vehicle safety compromises and road safety breaches around the world. These have caused 1.35 million deaths due to automobile crashes till 2018, with a person at the wheel, according to the World Health Organization (WHO), making it one of the leading causes of death for people aged 5 to 29.

Significantly reducing this number is one of the biggest challenges we face in the 21st century, with modern transportation at an all-time high. Globally, car makers, software companies and others spent more than \$54 billion on AV development in 2019, and market researchers expect that to grow more than tenfold to \$556 billion by 2026.

It's not surprising that the sector has attracted many global leaders in AI, software development and device engineering.

## Data annotation and AV safety

When we compare a car driven by a computer to a car driven by a person, we are comparing perspectives. According to the US' National Highway Traffic Safety Administration, there are more than six million car crashes every year. More than 36,000 Americans die in these crashes, with another 2.5 million ending up in hospital emergency rooms. The global figures are even more staggering.

One could ponder if a switch to AVs would cut these figures drastically. But those involved in various AV initiatives admit that the more revealing characteristic is consumer confidence. How willing are consumers to consider opting for a fully autonomous vehicle, or be ferried around in one?

A 2018 Rand Corporation report, 'Measuring Automated Vehicle Safety', studied the conflict between the need for empirical data for AV developers seeking to advance the state of the art and the

determination of consumer safety regulatory bodies to resist what they generally regard as avoidable risk. It said: "In the United States – and elsewhere, to some degree – the emergence of AVs has been associated at least implicitly with the view that some exposure to risk and uncertainty about this risk must be accepted in the short and medium terms to see the long-term benefit of AVs."

## Importance of mapping

AVs need to be safer than human-driven cars – that is the ultimate goal. It can only be achieved if all technologies deployed are complimentary – mapping, sensors, AI and predictive intelligence.

Mapping is key. AVs require a mix of directions, roads, traffic conditions, street imagery and other directional characteristics to make good decisions while running the algorithm. And all this is required in real time. We are expecting AV technology to predict and improvise decisions based on what is happening around the car.

To achieve valuable data at such a granular level requires intelligent tools and technology. For example, Tesla counts on video-based systems whereas most AV makers employ LiDAR and video for the data they need. The former provides location accuracy, and the latter adds depth perception.

LiDAR is accurate within centimeters and can create 3D maps for vehicles with a sensor range of around 200 metres. LiDAR does not demand ambient light and is less sensitive to rain or fog through its use of near infrared signals. Apple, Ford, Volkswagen, Microsoft, Hyundai and others are investing heavily in LiDAR, transforming the research into an arms race as most explore it.

As a global leader in data annotation for autonomous vehicles and having enriched more than 150 million data points, we affirm that data is critical for AI models to

work precisely. Since autonomous vehicle development is largely a visual interpretation task, all the training data is some form of video – from still images to full-motion video. Cameras and other sensors installed in an AV are bombarded with constantly shifting streams of information. Some of it is static – buildings, fields, lampposts and the like as the car travels down a street or highway – while the rest represent seemingly random events that can require immediate intervention by the car’s AV computer – a pedestrian darting out between parked cars, a bicyclist cutting in front of or around the car or another car veering into the same lane.

In each instance, the AV algorithm controlling the car must make split-second decisions about the nature of the object and the danger it represents to the vehicle – or vice versa.

### Types of data annotation

Simply put, data annotation is the process of tagging or classifying objects captured in a frame by an AV. This information is further curated to feed deep learning models and labelled or tagged manually or using AI models or a combination of both. This process is required to help AVs to learn to detect patterns from data and classify accurately to make the right decision. It is also important to deploy the right type of annotation to acquire optimal data. Here are the types of data annotation for AVs:

- Bounding Box Annotation: Marking

rectangular boxes to identify targeted objects

- Semantic Segmentation: Annotating images after segmenting into component parts
- 3D Cuboid Annotation: Using 3D cuboids to illustrate desired objects by judging camera perspective to obtain spatial-visual models
- Keypoint/Landmark Annotation: Determining shape changes by multiple consecutive points
- Polygon Annotation: Annotating an object’s exact edges, regardless of shape
- Polyline Annotation: Marking lines to define pedestrian crosswalks, single lanes, double lanes, etc, for road recognition
- 3D Point Cloud Annotation: Annotating 3D point clouds to support LiDAR and radar
- Object Tracking: Locating and tracking objects across a series of images or point clouds in sequential frames
- Instance Segmentation: Identifying each object instance of each pixel for every known object within an image
- Panoptic Segmentation: Coupling instance and semantic segmentation
- Multi-Sensor Fusion: Combining LiDAR, Infrared and images from multiple angles captured from different sensors

### Edge cases

The progress of AV technology has been

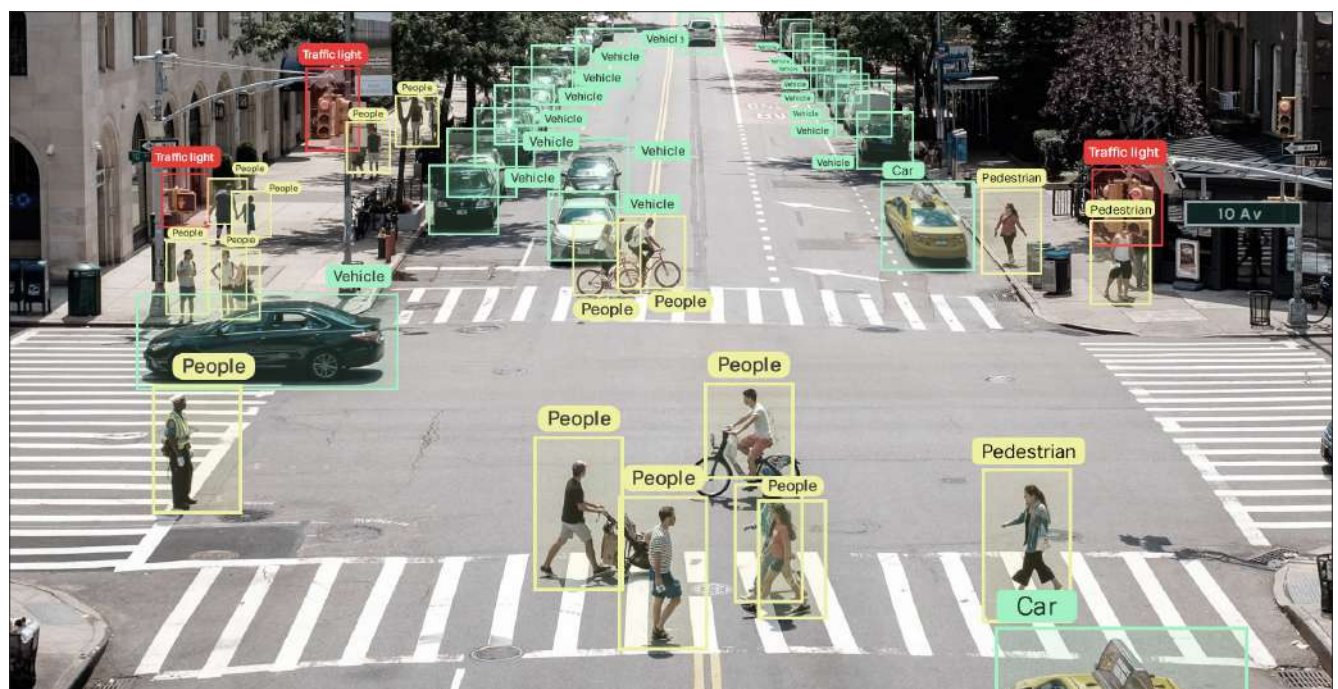
substantial in the past decade. However, the technology still faces a massive barrier that is preventing mass adoption. This barrier is known as an ‘edge scenario’, a unique situation or unusual occurrence in which an AV is unable to appropriately address or identify an unusual obstacle, circumstance or incident on the road, which can result in an accident or fatality.

As compared to a fully focused human driver, AVs lack the intelligence to register and react to random occurrences and developments. To address edge cases, AVs require special design considerations to handle these developments securely.

