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Editorial

AIS 140: Saga or a Myth

The knee-jerk notification released by MoRTH has left many in the industry bewildered and bleeding. If one were to figure out how to bleed any industry, the AIS 140 initiative and series of developments could be one of them. To begin with the notification of finalised draft version last May 2017 which proposed the use of tracking device with emergency button in all public transport vehicle(state transport corporations, auto-rickshaws, taxis and all used for public transportation) to its final notification in Sept'2017 was no less than setting the cat amongst the pigeons. It was an uphill task and the requirements were difficult considering the use of IRNSS signal for vehicle tracking, which itself was not stable. The device manufacturers quoted that such a shift generally are given 2 to 3 years time frame. But the government was quite committed about the implementation date. Given the transition to Bharat Stage IV emission standard, where government did not budge, industry despite giving several request for amendments to AIS 140 settled down to fact that it will be implemented on the given date.

The short time frame was overshadowed by the emerging opportunity; and the industry started gearing up for the new challenge to meet the huge demand which would have come up. Vehicle telematics companies started investing in device to make it AIS 140 compliant, getting it certified by ICAT/ARAI and thereafter building the inventory for the perceived demand of these devices. For any company which was in the business of tracking device, it was an opportunity not to be missed. The volume would be unprecedented and so would be the growth of overall vehicle telematics industry.

Seventeen days into the new regulatory regime, MoRTH issues a notification postponing the implementation of AIS 140 till 1st April 2019. The vehicle tracking device industry was left high and dry. Not sure, if the regulatory agency would ever clarify the logic to leave this vehicle telematics industry industry bleeding:

Why did it rush with the AIS 140 implementation? Giving only 10 months for the industry to be ready with AIS 140 compliant device

When it did so, why in just 10 months it went back on its own decision?

If it had to postpone the implementation date, why was it not done 3-4 months before?

We doubt, if ever, anyone in the regulatory side would be held responsible for the misery and loss to the vehicle tracking industry. Maybe, they are ignorant of the pain most of these entrepreneurs and business heads would be undergoing. If not, are they going to take some corrective measures to implement it in phase wise beginning few months down the line for some priority sector.

Regulatory frameworks are the building blocks for any nation. No one other than governments knows it better and more so for a nation of the size we are, such ad hoc decisions can break the industry, unless it was a deliberate move to benefit few who have quietly sat through the entire fiasco (this is what AIS 140 looks like now), who would now be amongst few vehicle tracking companies left to take on the large number of bleeding and bruised companies which jumped into the AIS 140 pyre.



Maneesh Prasad Editor & CEO

Nowhere Journey of AIS 140

Government taking cognisance of the unfortunate incident which took place in December 2012, formed a three member committee headed by former Chief Justice of India, JS Verma, to suggest amendments to criminal law. The committee along with its recommendations which it submitted in January 2013, suggested use of safety measures in buses for passenger safety. In the following budget session in February 2013, Govt of India created a non-lapsable fund of Rs. 1000 crores (INR 10 Billion) for implementation of initiatives aimed at enhancing the safety and security for women in the country. Government also started exploring technological solution to enhance passenger safety in public transport.



Technology intervention for safety

In January 2014, Government approved the project to install CCTV, panic button and vehicle tracking devices in public transport buses across major cities in India. Ministry of Road Transport and Highways (MoRTH) suggested a scheme Security for Women in Public Transport, under which National Level Vehicle Security and Tracking System was to be setup. This scheme was given inprinciple approval by Ministry of Finance. MoRTH engaged DIMTS (Delhi Integrated Multimodal Transport System) as its technology advisor for the project. The scheme was supposed to create (1) National Backend Data Centre, (2), City Command and Control Centre in all 32 cities and (3) Installation of CCTV, Panic Button and vehicle tracking system in public transport buses.

Need for Standard & its Implementation

The scale of implementation, prioritised the need to have standards for the devices, because it would help in accelerating the development and implementation of technologies that influence and transform our lives. An interesting observation was made regarding the standards for tracking device and emergency buttons,- "In automotive industry, the ones who sit at the regulation side, are regulation experts; and not the subject experts. Similarly for vehicle telematics standards too, experts from regulation side joined for its standards".

The automotive tracking device standards drafting began with BIS (Bureau of India Standards) being assigned the work to draft the standard. DIMTS was given an assignment to draft the guideline specification for automotive tracking device. The committee also suggested that the device should be of industry grade rather than consumer grade device which was proliferating the market. The committee took into account the Indian environment- temperature variation, dust, vibration etc, which is significantly different from those in Europe or US. DIMTS in discussion with IIT, CDAC and other submitted the guidelines by end of 2014, which was later published by MoRTH.

With specific reference to the panic button, the committee deliberated on how the users get to know whether this panic button is working? To ensure it working, there was a need to have



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AIS 140 hurts VTS industry

some indication for the user that the device is functional. Earlier, there were red buttons which did not show whether they were working or not; but later it was changed to be illuminated with backlit. One would get to know that this is working. With panic button being pressed, the indication will change (blinking or it turns to red) and when it gets deactivated it will be back in the same state.

BIS along with ICAT (International Centre for Automotive Testing) and DIMTS using the guidelines formulated by DIMTS and in consultation with some of the industry players, drafted the standard (Automotive Industry Standard 140 or AIS 140) through a formal AIS working committee. The finalised draft was published in May 2017 with the effective date of implementation of mandatory use of recommended device in all public transport vehicles being 1st April 2018.

The AIS 140 Pandora Box

Some of the industry players in the field of vehicle tracking devices were caught off-guard. Telematics Wire organised a round table for vehicle tracking device manufactures and reseller on 4th of August 2017. The recommendations were submitted in the first week of Sept'2017 to AIS 140 Committee, MoRTH, DIMTS, ARAI and ICAT. But, without any cognizance of the industry recommendations AIS 140 was formally notified in September 2017, on the website of



ARAI (Automotive Research Association of India), the custodian and publisher of automotive industry standards. Now all the public transport vehicles-public or private, bus or cab were required to conform to AIS 140 guidelines starting from 1st April 2018. This effectively means, any new vehicle would not get permit to ply on road if it does not conform to AIS 140. Further, any old vehicle seeking fitness renewal would have to comply by AIS 140. In other words, in a year's time all the public transport vehicle would have become AIS 140 compliant.

It was a long felt need for these standards but it took the brutal and hear-wrenching incident in the nation's capital, inside a public transport vehicle to wake-up the government out of its slumber.

In May 2017 with the release of finalised draft of AIS 140,

As per recent notification issued by MoRTH on April 18, 2018, all public service vehicles have been exempted from the provisions of rule 125H of the Central Motor Vehicles Rules, 1989 (of equipped with or fitted with vehicle location tracking device and one or more emergency buttons) upto the 1st day of April 2019. Some of the telematics industry members who had invested in making AIS 140 complaint devices and creating an inventory in anticipation of increased demand find themselves in a difficult situation. In such a scenario, it has become necessary for the government to consider the issues and concerns raised by the telematics industry. Telematics Wire has compiled the views and suggestions of some of the industry players on the MoRTH notification- perceived reasons for the extended deadline, impact on their business, expectation from Indian government and any other suggestions.