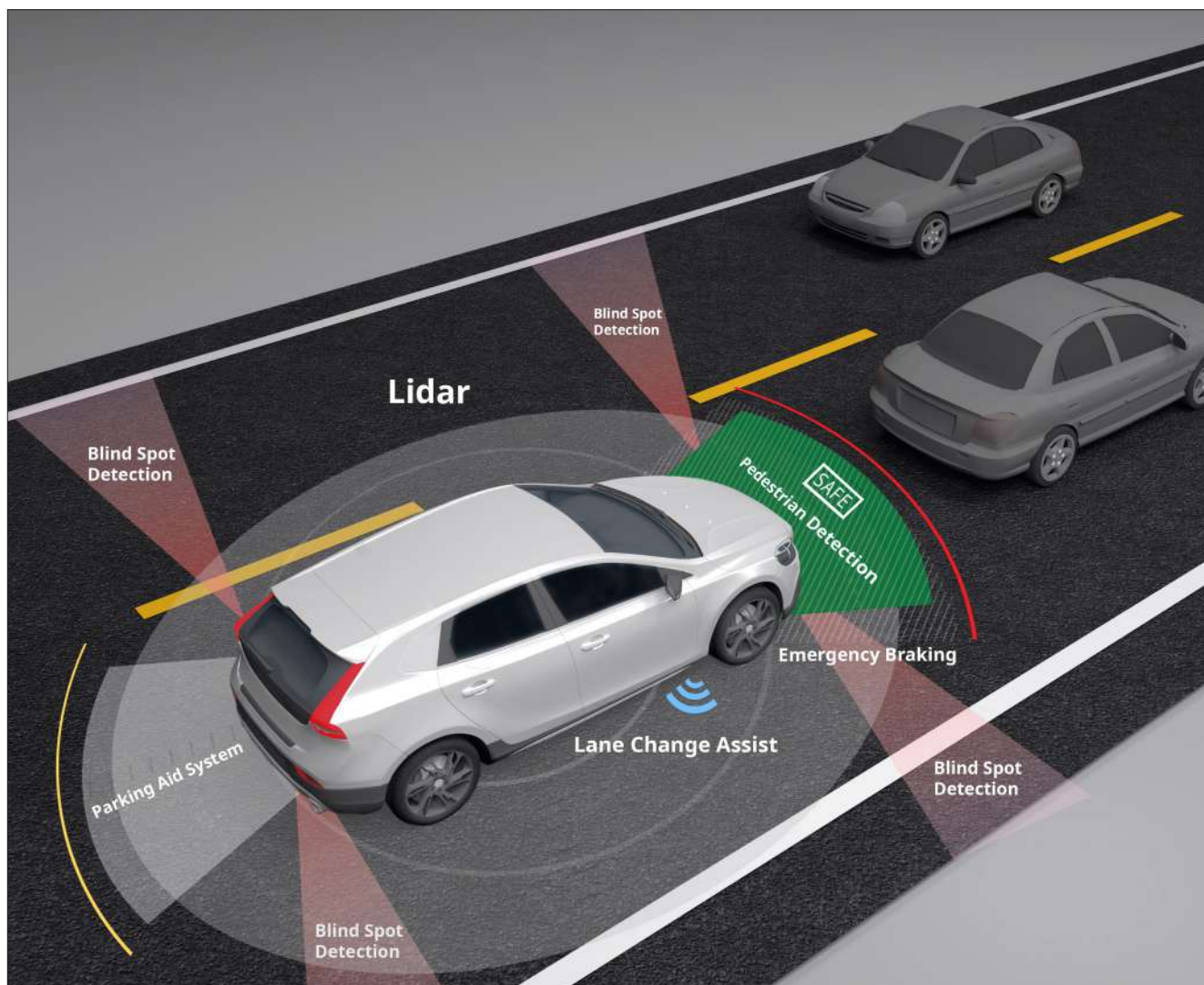
As data is largely generated manually for the training of AVs, it is challenging to train vehicles to perform for unlikely happenings that may take place on the road. It is difficult for a system to perceive the environment like a human.

Environmental perception is a contextual understanding of the ecosystem or the situation, such as locating obstacles, recognition of road signs/markings, and sorting data by their semantic meaning. A trained model can predict many edge cases, and edge case training can make the autonomous system more robust under novel operational conditions.

For instance, a road sign with an image of a deer can be confusing for an AV. It may treat the sign as an object and stop abruptly. A person with a trolley or a pram on the road might not be identified by the car. It is crucial







to factor a balance between analysis and field experience because an edge case, like cattle on the road, could be a single point of failure if not trained.

Each country, city, and landscape present a unique set of edge cases and training for these challenges – a constant challenge itself. Situation is an essential element when defining the nature of any roadside development or sign. For example, every country/city’s police department has its own distinct appearances and every city/country has unique road laws. While cattle

on the road may be commonplace in certain parts of the world, they might not be in others.

The most significant safety benefit of an AV is that it is not a human. It is designed to follow all traffic laws and to be indestructible by minor things like text messages or flashing phone screens. AVs can also detect what humans cannot, especially edge cases, and respond more rapidly to prevent a collision, at least in theory. Accurate labeling of edge case data helps push this from theory to reality.

Edge cases are a massive deterrent to the mass adoption, safety and efficiency of AVs. Predicting and addressing them is an essential element of success for AVs. With the right workflow, talent, and understanding of a region’s given edge cases, they can be overcome effectively.

### The future

The push for AVs has led to massive innovations and driverless cars are already out on some roads, revolutionizing travel. To continue this rate of development, innovators are continually going to require access to high-quality, affordable data. This is an enormous opportunity for data annotation experts like us to collaborate with people, process and technology to deliver the best datasets. For AVs to become a common reality, data annotation providers and developers must innovate to resolve edge cases and build data-driven systems which are foolproof and perceptive. □



#### AUTHOR

**RADHA BASU**  
 Founder and CEO  
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Radha Basu is the Founder and CEO of iMerit, a global AI data solutions company delivering high-quality data that powers machine learning and artificial intelligence applications for Fortune 500 companies. She is a leading tech entrepreneur, and a pioneer in the Indian software business. Under her leadership, iMerit has employed hundreds of skilled and marginalized women and youth in digital and data services worldwide.

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# Enabling Safety & Connectivity with next generation

Advance Driver Assistance Systems (ADAS) help automotive ecosystem partners reach zero - accident mobility while improving connectivity

**SAIKAT SAMANTA**  
SerVision (India)

Autonomous driving with improved safety features is one of the most ambitious areas of automotive innovation. The ever-increasing number of road accidents is a point of concern worldwide. The situation in India is no different. According to a report published by the World Bank, India, with just one percent of the global vehicle population, accounts for eleven percent of worldwide deaths in road accidents - the highest in the world. About 4.5 lakh road crashes happen in India per annum, leading to 1.5 lakh deaths.

Considering the seriousness of the problem, automotive OEMs worldwide are focused on zero-accident mobility. Consequently, vehicle safety systems are evolving, paved by the convergence of Advanced Driver Assistance Systems (ADAS) and telematics creating adaptable systems which ensure a safer, more automated driving experience. ADAS, or advanced driver-assistance systems, are sensor-based intelligent systems that have the potential of dramatically improving road safety paving the way for zero-accident mobility. ADAS includes various types of sensor technologies, optical technologies, and radar to LiDAR (light detection and ranging), operating in tandem with powerful artificial intelligence (AI) software.

## How ADAS work

Advanced Driver Assistance Systems (ADAS) assists drivers by offering advanced technological solutions, such as Adaptive Cruise Control (ACC), Intelligent Speed Adaptation (ISA), or Collision Warning Systems (CWS). A safe Human-Machine

### MAIN FUNCTIONS OF - AT A GLANCE

**PEDESTRIAN COLLISION WARNING (PCW):** It provides drivers with a warning in critical situations when there is a pedestrian existing in front of the vehicle's pathway.

**FORWARD COLLISION WARNING (FCW):** It alerts drivers with a warning in critical situations where a collision is impending.

**LANE DEPARTURE WARNING (LDW):** It warns drivers about lane departure for safe driving. It alerts the driver of sound and visual warnings and helps to regain direction if the host vehicle departs lanes unintentionally.

**FRONT VEHICLE START ALARM (FVSA):** It notifies the driver if the front vehicle starts to move forward from 0 speed (complete stopped status) and the host vehicle is not moving within 2 seconds.

**FORWARD PROXIMITY WARNING (FPW):** It warns the driver when there is a vehicle existing within detection range.

**DIGITAL VIDEO RECORDER (DVR):** It records scenes before and after an accident along with imminent crash situations. DVR function records data into the micro SD card every minute in a loop.

Interface (HMI) is also considered while designing these driver assistance systems. ADAS can share vital information about the road closure, congestion levels, and alternative routes to avoid congestions. These systems are even capable enough to judge the fatigue and distraction level of the driver and provide precautionary alerts. On assessing potential threats, these systems take over complete control from the human driver and execute easy safety tasks like cruise control as well as difficult maneuvers

such as overtaking and parking. Some ADAS systems, classified as 'active safety systems' or 'dead driver systems', operate in an even more advanced way. Obstacle detection systems for example can decide to use the brake if the situation is assessed as 'very dangerous'.

Different components of ADAS enable different safety features. For example, Lane Departure Warning (LDW) continuously monitors lane driving and alerts the driver to any deviation with the help of a variety

SN	Vendors	Total Installations	Accidents per Trip%
1	Vendor 1	23	0%
2	Vendors 2	28	0%
3	Vendors 3	32	0%
4	Vendors 4	26	0%

**Table 1:** Installation Status



of alarm options like audible alarms, lights, HUD display, vibration, etc. This in turn enables drivers to take corrective action. Whereas, Blind Spot Detection (BSD) is a radar sensor-based ADAS component which monitors a vehicle's blind spot, a driving zone hidden from the driver's field of vision. Blind spots cause a large number of road accidents. Another important safety component, Forward Collision Warning (FCW) detects potential collision situations with a preceding vehicle in the vehicle's lane. These three useful driver assists create the circle of safety by protecting the vehicle to the front (through FCW), side (through LDW), and rear side (through BSD).