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मं, 1509) भ No. 1509) NEW DEL का.आ. 1663(31).—केन उप-पास (3) खपड (क) हारा पर 2019 तक, केन्द्रीय मोटर यान निय युक्ति और एक या अधिक आपात न प्रक्रित और एक या अधिक आपात न S.O. 1663(E).—In exerci Motor Vehicles Act, 1988 (59 of provisions of rule 125H of the Ce tracking device and one or more er	EXTRAORDINARY भाग II-खण्ड 3-अर-खण्ड (ii) PAR II-अरुर्वात 3-अर-खण्ड (ii) PAR II-अरुर्वात 3-अर खण्ड (ii) प्राधिकार से प्रकाशिल PUBLISHED BY AUTHORITY दे दिल्ली, ग्रांश .4% 23, 1940 HI, WEDNESDAY, APRIL 18, 2018/CHAITRA 28, 1940 संद्रक परिवहृत और राजमार्ग मंत्रालय बच्चियूचना नई दिल्ली, 18 अप्रैल, 2018 टीय सरकार, गोटर यान अधिनियम, 1968 (1968 का 59) की घारा 110 की ता भाविसती का प्रयोग रुले (दुए, रसनी सार्वाजनिक संता यान को तारीख 1 अद्रैल, ग, 1989 के नियम 125ज के लागू होने से (यान की अतीरिधारी का पता लगाने वाली दरनों से सण्जित होने या फिट होने से), एतवड्वारा घूट प्रयान करसी है। [संआर.टी–11028/12/2015-एम.सी.एस.] अगय दामले, संयुक्त साविध NETRY OF ROAD TRANSPORT AND HIGHWAYS NOTIFICATION New Delhi, the 18th April, 2018. se of the powers conferred by clause (a) of sub-section (3) of section 110 of th trafa Motor Vchicles Rules, 1989 (of equipped with or fitted with vehicle location nergency buttons) upto the 1" day of April, 2019. [No. RT-11028/12/2015-MVL]
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म्, 1509) भ No. 1509) NEW DEL का. 1509) NEW DEL का. 1663(31).—केन उप-पास (3) खपड (क) हारा पर 2019 तक, केन्द्रीय मोटर यान निय युक्ति और एक या अधिक आपात व JR S.O. 1663(E).—In exerci MIN S.O. 1663(E).—In exerci Motor Vehicle Act, 1988 (59 of provisions of rule 125H of the Ce tracking device and one or more er	EXTRAORDINARY भाग II-खण्ड 3-34-खण्ड (II) PAR II-डरारांग 3-348-खण्ड (II) भाषिकार से प्रकाशित PUBLISHIED BY AUTHORITY हे दिल्ली, 18:0.4% 28, 1940 HI, WEDNESDAY, APRIL IS, 2018/CHAITRA 28, 1940 मंद्र विरवत्त और राज्यार्थ मंत्रालय बवियूचना नई दिल्ली, 18: अप्रैल, 2018 दीय सरकार, गोटर यान अधिनियम, 1968 (1968 का 59) की घारा 110 की तः भाषितयों का प्रयंग करते हुए, रानी सर्याजेनिक संता यान को तारीख 1 19 की तः भाषितयों का प्रयंग करते हुए, रानी सर्याजेनिक संता यान को तारीख 1 19 की तः ना भातित्यों का प्रयंग करते हुए, रानी सर्याजेनिक संता यान को तारीख 1 अप्रैल, म, 1969 के नियम 125ज के लागू होने से (यान की अवस्थिति का पता लगाने वाली तटनों से सर्विजत होने या किट होने से), एतदद्वारा घुट प्रयान करती है। [संजारटी–11028/12/2015-एम.वी.एस.] अमय दामले, संयुक्त सचिव Notification Notification Set of the powers conferred by clause (2) of sub-section (3) of section 110 of th सारा Motor Vehicles Rules, 1989 (of equipped with or fitted with vehicle location nergency buttons) upto the 1" day of April, 2019. [No. RT-11028/12/2015-VIL] ABHAY DAMLE, J.t. Secy.
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government was about to take a gigantic step, but still for many the question was- whether were we ready for it? The IRNSS based tracking was on roller coaster with atomic clock in one of its geosynchronous satellite having developed error and its replacement failed in August 2017.

Informally, the round table coordinator on AIS 140 at Telematics Wire was notified that it is too late for consideration of any of the points, they would be considered as amendment to the notified AIS 140 in coming months. The wait for meeting for amendment to the notified AIS 140 was in vain and finally the entire recommendation was published in Nov-Dec issue of Smart Automotive for sensitisation of larger community.

It was now a wait in anticipation!

Though initially many of the industry players were reluctant for the 1st April 2018 date, but as per the informal sources by March 2018 more than 60 companies in India were getting ready with AIS 140 compliant device and almost 30+ companies had submitted their devices for certification.

18th April 2018: 'The Gazette of India' notification

Ministry of Road Transport & Highways on 18th April 2018, through its Gazette notification stayed further compliance of AIS 140 in public transport vehicles till 1st April 2019. To say the leastindustry was again taken aback by this.

It was as if government was taking the vehicle tracking service providers through cycles of stress test. Initially when they were seeking more time for implementation, it was denied by being noncommital on various request mail and posts which were sent to various AIS 140 committee members and departments associated with automotive industry standards. When the industry geared up by pushing their own R&D and setting up the industry to meet the



Sanjeev Agrawal

Business Area Director, Trimble

Trimble is a leading MNC in topographical survey and construction equipment.

Looking at the massive fleets & deployment, MORTH had planned to implement through AIS 140, I was afraid if this would happen. It is highly impractical to take the

industry by surprise. The preparations, information update, execution, and planning was missing. It is very ambitious for this level of deployment unless industry is well informed on the solution, network, channels, registered vendors etc. Perceived reasons are obvious, as there was no clarity available to many enforcing departments and authorities could clearly sense that this would be practically difficult to implement abruptly and might bring disruption to the mandatory public services. Such massive deployment will generally be reverse planned. It requires solution and products to be rolled out in advance and related departments should be trained, vendors should be pre-registered. Similarly, the solution needs to be evaluated on many aspects such as - how data shall be consumed, availability of the servers, role of government agencies etc.