In ADAS, possibilities for time-to-collision (TTC) and headway are computed and if they cross the safe threshold, suitable alarms are set off to alert the driver. Pedestrian Detection System (PDS) coupled with zero user setup automatically detects people walking in front of the car. It helps drivers avoid collisions.

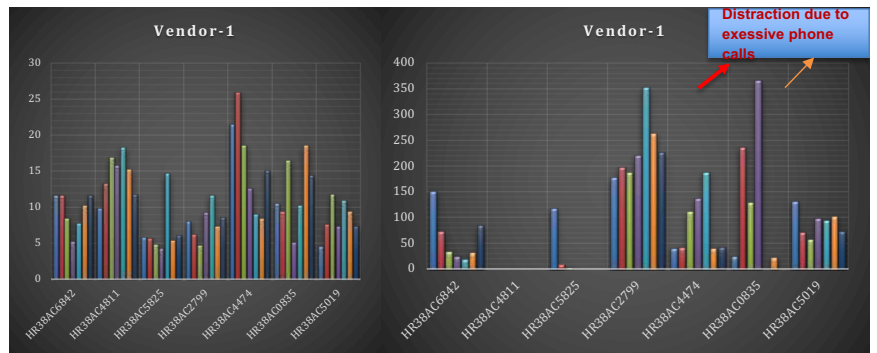
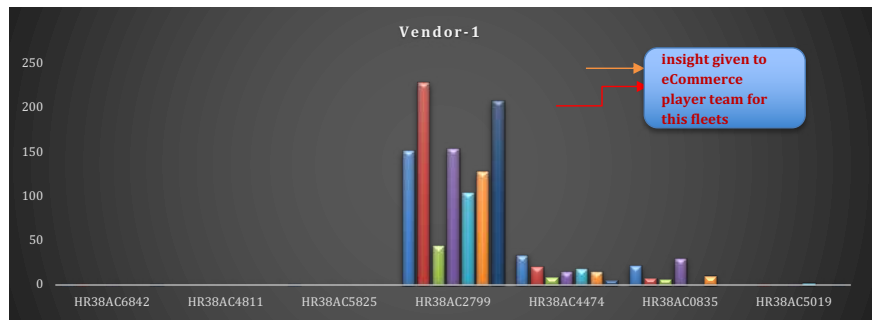
### Benefits demystified

Implementation of ADAS results in numerous benefits. However, the most important advantage of using ADAS is that they facilitate communication between different vehicles. This enables the exchange of information for improved vision, localization, planning, and better decision-making capacity of the vehicles.

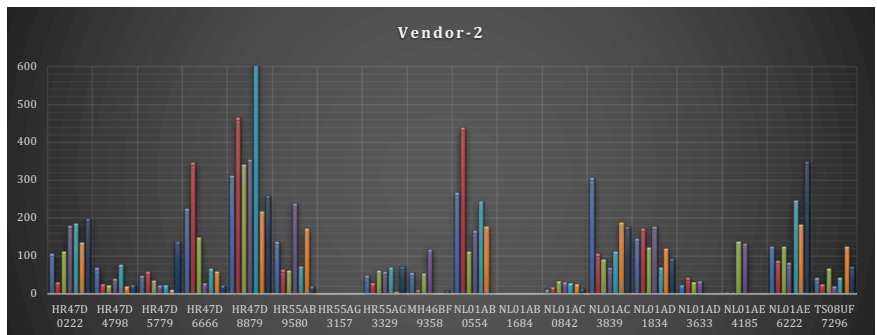
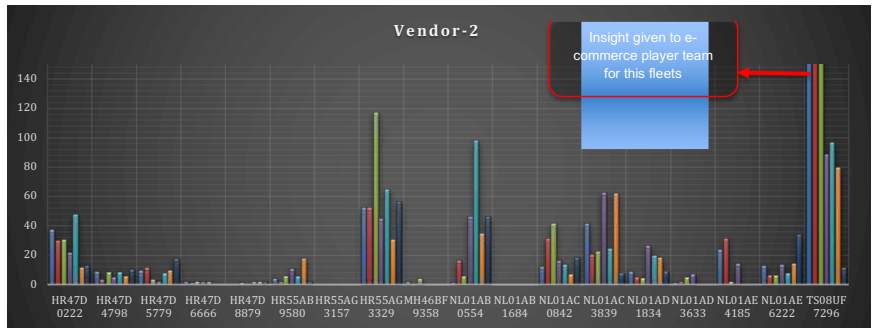
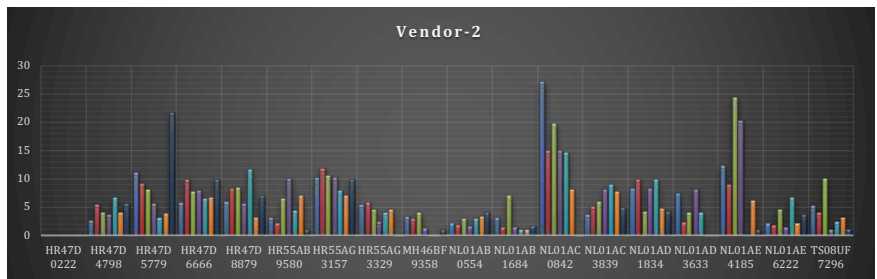
Besides improving driver performance and vehicle safety, these systems also reduce costs associated with vehicle collisions such as disbursements for third-party injury or damage, repair, and replacement of

## ENABLING FLEET MANAGEMENT FOR A LEADING ECOMMERCE PLAYER THROUGH

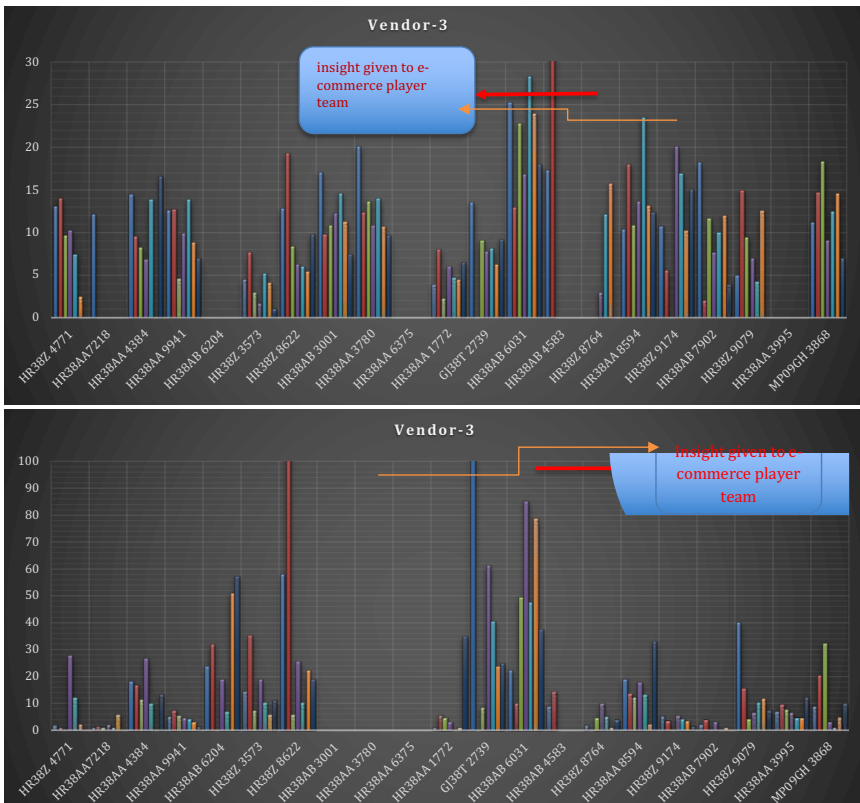
A critical event analysis of & DMS /1000 KM basis was done with five vendors (109 fleets) of the e-Commerce player. SerVision (India) installed (Table 1) in September, 2021 and provided critical trend analysis on a weekly basis. along with imminent crash situations. DVR function records data into the micro SD card every minute in a loop.



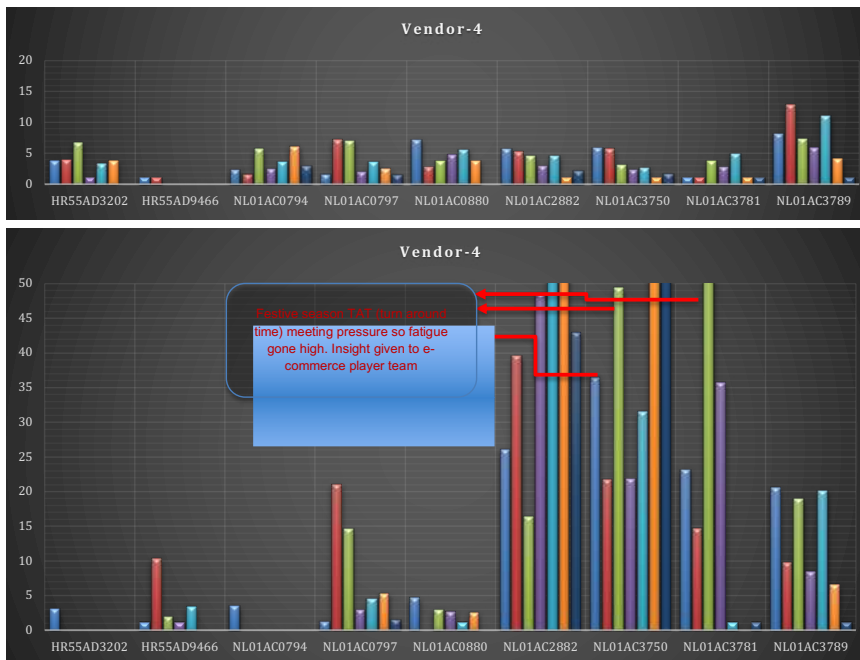
**Figure 1:** Graphs showing trends of Alerts/1000 KM of installed for Vendor 1. Apart from a few variances most graphs show a downward trend in no. of alerts generated /1000 KM.



**Figure 2:** Graphs showing trends of Alerts/1000 KM of installed for Vendor 2. Most graphs show a downward trend in no. of alerts generated /1000 KM.



**Figure 3:** Graphs showing trends of Alerts/1000 KM of installed for Vendor 3. Apart from a few variances and asymmetric results most graphs show a downward trend in no. of alerts generated /1000 KM. This indicates that this system does not require continuous counseling of the driver.



**Figure 4:** Graphs showing trends of Alerts/1000 KM of installed for Vendor 4. Apart from a few variances and asymmetric results most graphs show a downward trend in no. of alerts generated /1000 KM.

expensive accessories or components.

Moreover, insurance companies have been especially receptive to working with

ADAS technology for a couple of main reasons. First, ADAS offers an all-in-one solution including headway monitoring

and warning to prevent tailgating, forward collision warning, lane departure warning, pedestrian and cyclist collision warning, and speed limit indicator. Second, the technology can easily be retrofitted into existing vehicles at the fraction of the cost of purchasing new vehicles. By offering customers discounts for installing collision avoidance systems, insurers can both lower their premiums and their clients' risk of collision. Insurers that take advantage of this opportunity will surely gain a significant competitive edge over the next few years.

Although these systems are primarily designed to provide real-time feedback to the driver to improve driver performance, by connecting the ADAS to a telematics system, it is possible to implement a driver monitoring program by capturing the vehicle activities within a fleet system. Moreover, the captured data can be used to create key performance indicators (KPI's) for tracking timely performance for a specific driver, or from driver to driver during a specific timeframe.

An interesting case study is shared below explaining the application of ADAS for eCommerce fleet management.

The eCommerce player suggested conducting this analysis with the most accident-prone routes and 32 feet line-haul vehicles plying on national lanes and highways. The eCommerce player rated those vehicles as the low-performing carriers.

SerVision(India) did the benchmark analysis of the following three critical events

- Forward Collision Warning
- Drowsiness
- Distraction/Phone calls

## ADAS & DMS Warning Trend Analysis Reports

### Benefits realized

- No accident happened in the 100 plus fleets where SerVision (India) ADAS were installed.
- The Weekly trend analysis reports enable the eCommerce player to assess and compare the performance of the vendors, vehicles, and drivers. The eCommerce player intends to set up benchmarks for the minimum number of alerts per vendor/vehicle/driver.
- SerVision(India) ADAS systems enable drivers to follow appropriate driving behavior through sound-based training.

Major ADAS solution providers such as Robert Bosch (Germany), Continental (Germany), and Denso (Japan) have production facilities across the region as well.

Despite the slowdown in vehicle sales due to the COVID-19 pandemic, evolving safety mandates are likely to boost the

### MARKET NEED FOR

Advanced Driver Assistance Systems (ADAS) have helped improve road safety by complementing the drivers' actions. Till date these systems are only available on new luxury vehicles. However, there is a strong market demand for making these features available for even mid level vehicles. According to a report published by Markets & Markets, the Global Market size is projected to grow from USD 27.2 billion in 2021 to USD 74.9 billion by 2030, at a CAGR of 11.9%. Compliance with upcoming safety mandates and increasing demand for semi-autonomous driving systems will drive the market for .

### IMPACT OF COVID-19 ON MARKET

The COVID-19 pandemic has led to the suspension of vehicle production and supply disruptions, which have brought the automotive industry to a halt. Lower vehicle sales will be a major concern for automotive OEMs for the next few quarters. In 2021, lower vehicle sales and abrupt stoppage in the development of new automotive technologies resulted in sluggish growth of the advanced driver assistance systems market. The market, however, is expected to witness a significant boost in 2022 owing to the mandates by different countries.

penetration of ADAS features in upcoming vehicles. For example, China is considering mandating automatic emergency braking during the forecast period. In addition, the Chinese government released multiple measures to boost economic recovery, including stabilizing domestic

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consumption, supporting new energy vehicle development, and other monetary and fiscal policies. Financial assistance, upcoming mandates, and the growth of Chinese OEMs are likely to drive the



demand for ADAS in the country.

The Ministry for Road Transport and Highways (India) planned to adopt ADAS features by 2022. Features, such as electronic stability control and automatic emergency brake, have been considered in the first phase. Tier 1 manufacturers such as Continental are collaborating with OEMs in India to support the implementation by 2022-2023.

## ADAS Market dynamics

- **Driver: Stringent vehicle safety regulations:** Increased awareness about vehicle safety ratings and decreasing component costs are major growth drivers for the ADAS market. Major OEMs will implement ADAS solutions to accomplish higher safety ratings and attract more consumers. Hence, they either incorporate standardized safety systems across models or offer

these systems as additional features. The increasing penetration of advanced driver assistance systems features will surge the demand for components such as cameras, radar sensors, ultrasonic sensors, and LiDAR during the forecast period.

**Restraint: Lack of required infrastructure in developing countries:** ADAS requires basic infrastructure to be in place, such as well-organized roads, lane marking, and availability of GPS for effective functioning. Poor infrastructure outside urban areas, cost considerations, and improper driving training or driving discipline restrain the growth of the ADAS market in developing countries. In addition, the financial crises due to the ongoing COVID-19 pandemic will further delay the development of modern infrastructure for intelligent transportation.

- **Opportunity: Launch of autonomous vehicles:** The introduction of autonomous vehicles will transform commuting. ADAS technologies have significantly reduced the driving-related complexities, with features such as lane monitoring, emergency braking, stability controls, and others. Autonomous vehicles rely on advanced technologies and systems such as LiDAR, radar, ultrasonic sensors, and high-definition cameras to collect data. An onboard driving system analyses this data to maneuver the vehicle safely. The increasing focus on autonomous

driving systems would lead OEMs to incorporate more cruise control features and advanced safety systems for the semi-autonomous vehicle segment.

- **Challenge: Environmental constraints and security threats:** The majority of safety features of ADAS constitute sensors such as radar sensors, LiDAR, ultrasonic sensors, cameras, infrared, and several actuators. These sensors and actuators monitor fields in every direction and ensure the safety of the vehicle, driver, passengers, and pedestrians. The system functionalities depend on several factors, such as traffic and weather. Therefore, a lack of accurate fail-safe methods could jeopardize occupant safety. A perfect balance is necessary for the safe operation of advanced driver assistance systems. ADAS must have a security mechanism to prevent malicious attacks by hackers. A hacker could gain control of the entire vehicle just by infiltrating ADAS. Several studies have shown that hackers could gain vehicle control through Bluetooth, Wi-Fi, or even GPS. These security threats pose a significant challenge for system manufacturers and OEMs.

## Moving Forward

The passenger car segment is likely to be a key growth driver to the ADAS market. Improved road safety standards for passenger cars, supportive legislation, and consumer awareness contribute to the increasing demand for safety systems in emerging market regions. Several countries in Europe, North America, and the Asia Pacific have mandated the implementation of various types of ADAS in the passenger car segment. For instance, the European Union has outlined Vision Zero, an initiative to mitigate road deaths to zero by 2050. The authority has targeted to reduce fatalities and injuries by 50% by 2030. The strategic plan also includes mandating major safety features such as lane departure warning, automatic emergency braking, and drowsiness & attention detection in new vehicles by 2022. Developed countries such as South Korea have mandated AEB and LDW systems for all new passenger vehicles from January 2019. □



### AUTHOR

**SAIKAT SAMANTA**  
CEO

**SerVision (India)**

Saikat Samanta is a technology practitioner and entrepreneur. Co-founder of an Indo-Israeli venture for technology co-operation and CEO of SerVision India, Saikat firmly believes that engineering and innovation must be at the heart of sustainable change and equitable connectedness. He is also an active member of an NGO committed to gender empowerment of young girls and women.

## PCM 6.0 Infotainment System

Revised user interface for the PCM 6.0

Porsche is enhancing its infotainment system. The latest, sixth generation of Porsche Communication Management (PCM) in the 911, Taycan, Cayenne and Panamera models now has many new functions.