A solution should be simple, and easy to implement on various models either in existing running vehicles and new vehicles, which are manufactured by OEM. We see that a particular type of telecom connectivity was asked, and its availability still is a



Shivalik Prasad

Director, MapmyIndia

MapmyIndia is India's homegrown leading map data provider. It has also been providing APIs, GPS navigation and tracking service, location apps & GIS solutions.

We at MapmyIndia do not know the reason why the date has been extended. We have only seen the

official communication from the Government Department.

The impact on the business has been high as GPS tracking/ telematics is a key part of the business and we were geared up with sales team, delivery teams, distribution network, inventory running into thousands of devices, activate cellular sim cards etc.

We have already invested a large amount of monies into the project and now have to retract due to policy decision changes. We expect the GOI to review this decision and if they can activate the process before April 1st, 2019, it will be great for MMI (we will try and reduce losses). Also, it will start the movement of GPS/safety in public transportation which will benefit the citizens at large.

Every day delayed is a day delayed. The government should try and bring the date forward within this year and put up a proper process guideline for state level empanelment and activation. The idea of having GPS devices and emergency response for public transportation is a great thing. The quicker it can be made live, the better it is for citizens at large.

challenge and hence the cost-effective solutions would have eased the massive deployment. Impact on business is huge like many OEM / Service Providers as well as we invested a lot in new product development, testing, buying inventory, setting up sales & service channels. This sudden change has resulted in a major negative impact on business and on the GPS / VTS solution industry. My expectation is that the Government should review the full solution and their role and actionable items / Value for the vehicle owners / fleet operators as well out of AIS 140 implementation. India is a very diverse country and has a large population which travels in Public Transport. We see that IRNSS Chip to be included from Oct 2018 onwards while the same is yet not available commercially and also at a reasonable price. If this is to be implemented, I am afraid that there would be another challenge on availability and cost of hardware will shoot up 50% plus.

My suggestion would be for government to review the whole AIS 140 and its role, expectation, practical aspects and usability. This includes the review of some technical aspects, which does not add value. Many of such deployments ends up becoming mere a compliance on regulation and most of such technology does not function for the longer period if not implemented properly and hence solution needs to be designed in such a manner that it would ensure uptime and value for the Fleet Operators / Owners and State & Central government. I would again insist that the practical aspects should be considered. The implemented technology should bring value to all stakeholders, vehicle owners and at the same time, government should be able to utilize it to take actionable measures in case of any mishap.



Rajiv Sharma

Director, KS Technosoft Pvt. Ltd

KS Technosoft Pvt. Ltd., is into GIS based apps development & GPS vehicle tracking system.

We as provider of GPS Vehicle Tracking Systems are of the opinion that there is no need to have the devices certified by ARAI as this is a software product and not a technical product which directly

effects the working of an automotive vehicle.

The entire fleet management is done by software and hardware is just a tool to receive the data and transfer the same on to servers. Further there is no activity of the GPS tracker which increases/decreases the efficiency of the vehicle so why ARAI certifications. Further the cost of certifications is way high and very cumbersome.



Krishnamurthy V CEO, EI Labs

El Labs India designs and manufactures its products in Telematics and IoT space. Spark Minda acquired El Labs in September 2017.

It is a very welcome notification. The original deadline was neither practical nor thought through. The ecosystem was not ready at

all. Even vendors with certifications were not production ready. The costing was not in place. A customer used to a sub 5K pricing for similar systems was being asked to shell out 30 - 40% more.

The cost of certification is very high, and time taken for certification is also long. The embedded SIM as well as the IRNSS receivers were monopoly businesses, which is neither good for the customer nor the industry. Considering the impact on business, there would be loss of short term revenue, but it is good for long term. The government should include representatives from all parts of the ecosystem. Telematics device manufacturers should be suitably represented. Time line is fine, and a status check should be done mid-year. The extensions should not come after lapse of the dead line to prevent future shocks.

The standard should be reviewed. It should limit itself to certifying the safety aspects which is the intended reason. There is no reason to specify 4 digital inputs, when one will suffice. There is no reason to specify 2 digital outputs, when the use case is not defined.

IRNSS is not key to the safety aspect at all and should be left out from the clause. There should be provision in the standard for device manufacturers to add other features on top of these base features to differentiate in the market. The dual profile of the SIM adds to the cost. Instead a single embedded SIM should suffice, and it should work under the emergency services even if the SIM is not paid for. demands government puts it on hold for a year.

There can be no better way than this AIS 140 roller coaster ride, if one has to kill the industry!

It's not that the ride for safety features in public transport has been anywhere easy. Nirbhaya Fund had first came to MoRTH; later MHA fund was given to MHA; it was a cabinet decision to give funds-some 1400 crores to MoRTH; some 700 crores to MHA. In 2015, they said that all the funds that have been given earlier, their administrative department is MWCD (Ministry of Women Child & Development). Perhaps, it was difficult to cancel the cabinet decision. Perhaps, nobody went back to cabinet, as it could become national issue of changing the decision on women safety. With MWCD, it was not clear, who was supposed to do what? If the project was sanctioned and the money was there with the department, what did MWCD have to do here? Eventually, after some time, MHA and MoRTH were asked to transfer the Nirbhaya Fund to MWCD. Maybe government wanted to involve Ministry of Women and Child Development for better insights into the women safety. But some allege- if you want to change or slow down the process/scheme, this is how to do it.

The missed bus

Today, even after 5 years of Nirbhaya incident, our most widely used cab services- Ola and Uber, do not feature an emergency button. Or if there it is one, it is not known or shown to the passengers. Whereas, unconfirmed sources say there are FIRs against these shared mobility service providers almost every day, mostly hinged on the safety of the passenger availing the service. Though the complaint list goes beyond panic button to their quality of service, including rash driving, detours etc.

To gauge its probable impact, look at the CCTV in metro rail (Delhi NCR) and around it, almost one-third of them would be dummy. But it creates a sense of fear amongst people as they do not know which one is real and which one is dummy. Due to which the metro station stays clean and there are lesser number of sexual harassment incidents, faced by commuters.

Similar situation could have been created with AIS 140 compliance in public transport vehicle. The passenger could have had a choice to not board the cab if the panic button is inactive. The dependency of passenger for their safe commute would not have been only limited to the option given through 'Ride Hailing App' by Ola/Uber.

Post the implication of 1st place of AIS 140, in a year's time it was anticipated that all the public transport vehicles would have been equipped with CCTVs.





Was it because emergency buttons would be inaccessible to many, government decided to postpone the AIS 140 implementation date?

Emergency response system- NERS to SERS & what we lost

Linked with AIS 140 but a separate project has been underway to monitor the panic button alerts. This was initially conceived to be under the National Emergency Response System, which MHA was preparing for emergency alerts. The NERS was considered to be a holistic approach which would have collated panic information from mobile phone (panic button being pressed three times), panic button associated with vehicle tracking device, and multiple apps like HIMMAT and others. For the vehicles, it was very clear that once you press the emergency button, the alert will go to two places: (1) To transport department informing them that the vehicle is in emergency state and (2) To police with a real-time location data. Now the emergency no. of NERS i.e. 112 or that of state emergency response will send the data to that IP on realtime basis as soon as somebody press the panic button because transport department cannot act as security is not its responsibility. Vehicle today generates huge amount of data. A central repository-NERS would have been a huge database for transport department, which could have been used to check violations; route planning; traffic control; and more. The NERS data to be kept by government would have benefitted general public in long run.

But, moving from the earlier vision to have centralised data base of all the emergency alerts and managing it, the MHA decided to have individual state implement the NERS at state level, with the integration of state level NERS data at a later date. NERS is also changed to SERS State Emergency Response System); so it's implementation has also been changed. With dial 100 under this state level NERS, it will no more be a national-level responsibility! These responsibilities will be with the state govt. Centre can give guidelines and tools. Centre could have said, you do state emergency response system but at a national level. In effect, if a bus leaves Jaipur for Delhi; and somebody presses panic button in Haryana/Gurgaon, then Gurgaon police should ideally be informed. What would Jaipur police would do in such case? This maybe a situation with individual state implementing NERS.

There are apprehensions that such a situation may leave a room for manual intervention, which will defeat the entire objective and perhaps kill the soul of NERS. Wonder if we are deliberately leaving rooms for people to escape?

NERS though continues, it has been diluted.

Just imagine your PAN data being a responsibility of state government or CIBIL report being accessed through state agency.