These include native integration of Spotify for the first time, a revised interface design, additional optimisation of Voice Pilot voice assistant, wireless Android Auto connection and improvements for planning charging stops for electric vehicles.

### Optimised PCM user interface

New, coloured icons make the functions of the revised PCM 6.0 user interface easier to recognise. Porsche made this improvement at the suggestion of its customers.

In addition to a clearer display, the PCM update improves the scope of the Voice Pilot. The integrated voice assistant is further improved and makes it easier to access several functions. These include news, the operating manual and in-car music streaming.

### Native Spotify integration

Porsche drivers have direct access to their favourite Spotify songs and podcasts in the revised PCM 6.0. Spotify Premium customers can link their account to the vehicle using their Porsche ID and use Spotify as an additional media source.

The vehicle accesses the streaming service

provider directly without having to use a smartphone. Through this new integration, drivers will have instant access to more than 70 million songs and 3.2 million podcasts right at their fingertips – all required data is included in Porsche Connect. The app also displays the Like function, all saved playlists and the new Go to Radio option, which looks for a piece of music similar to the one currently playing.

### Charging Planner with improved algorithms

With electric cars, it is important to plan the route as efficiently as possible. That is why Porsche has improved the calculation of charging sessions in the Charging Planner. The optimised algorithm prioritises to a greater extent charging stations which offer a higher energy output and plans charging stops more efficiently. These improvements are also based on customer feedback. Additionally, the

Charging Planner now also takes into account the time required to start and end the charging process at the charging station when calculating the total driving time. Together, these measures make for a much improved charging experience.

For a better overview, a dynamic zoom function for charging stations during the trip has been introduced. The system shows all available charging options in the immediate vicinity including whether or not they are currently in use. In the wider view, the display is limited to fast-charging stations. A new filter makes it possible to sort charging points by output. The PCM 6.0 navigation system also includes a revised route monitor, on which relevant events can be individually displayed or hidden during the trip. The new functions are standard as of now on every newly configured Porsche 911, Taycan, Cayenne and Panamera. The exact scope depends on the equipment and powertrain type of the vehicle.



Native Spotify integration

## Anritsu launches Interference Waveform Pattern software for 5G and LTE UE/Module Rx tests



Anritsu Corporation announced the launch of its new Interference Waveform Pattern for 5G NR Receiver Test MX371055A and Interference Waveform Pattern for LTE Receiver Test MX371054A software. These tools generate 3GPP interference waveform patterns for testing the receiver sensitivity and throughput of both 5G and LTE user equipment (UE) and modules using the Vector Signal Generator MG3710E. Installing these tools in the MG3710E used in combination with the Radio Communication Test Station MT8000A and Radio Communication Analyzer MT8821C facilitates easy interference evaluation tests required by the 3GPP RF Compliance Test.

The tools are designed to support both in-house pretesting for confirming compliance of Sub-6 GHz 5G and LTE UE and modules before the official 3GPP Compliance Test as well as for R&D to improve receiver sensitivity and throughput performance.

### Development Background

In parallel with increasing 5G smartphone shipments, annual shipments of 5G Customer Premises Equipment (CPE) are

increasing based on mobile-operator Fixed Wireless Access (FWA) services. In addition, manufacturer of automotive electronic equipment are developing 5G communications modules, such as the Telematics Control Unit (TCU). Moreover, alongside this growing market for 5G UE and modules, the same manufacturers are still developing LTE UE and modules for mobile operators who have not started 5G services yet.

To sell 5G and LTE UE and modules, these equipment manufacturers must ensure that their products pass the 3GPP RF Compliance Test administered by a certified test organization.

The Compliance Test is the final product evaluation before commercial release and failure to pass possibly requires redesign and retesting. Consequently, pre-testing during development is essential to avoid this risk.

A vector signal generator is required to generate interference waveforms at pre-testing. Evaluation using interference waveforms is important in suppressing degraded receiver sensitivity and helps assure development of competitive UE and modules.

Anritsu developed these two 3GPP-

compliant interference waveform pattern tools to help engineers without specialist skills generate interference waveforms for easy interference tests.

### Product Outline

The Vector Signal Generator MG3710E supports receiver sensitivity and interference tests by outputting modulation waveforms up to 6 GHz and these new interference waveform pattern software tools facilitate output of different signal types.

The MG3710E with Anritsu's RF Conformance Test System ME7873 series supporting for 5G and LTE systems can perform the RF Compliance Test by certification organizations, such as test houses.

### Features

Generate 3GPP-compliant interference waveform patterns for Rx tests of Sub-6 GHz band 5G and LTE UE and modules. These waveform patterns are also used by our RF Conformance Test System.

Output required waveform pattern instantly by choosing from pattern list.



# VuDrive – a complete AI video telematics solution

Jungo introduced VuDrive, a complete aftermarket solution for fleets, Telematic Service Providers (TSPs) and distributors, providing camera-based driver monitoring, road risk analysis, video recording and cloud services.

Based on Jungo’s award-winning and patented CoDriver AI software, VuDrive’s dual-camera is an end-to-end AI video analytics solution for driver safety, including real-time driver monitoring alerts, road risk analysis, cloud services for fleet managers and APIs for TSPs to integrate into their own cloud. The VuDrive hardware is easy to install, affordable and without long term commitment.

VuDrive provides fleets real time alerts on risky driver and road events, and enables viewing complete safety information and driver scoring, both aggregated and per event, which includes real-time all driver notifications, video clip recordings of both the cabin interior and the road. This enables fleets to identify and improve risky drivers, and prevent potential future accidents.

VuDrive is already deployed by fleets in various geographies.



## VuDrive Capabilities

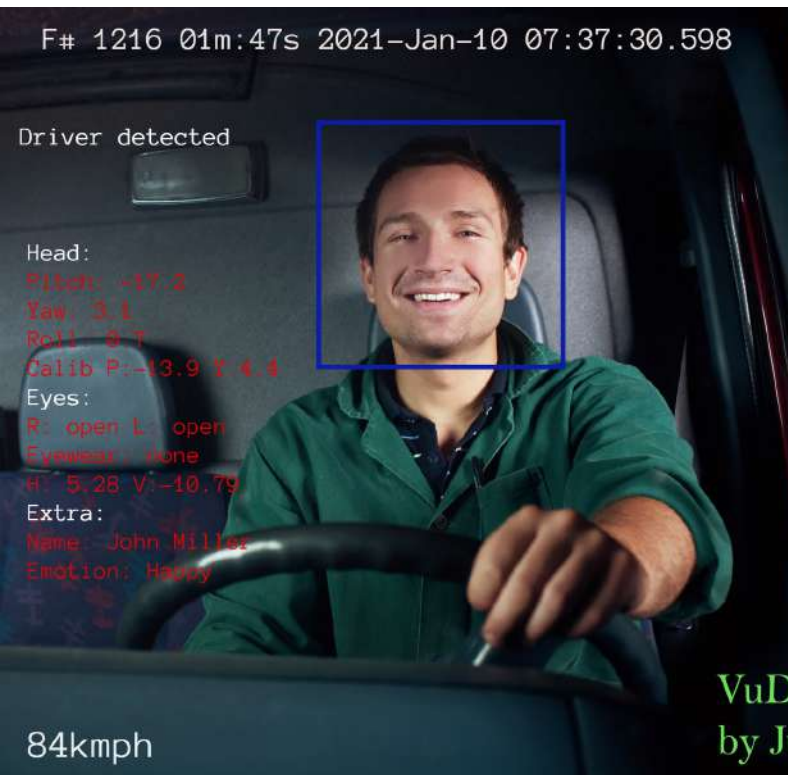
### Driver monitoring & alerts

- Driver distraction
- Sleep/Drowsiness
- Fatigue
- Alerts to driver
- High speed alerts (fixed speed, configurable)
- Alerts, e.g to fleet manager/parent

### Video recording

- Record all rides videos
- Proactively record important events, with one click

- Upload on WiFi or cellular
- Driver protect mode + Panic button (vs. problematic passengers)
- 24/7 recording mode – protect your car even when parked
- Motion alerts in 24/7 recording mode
- Email notifications – get alerts and trip summaries
- SD card support
- Date and time stamp your videos
- Bluetooth media button support for quick recording of events





## Serve Robotics to commercially launch Level 4 self-driving robots

Serve Robotics announced the deployment of its next-generation delivery robots. This milestone means Serve Robotics' latest generation of robots are able to operate routinely without human intervention, and can rely on their onboard capabilities to ensure safe operation.

Serve Robotics recently completed the first-ever delivery to occur at Level 4 autonomy, navigating fully autonomously in designated areas. The company's robots are equipped with an extensive array of technologies that ensure the highest degree of safety by utilizing multiple layers of redundant systems for critical navigation functions. This includes multiple sensor modalities—active sensors such as lidar and ultrasonics, as well as passive sensors such as cameras—to navigate safely on busy city sidewalks. Serve Robotics' achievement required development of a wide range of market-leading capabilities, such as automatic emergency braking, vehicle collision avoidance, and fail-safe mechanical braking.