Government could have assigned the responsibility to any of large IT companies like HCL, Infosys, TCS or other who would not have



Harman Singh Arora

CEO, Axestrack

Founded by IIT/ IIM passouts, AxesTrack is a GPS based fleet management company.

The Government of India felt an acute need of its own software for Vehicle Tracking, unfortunately they were unable to deliver it as expected, implementing a system which cannot be used would result

in declining profits for the fleet owners. The delay definitely resulted in decreased sales expectations, moreover many people have made huge investment and it will affect ROI. The Government should take concrete steps and be totally prepared to implement this on the next proposed date. The extended deadline should have been announced much before April 2018, if the same would have been done around Jan'18 the investment in developing products could be saved. The impact of this on the business would have been less had the decision been managed efficiently.

The implementation should be done after full research on technology, as the idea has a potential to completely revolutionize Indian transport industry.



Vineet Sharma

Co-Founder, fleetx.io

fleetx.io is a fleet management data platform and vehicle GPS tracking system in India.

We, at fleetx.io, have been partnering with several manufacturers of AIS 140 compliant devices to ensure a smooth rollout w.e.f. 1st April 2018. We believe that despite the

delay due to infrastructural shortcomings, the AIS 140 can prove to be a very effective measure for fleet safety. The current delay does however pose a challenge, as several of us have invested significantly in the AIS 140 rollout and if it stays delayed for longer, it will create a negative impact in the fleet industry. The government can take measures to start the rollout, for newer vehicles at least, in the major metropolitan areas and monitor the process. It will solve two problems, 1: There will be enough supply of compatible devices and 2: Fleet owners will start getting used to the process and get accustomed, without facing any big immediate impact on their business

struggled with the size or proportion of data, if that was the case to move it to state level. With the NERS tracking, the vehicles on road, will have utility beyond emergency response. Permits to ply on certain stretch can be validated on real-time and alerts on detour being raised on real time. Permits for commercial vehicles and public transport could have been streamlined and their implementation reduced to location-data being validated on real time with respect to their route permit. Litigations related to route deviation or other issues could have been further reduced.

But, yes this would have seen transition of authority to the faceless and emotionless information system with little scope for exerting influence to tamper with basic facts in case of any unfortunate incident endangering safety of passenger. •••

Exploring Vehicle to Grid (V2G)

Electric vehicles have seen a surge in demand amid concerns about increasing pollution level and emission of green house gases. The electric vehicles have capability of energy storage which provides us with an interesting opportunity to utilize them for energy storage and distribution during 'peak' demand.

This technology is known as vehicle to grid (V2G) technology and it can be a promising solution for future energy problems. With V2G technology, parked electric vehicles can be turned into power service providers. It is known that the Energy Storage Systems in an electric vehicle allows two way power flow and they can be used to take power from or supply power to a connected grid.



In V2G technology, an exchange system between the grid and a vehicle with electrical energy storage is setup which can be utilized for the benefit of both the parties involved. It works through specially designed bi-directional charging stations that allow electric vehicles owners to charge their cars whilst also facilitating the discharge of the vehicle's battery.

The vehicle batteries that are fully charged during low demand hours and when the vehicle is not being operated, the on-board battery is connected to a nearby electrical grid via appropriate communication devices. The flow can be reversed at any time according to the requirements.

This is done by using a concept of 'smart grid' which is an electricity network capable of processing the information. It can also manage the electricity flow to fulfil the end users' varying power demand and is able to provide communication between generation sources and end users.

Several companies are working to solidify the use of electric vehicle batteries as a mobile energy source, which could absorb electrical overload from a solar facility, or supply a building with power when no power is generated on a large scale.

The transmission system operator TenneT, the energy service provider The Mobility House and the automotive manufacturer Nissan are working on a joint project to investigate the ways in which electric cars can contribute towards solving the problem of security of supply.

In the project, TenneT, The Mobility House and Nissan are making use of the potential of the batteries in electric vehicles for storing locally produced electricity and to feed it back into the grid to stabilise the grid.

During the project phase, Nissan electric vehicles are being used as mobile energy storage systems in the TenneT control area in Northern and Southern Germany to directly reduce local overloads in the power supply or power demand. After a successful implementation of the project, Nissan e-vehicles could be used for this purpose right across Germany.

The load and energy management software developed by The Mobility House enables automated control of the vehicle charging



and discharging process. British energy provider OVO Energy has presented a Vehicle to Grid charger for use at home with a 6 kW charge. In the first step, it will be handed out for free to 1,000 Nissan Leaf owners this summer.

Similarly Hitachi, Mitsubishi and the French utility Engie recently introduced a new project which will use electric cars as an energy buffer for office buildings in what they call a V2B model. The charging scheme is made possible using a V2X charger made by Hitachi, while Engie is optimising the energy system in the building and Mitsubishi has provided its Outlander PHEV as the central testing vehicle. Japanese carmaker Honda is also working with green energy supplier Good Energy and Salford University to investigate how vehicle-to-grid (V2G) technology could stabilise the national grid and cut costs for households.

The researchers, working in partnership with smart energy firm Upside Energy, will examine energy flows around a normal home that uses an electric car, to investigate how car batteries could be used by the grid to store and export energy in response to national demand. It will assess how well V2G technology can work with homes already using solar panels and batteries to generate and store their own energy, with the aim of developing the business case for V2G technology. As well as helping to manage peaks and troughs in national demand, V2G technology could also help householders earn extra cash by adapting their energy use patterns, the researchers argue.

OVO Energy has partnered with Nissan with the intention of launching a vehicle-to-grid (V2G) offering for private customers buying the latest Nissan LEAF from January 2018.

The V2G offering, enabling drivers to sell energy to the grid from their electric vehicles, will be designed to allow LEAF owners to connect to the grid and charge at a period of low-demand and therefore cheaper tariff periods.

The vehicle's battery can then be used when costs are higher to power homes and workplaces, or fed into the energy system to generate revenue. OVO plans to create special tariffs to reward customers for this interaction with the grid.

Nissan Europe has also entered into a partnership with E.ON which leverages Nissan's vehicle-to-grid infrastructure and advanced bidirectional charging technology to allow customers to optimize their energy use and costs.





IoT Fleet Management Solution



Is VTS hurting private public transporter?

It was somewhere in late 90s when vehicle tracking devices were installed for the first time in public transport. It started with BMTC buses in Bengaluru. The journey of vehicle tracking/ telematics has been rather long with almost two decades of unaccounted lost opportunities. Even today not even one state transport corporation of public transport body can claim across the organisation implementation of VTS. Though some like BMTC, KSRTC and few others are better off compared to many others and some virtually non-starters. History repeats itself and it seems to be coming true for public transport which has once again lost opportunity to enlarge the ambit of tracking in public transport.

It would have included auto-rickshaws, ride sharing cabs, BPO cabs and all with AIS 140. In view of the deferred AIS 140 which was to be in-force from 1st April 2018, our team members sought views from the public transport service providers, which leaves us with bigger question on its utility being understood by the those who are going to have it installed in their vehicle.

DTC Staff

During Commonwealth games (2010), GPS were installed in 3,700 DTC buses. DTC had its own monitoring and control room at Millennium Park Bus Depot, Delhi. With the help of vehicle tracking system, DTC was having information about the buses in real time while monitoring their speed, routes, bus tops etc.

As of now vehicle tracking and panic button have become mandatory so DTC is adding new features under its Passenger Information Systems (PIS). DTC has already floated tenders for installing vehicle tracking with PIS.

On tracking data being collected from these VTS: We are currently "at the preliminary stage" and there is no control room or there is no data collection centre at present.

Rajghat Depot 2 (Green buses), DTC Staff

DTC Staff: Here GPS devices have been

We are required to install GPS (vehicle tracking system) in our vehicles, because if anybody gets caught by police without it, he will have to pay a penalty of INR 5000.

So are drivers paying penalty?

No. Currently, we offer them Rs100-200 (when caught) and many are running their vehicles without GPS(vehicle tracking system). But all the drivers or owner will eventually have to install these devices as they are facing problems regularly.

Who is installing these GPS devices in your vehicles?

The vendors who install fare-metres are installing GPS(vehicle tracking system). The GPS in TSRs (Three-Wheeler Scooter Rickshaw) are connected to their "fare-metres" which shows the exact location of the vehicle and the actual distance travelled by the commuter.



VIJAY KUMAR Auto rickshaw driver

fitted in a few vehicles but they have been removed sometimes back (last month). No penalty is there at present for running buses without having GPS installed. There is no GPS installed in these buses (green ones) but a few red buses have GPS devices (Depot 1). There is no emergency button in any bus now.

Driver, DTC bus: There were few emergency buttons (4 buttons in a bus) but people made use of that to disturb drivers, conductors etc. They pressed the button without any valid reason, especially kids as it is in their direct reach. As soon as they pressed the button, the alert went to the driver and the vehicle was immobilized. The information or alert was being sent to driver only and not to any Control Center or PCR, as there is no connectivity.