### HEADLINES

- Magna adds more than 120 engineers, strengthens ADAS capabilities
- Industry-driven DINPAS consortium paves the way for fully autonomous systems by advancing globally available, highly accurate positioning
- TriEye collaborates with major Tier 1 Hitachi Astemo to accelerate the launch of cutting-edge ADAS technology
- Pony.ai debuts its 6th generation autonomous driving system design



## WeRide reaches 10 million kilometers of autonomous driving

WeRide announces the breakthrough of reaching 10 million kilometers of autonomous driving on public roads, among which 2.5 million kilometers are in fully driverless mode.

WeRide has accumulated a massive number of high-quality scenarios through 10 million kilometers, combining testing and operations with more than 300 AD vehicles over the past four years. WeRide's fleets comprise Robotaxi, Robobus, and Robovan, running in cities such as Guangzhou, Zhengzhou, Nanjing, Wuhan, Anqing in China and San Jose in the US. They are tested and operated day and night, traveling from CBDs to urban villages, tunnels to highways, under the sun, rain and snow, all contributing to generate an abundance of valuable AD data.



## Nuro unveils third-gen autonomous delivery vehicle built with BYD

Autonomous vehicle company Nuro has unveiled its third-generation self-driving electric delivery vehicle in partnership with BYD North America.

Simply called Nuro, it's described as the most advanced zero-occupant vehicle designed by the company to date. With the new model, California-based startup hopes to scale its services to millions of people across the country.

Nuro's third-generation vehicle is designed to carry more goods—it offers twice the cargo volume of its predecessor—and enable more deliveries thanks to a higher top speed of 45 mph (72 km/h). Its compartments can hold a combined 27 cubic feet (0.76 cubic meters) of stuff, which equates to about 24 bags of groceries. The four-wheel robot can handle almost 500 lbs (226 kg).

The self-driving delivery robot will be produced in a supplier partnership with BYD North America and completed at Nuro's new \$40 million end-of-line manufacturing facility and closed-course test track in southern Nevada.



## Qualcomm and Alps Alpine work together to deliver advanced automotive In-Cabin capabilities

Qualcomm Technologies, Inc. and Alps Alpine Co., Ltd. announced their joint work to deliver the Digital Cabin – a proposal for future mobility to enrich a space of style and comfort, even behind the cockpit. The Digital Cabin uses High-Performance Reference Architecture (HPRA), Alps Alpine's original integrated electronic control unit (ECU) powered by the 3rd Generation Snapdragon® Cockpit Platforms. HPRA is used to perform software processing for the Digital Cabin via human-machine interface (HMI), sensor and connectivity technologies, enabling advanced infotainment and cockpit capabilities in the vehicle.

By combining Alps Alpine's HMI, sensor, connectivity and infotainment technology with Qualcomm Technologies' fully scalable cockpit solutions – designed with a modular architecture to allow automakers to deliver a variety of customizable options for their consumers – the companies are further enhancing the digital in-vehicle experience.



## Sensata Technologies' new Smart-Tactor contactors provide critical data to improve system performance

Sensata Technologies announced the availability of the new GXC and MXC series of Smart-Tactor™ contactors with CAN bus communication which provide valuable data for improved system performance, reliability, and diagnostics in military, battery system, energy storage, commercial vehicle and industrial applications.

Built on the industry proven GX and MX series from Sensata's GIGAVAC product brand, this new series of smart contactors are easily integrated and simplify data acquisition, making them ideal for data logging, telematics, and predictive maintenance.

The GXC and MXC contactors feature the following:

- Ability to program overcurrent trip points with timer delays for each trip point
- Configurable baud rate of 250k or 500k
- Rugged ceramic seal rated to 175°C, increasing performance during over-current conditions
- Hermetically sealed and designed to meet: UL1604 for Class I & II, Div 2 and Class III for use in hazardous locations, IP67 for temporary water immersion for 30 min, IP69K for pressure washing, SAE J1171 – external ignition protection, and ISO8846 for protection against ignition around flammable gasses.

## SecureThings lauded by Frost & Sullivan for addressing connected-vehicle cybersecurity challenges through continuous vehicle monitoring

Based on its recent analysis of the Indian automotive cybersecurity solutions market, Frost & Sullivan recognizes SecureThings.ai with the 2020 Technology Innovation Leadership Award. The company employs a holistic approach to addressing issues in connected vehicle cybersecurity by offering continuous vehicle monitoring to detect unknown behaviors and threats. SecureThings differentiates itself through its comprehensive, multi-layer, and in-depth defense cybersecurity solutions for electric vehicle makers, fleet owners, original equipment manufacturers (OEMs), Tier I suppliers, telematics device suppliers, and mobility service providers.

SecureThings offers end-to-end solutions with the following five-pronged approach for vehicle security: detection, response, recovery, identification, and protection. The preferred provider of in-vehicle cyber protection for OEMs, Tier1 Suppliers and Subsystem Manufacturers using patented machine learning based solutions. The company's threat intelligence and cloud protection platform offers complete control, comprehensive monitoring and effective resolution methodologies to the OEMs, shared services operators, and fleet managers.

Sibros closes \$70 Million Series B funding to power the connected vehicle ecosystem

Sibros announced its \$70 million Series B funding round led by Energy Impact Partners (EIP) with participation from Fontinalis Partners, Google, Iron Pillar, Qualcomm Ventures and existing investors Nexus Venture Partners and Moneta Ventures. The funding will be used to fuel the company's expansion to meet strong global demand and deliver large customer deployments of its vertically integrated connected vehicle platform.

As automakers have shifted to a new software-defined vehicle paradigm, they must deliver fully connected products at rapid scale across a complex ecosystem of suppliers, software, and data dependencies. This complexity is further increased with the numerous safety and security requirements that must be met along the way. Keeping connected vehicles continuously updated while collecting relevant data to improve product functionality are challenging priorities with today's siloed approach to automotive software, often supported by custom development and manual work.



## HEADLINES

- VinFast taps HERE to accelerate in-car navigation for its smart electric cars
- IRP and Bosch partner to mass-produce controllers for the booming electric personal mobility market
- Black Sesame Technologies receives investment from Bosch's Boyuan Capital, further strengthening ongoing partnership
- BorgWarner completes investment in Qnovo Inc., enhancing battery management capabilities
- Qualcomm and Volvo Cars enable Snapdragon-powered premium infotainment experiences for upcoming electric vehicles
- Ford and ADT to form joint venture to fortify vehicle security with breakthrough technology
- Honda and V2X Suisse consortium to advance vehicle-to-grid charging technology in Switzerland
- Opus IVS™ and 1Collision® launch nationwide diagnostic partnership
- IonQ and Hyundai Motor partner to use quantum computing to advance effectiveness of next-gen batteries
- Airbiquity strengthens collaboration with Renesas for continued technology integration efforts
- Black Sesame Technologies and BlackBerry QNX team up to create safe, reliable autonomous driving solution for Chinese automakers
- Mercedes-Benz partners with Luminar to enhance pioneering work in next-generation automated driving systems
- Geely Holding Group and Renault Group sign agreement for joint cooperation in South Korea
- Ford selects Telenav's electronic horizon application to keep drivers safe
- Vewd for automotive enables premium entertainment in Skywell flagship electric SUV
- Ford Pro announces new partners, services; demand strong with orders for 10,000 E-Transits
- Otonomo and AUDI AG partner to enable innovative, data-driven services
- Continental is jointly developing fully automatic charging robots for electric vehicles with Volterio
- Hyundai Motor Group and JTC to develop smart transport and logistics models for Singapore's Jurong Innovation District
- ProLogium and Mercedes-Benz entered into a technology cooperation agreement to develop solid-state battery cells for electric vehicles
- ABB acquires controlling interest in InCharge Energy, strengthening its EV charging solutions in the U.S.

## Velodyne Lidar signs five-year sales agreement with QinetiQ Inc.

Velodyne Lidar, Inc. announced a five-year sales agreement for its lidar sensors with QinetiQ Inc., a leading defense and security company. QinetiQ selected Velodyne's sensors to provide perception and mapping capabilities across its unmanned ground vehicle (UGV) portfolio.

QinetiQ offers a full range of unmanned ground systems ranging from 5 pounds to 50,000 pounds and has been a leading provider of UGVs for defense and first response users for over 20 years. While QinetiQ's UGV offerings originally focused on the dangers of Explosive Ordnance Disposal and Route Clearance, its systems are now found in a range of operational missions distancing operators from new everchanging threats.

## Aptiv announces the acquisition of Wind River

Aptiv has announced that it will acquire Wind River from TPG Capital, TPG's private equity platform, for \$4.3 billion in cash. Wind River's edge-to-cloud software allows for the secure development, deployment, operation and servicing of mission-critical intelligent systems.

The company serves a number of industries around customers around the world – including telematics and automotive. Its software portfolio is spearheaded by Wind River Studio, a cloud-native intelligent systems software platform that enables management for edge-to-cloud use cases across the full product lifecycle.

Through the acquisition, Aptiv aims to accelerate its expansion into the software-defined mobility market. It will also expand into further industries with Wind River's team and software platform. Through Wind River's resources, Aptiv expects to develop, and enable, a variety of end-use applications and solutions as processing moves toward the edge and connected devices expand in their complexity and capabilities.

## Arval and Ridecell sign strategic partnership to deploy next-generation shared mobility solutions

Arval and Ridecell announced the signature of their strategic partnership with the shared objective of accelerating the development of end-to-end mobility solutions. Ridecell's fleet automation and mobility platform coupled with Arval's leading position in the car leasing market will help cover any mobility needs of Arval corporate customers throughout Europe.

In 2022, this new Arval Car Sharing platform will soft launch in Belgium with a widespread roll out in the latter half of the year, expanding to other European countries. Ultimately, the goal is to offer coverage in all Arval's markets worldwide, with plans to grow the car sharing fleet by 50% each year.

Arval and Ridecell's five-year agreement aligns with Arval's 2020-2025 strategic plan, Arval Beyond, which aims to offer customers an integrated, seamless mobility experience. Through connected, flexible products and services, Arval's strategic plan will support users through their energy transition with guaranteed simplicity. Arval has forged partnerships with innovative players in the field of mobility.



## Volvo Trucks launches electric truck with longer range

The Volvo VNR Electric is one of Volvo Trucks six all-electric heavy truck models and is specially designed for the North American market.

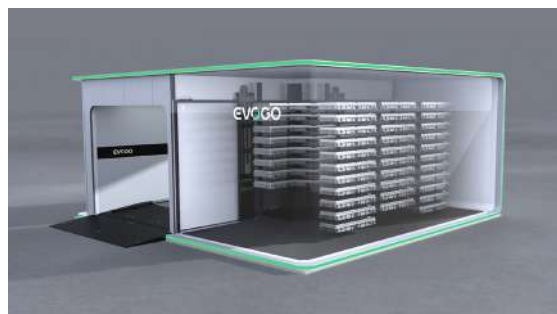
The first generation of Volvo VNR Electric had an operating range of up to 240 km (150 miles). Now an enhanced version of the class 8 electric truck is launched, with an operational range of up to 440 km (275 miles) and increased energy storage of up to 565kWh. The improved performance is due to, among other things, improved battery design and a new six battery package option.

The new Volvo VNR Electric also reduces the required charging time, as the 250kW charging capability provides an 80% charge in 90 minutes for the six-battery package, and 60 minutes for the four-battery version. Globally, Volvo Trucks has set the target that half of all trucks sold are electric by 2030.

## EV Connect introduces electric vehicle charging solution designed for fleets

EV Connect announced the general availability of its Fleet Charging Management Platform. The City of Porterville now leverages the EV Connect Fleet solution for advanced capabilities such as real-time charger and vehicle data, automatic and manual charging prioritization, and energy management to help mitigate on-peak energy costs.

With the goal to balance operations, insights, and user control, the EV Connect Fleet Management Platform presents an intuitive dashboard that can track a vehicle's state-of-charge, ready time, and overall status, with complete visibility into depot specifics. Automatic and manual charging sequencing and prioritization provides adaptive fleet scheduling and gives owners and operators the ability to leverage in-depth analytics to improve fleet scheduling, including state-of-charge, energy power levels, and station availability. The charging management software supports all use cases, including parking lots, distribution centers, transit hubs, and other public-accessible locations.



## CATL launches battery swap solution EVOGO featuring modular battery swapping

Contemporary Amperex Energy Service Technology Ltd. (CAES), a wholly-owned subsidiary of Contemporary Amperex Technology Co. Ltd. (CATL), rolled out its battery swap solution EVOGO featuring modular battery swapping at its first online launch event.

Designed to look like a bar of chocolate, "Choco-SEB (swapping electric block)" is a mass-produced battery specially developed for EV battery-sharing.

It boasts the advantages of high-energy density with small size, flexible combination and minimalist design. With the support of the latest CTP (cell to pack) technology, it can achieve a weight energy density of over 160 Wh/kg and a volume energy density of 325 Wh/L, enabling a single block to provide a driving range of 200 km. Meanwhile, the Choco-SEB is compatible with 80 percent of global BEV platform-based vehicle models available on the market, and all BEV platform-based models to be released in the next three years globally.

## HEADLINES

1. MClarios announces new safety critical battery for EVs
2. EVmatch and SVCE partnering to address electric vehicle charger accessibility in Santa Clara County
3. Next.e.GO Mobile becomes the independent BEV manufacturer to enable its customers trade their CO2 certificates
4. Veolia announces its first EV battery recycling plant in UK
5. GM plans to broaden electrification, expanding fuel cells beyond vehicles
6. Foxconn to develop battery manufacturing and EV ecosystem in Indonesia
7. Renault, Nissan & Mitsubishi Motors announce common roadmap
8. Nissan announces all-new electric compact car coming to Europe

## IAC Group commits to reducing carbon emissions by 50 percent by 2030, achieving net-zero by 2050

International Automotive Components Group (IAC Group) has established global targets for sustainability improvements with a commitment to achieving net-zero emissions by 2050 and decreasing carbon emissions by 50 percent by 2030. The company will work to achieve these objectives by focusing on increasing renewable energy use, improving energy efficiency at all its locations, expanding engineering efforts for the vehicle electrification market, improving recyclability and lighter weight products, and heightening sustainability requirements for its suppliers.

The company also joined the UN Global Compact, the world’s largest corporate sustainability initiative, which encourages businesses to adopt sustainable and socially responsible practices in the areas of human rights, labor, environment and anti-corruption and establish a culture of integrity, meet fundamental responsibilities and set a standard of good values and principles that guide every aspect of the business.

## Upstream’s 2022 global Automotive Cybersecurity Report highlights actionable insights amid new regulations

Upstream announced the release of its fourth annual Automotive Cybersecurity Report. The 2022 Global Automotive Cybersecurity Report provides a comprehensive view of the cybersecurity threat landscape faced by the automotive industry. The data and the in-depth analysis compiled by Upstream’s expert analysts are based on over 900 connected vehicles cybersecurity incidents from over a decade of smart mobility, with a spotlight on 2021.

Even more concerning is that in 2021, over 54% of attacks were conducted by Black-hat actors, presenting a bigger challenge than ever in meeting new regulatory expectations. To boost industry awareness of global standards, such as UNECE WP.29 amendments set to take effect this year and the new ISO/SAE 21434 standard, the report gives real-world examples of how violations look in the field.

Beyond incidents and evolving attacks, the report offers an overview of the cybersecurity risk management solutions landscape. It also highlights the criteria for deploying effective safeguards in light of cybersecurity threats that are rising in magnitude and sophistication.

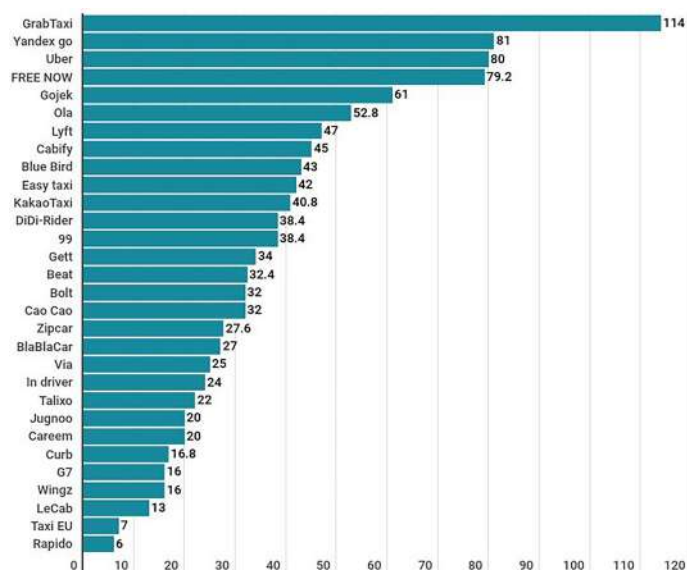
## Global automotive cybersecurity market analysis & forecast report 2021-2026 – business model, pricing model, & competitive landscape

The “Global Automotive Cybersecurity Growth Opportunities” report has been added to ResearchAndMarkets.com’s offering.

This study of the global automotive cybersecurity landscape includes an in-depth analysis of key cybersecurity market and technology trends in the connected vehicles space across passenger and commercial vehicle segments. It also explores different types of cybersecurity solutions and strategies value chain partners offer for mitigating threats during a vehicle’s life cycle.

Total addressable market for the cybersecurity of passenger vehicles will grow at a CAGR of 18.4% between 2020 and 2026, owing largely to the WP.29 regulation and OEMs in major economies competing to gain a competitive advantage.

Vehicles with embedded connectivity will account for about 80% of connected vehicle sales by 2026, and hence OEMs will prioritize securing them first. Overall, the market opportunity for automotive cybersecurity is progressive, with the regulatory landscape and innovation across the automotive value chain propelling growth scenarios and minimizing vehicle security threats.



## GrabTaxi, Yandex Go, and Uber are the most data-hungry ride-hailing apps

A study conducted by cybersecurity company Surfshark revealed that ride-hailing and taxi apps collect extensive information about their users. According to the research, these apps, on average, collect 14 data points per user and 30% of them use this data for “Third-Party advertising”. Surfshark’s data sensitivity index, which shows what type of data ride-hailing apps collect, ranked widely used GrabTaxi, Yandex Go, and Uber as the most data-hungry carpooling apps in the world. India’s most popular ridesharing app Ola comes in 6th place, while Rapido collects the least amount of data in the ranking.

The index researched data collection practices of the 30 most known ride-hailing apps from the Apple Store and measured how much data the apps collect in three main pillars: 1) data that is not linked to a user’s identity (such as app crash data); 2) data that could be linked to a user’s identity (such as name); 3) data that could track users across apps and websites (such as user ID).





## Mercedes-Benz to assemble EVs in India starting this year

Mercedes-Benz's Indian unit said it will soon start assembling electric vehicles in India. The Stuttgart-based company will start making its top-of-the-line EQS electric limousine in India starting this year. Having entered India's EV market in October 2020, the local unit of the company quickly sold its allocated units over the last 15 months.

The locally assembled EQS will invite a lower import duty of 40%, compared with 100-110% on fully built imported cars that could put it out of the reach for many prospective buyers.

With a lower GST and duty on imported completely knocked-down kits, the EQS will be priced closer to the company's existing S-Class limousine and help it generate higher volumes.

## Hero Electric and Mahindra & Mahindra announce strategic partnership in electric mobility

Hero Electric and the Mahindra Group announced their collaborative intent as part of Hero's growth and expansion plans to cater to the ever-growing demand for EVs in the country. The strategic partnership will create multiple synergies to help drive adoption across the country.

As part of the partnership, Mahindra Group will manufacture Hero Electric's most popular electric bikes – Optima & NYX at their Pitampur plant to meet the growing demands of the market. With this collaboration along with the expansion of their existing Ludhiana facility, Hero will be able to meet its demand of manufacturing over 1 million EVs per year by 2022. This will further enable them to drive adoption of a cleaner mode of transport.

The joint development efforts will also be a key factor in developing the platform approach to help electrification of the Peugeot Motorcycles' portfolio. This is expected to bring significant value to both parties through optimization of costs, timelines, and shared knowledge in this dynamic, fast growing global EV environment.



## HEADLINES

1. MG Motor with ACMA to promote EV skill development in the component segment
2. LML ties up with Saera Auto to manufacture electric vehicles
3. IIT-BHU researchers develop new technology for charging electric vehicles
4. Reliance Jio-bp opens EV charging hub in Delhi
5. Continental Tires introduces Conti SupRim Technology™ in India
6. IREDA launches new program to promote green mobility

## Ashok Leyland & Aidrivers to develop autonomous vehicles

Ashok Leyland (ALL) and Aidrivers for a new collaboration to develop AI-enabled autonomous vehicles. The two companies have signed an MoU for a long-term collaboration which will combine their specialist knowledge and experience to push forward together in this rapidly advancing field.

In the agreement, signed early in January 2022, Aidrivers will provide AI-enabled autonomous solutions and ALL will provide vehicle platforms. The partners will work together to explore target markets and opportunities for cooperation.

Aidrivers provides autonomous mobility solutions for industrial mobility automation which optimize clients' business operations and enable the delivery of efficient and quality services. The agreement envisages the development of autonomous vehicles, industrial mobility equipment and other autonomous industrial automation solutions that can deliver significant value to fleet operators, logistics providers and others. As per the MoU, the companies will look for specific project opportunities, joint marketing and joint market access.



**Dr. Akshay Singhal**  
**Founder, Log9 materials, working in the advanced EV battery-technology domain:**

In the upcoming Union Budget, from the EV ecosystem perspective, we hope to see that the FAME Subsidy corpus should be extended to EV retro fitment kits. Additionally, more R&D incentives should be given for energy storage and EV technology-related developments in India, as well as R&D investments made into local technology developments, which should be made 100% adjustable against corporate taxes.



**Akash Gupta**  
**Co-founder and CEO, Zypp Electric**

India is undergoing a massive EV revolution – which will get a further boost in 2022 following the rapid growth of charging infrastructure and advanced EV models. We are optimistic that the government will announce new initiatives to encourage local EV manufacturing, facilitate easy finance, and create an innovative EV ecosystem. With that said, we urge the government to reduce GST on EV purchases and rentals from 5% to 2%. A reduced GST would allow consumers to smoothly shift to EV. The Finance Ministry can also reduce taxes levied on loans taken to purchase an EV. GST reduction and tax benefits would play a crucial role in making EVs accessible to everyone. Additionally, the government can also subsidise electricity pricing for EV charging to further improvise the existing EV charging infrastructure.



**Prashanth Doreswamy**  
**President & CEO – Continental India**

The Union Budget 2022-23 is of paramount significance for the nation's automotive and manufacturing industry. With an unsettled pandemic situation and prevailing semiconductor shortages, the automotive and manufacturing industry is expected to be of prominent importance in the budget. We expect the government to introduce a uniform Goods and Services Tax (GST) levy of 18 percent on all automotive parts from the current 28 percent. This step will give much-needed support to the automotive industry amid the uncertainties.

The government has been taking significant steps to promote electric and safe mobility. We expect some relaxation for the research and development of new technologies. This will further motivate OEMs and automotive suppliers like us to invest in innovations and technologies for the country.

The PLI scheme is a welcome step and we hope the scheme will be further expanded this year. Further, we seek reintroduction of investment allowance at 15 percent for manufacturing companies that invest more than Rs 25 crore in plant and machinery. This will complement the PLI scheme and attract more investment in the sector.



**Deepak MV**  
**CEO & Co-Founder, Etrio**

At a time when EV adoption is gaining unprecedented momentum despite many challenges, in the upcoming Union Budget 2022, we at Etrio would like to see the Finance Minister address the critically-important area of making wide and varied range of financing options available for EV commercial vehicles' buyers – as this is extremely critical for further increased uptake of EVs in India, going forward. To this end, the Government should make the EV sector a priority lending sector for the financial institutions. Additionally, reducing the GST taxation on Lithium-ion batteries and EV spare parts and components can also be a great step forward from the EV manufacturing and OEM point of view. Given that increased adoption of EVs in the logistics and last-mile delivery segment is the need of the hour to reduce Carbon emissions, the Government must also come up with additional sops or incentives for the nation's fleet aggregators to switch entirely from IC engines to EVs in order to pave a sustainable and zero-emissions future. Last but not the least, we also hope that this Budget answers the need for revitalizing the B2B retrofitment (ICE to EV conversion) space pan-India by bringing retrofitment under the ambit of FAME-II.







### Better Visibility

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### Reduce Costs

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### Steady Improvement

Use violation playbacks to coach drivers. Help them adopt safer driving practices.

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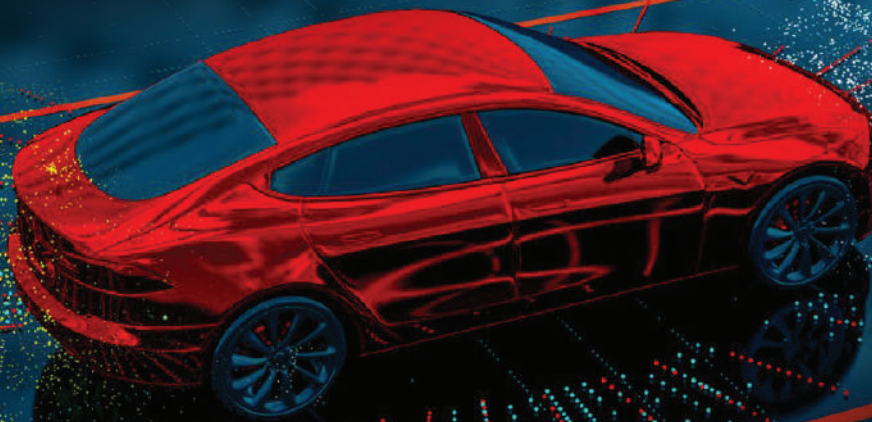
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**60+**  
Speakers

**10+**  
Sessions

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# CONNECTED VEHICLE 2022



## Who Should Attend?

- Automakers
- Automotive OEMs
- Mobility Service Providers
- IT Companies
- Tier 1, Tier 2 & Tier 3 Suppliers
- TSP's
- Chip Manufacturers
- Semiconductors
- System Integrators
- Software/Hardware Providers
- Insurance Companies
- Lighting Companies
- Map Providers
- Content Providers
- Application Developers
- Big Data Analytics
- Telecom / Wireless carriers
- Cloud Service Providers
- Component Manufacturers
- Electric Vehicle Manufacturers
- Government Bodies
- State Transport Corporations
- Policy Makers
- Academia/Institutions
- Car Sharing Companies
- Taxi Aggregators
- PSU / STC
- Financial Services
- Associations
- Consultants
- Investors
- Logistics & Transport

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