DTC Staff: At present, there are no emergency buttons in these buses. Some buses had but from there too, it has been removed. Out of 57 buses in our depot, 21 buses were having GPS installed but they have been removed by DTC. Mostly because they were damaged, or were stolen or sent for repairing which never came back. Presently, there are no GPS and emergency buttons in DTC buses.

DTC Official: We don't have GPS installed in any of our buses as of now but our buses are not passing the fitness test without GPS. At present, there is no information from DTC headquarters about when GPS



GPS fitted in Vijay Kumar's Auto rickshaw

will be installed in these buses.

Rajesh Kohli, Navrang Meter House

GPS is installed in most of the auto rickshaws running in Delhi. It is installed along with the fare-meter of auto rickshaw. In early 2013 (after Nirbhaya case), GPS installation in auto rickshaws started. In Gramin Seva also, there were GPS devices installed but there have been no checks to ensure its use across the board. Technically, their vehicles cannot pass fitness test without GPS; but once through the fitness certification, they are seldom maintained or kept working.

DIMTS is supposed to have all the data collected from these vehicles.

Sometimes back, when government made it mandatory that GPS has to be installed in all the vehicles. As a result of this move, we used to fit GPS in large number of vehicles. Though meters were there in many such vehicles but SIM related issues



GPS of Navrang Meter House fitted in an Autorickshaw

like signal, portability etc. needed to be resolved.

Now we are using Airtel SIM as it is going to stay in the market and works properly in roaming and has good signals strength in the region. Earlier, 99% of the SIMs were of Aircel (during 2012-13), but it closed down. Thereafter, we did not use Idea or Vodafone SIM as they were about to merge and so we were not sure.

Gramin Seva Drivers

GPS device is installed in their vehicles and there is some "Authority" (at Civil Lines) which gets all the information if anybody tampers these devices or removes them. The authority and DIMTS are receiving the entire data gathered from these vehicles. Without these devices installed, their vehicles cannot pass fitness test. Further, there is a minimum fine of Rs 5000 if they are not having GPS in their vehicles.

"Now government is driving us mad (crazy). They say this GPS device (as provided/certified by DIMTS) is no more valid. There is no warranty of these devices too. They are now asking us to install GPS device of some other company. Due to this one of my vehicles is not getting passed and standing idle for 15 days. Earlier it used to cost us Rs. 7000 and now they are saying to install devices (GPS + Emergency button) which comes for Rs 18,000. We are being forced to install it on our own.

How can we afford this? Our auto union (Gramin Seva Welfare Association) is protesting against the installation of these new devices."

Gramin Sewa drivers are puzzled and want to know that when they were made to buy devices Rs. 7000 just few years back, and prior to this, they spent another Rs 4000 for a deice, why are they being forced to again invest INR 18,000 for GPS with emergency button. Over and above this, they have to pay an annual recharge cost of Rs. 2700 per year.

"DIMTS provide us 1 year of warranty but they do not replace or repair the devices if they are damaged. So, if the GPS device fails at some point of time, then we have to install it again on our own."

"Initially, we were using Airtel SIMs (around 5-6 months back), then we were told not to use that (we paid around INR 1000-1200 for that). Then Aircel came, and we were told to use their SIM then two months back, it was also closed down. It costs INR 2000 to again change the SIM. It means that we have changed the SIM for third time during last three months. Now they are saying that vehicles will not pass without that new GPS device with emergency button. It will gain require new SIM."

"Although GPS can be placed anywhere in our vehicles, we are careful to place it where it is difficult to locate and remove.

GPS is like puzzle for us. We don't even get to know when it stops working. In such a case, E-challan (INR 5000) gets automatically generated and delivered right to our doorstep. This rule is completely suppressing and unacceptable to user. This should have been valid for



Working GPS in Gramin Sewa Vehicle

luxury car owners, rather than these public transport vehicles that run for around 5-7 km which passenger boards as per his convenience. It's a huge burden on poor people like us (drivers). We earn INR 1500 in 5 days, how can we pay the penalty of INR 5000?



BOBBY Gramin Sewa Driver

Presently most of us are using IDEA SIMs. Most of the rest SIMs have been closed-Reliance, Airtel and Aircel. It's mainly all due to corruption. We take the SIMs from distributors present at authority. Many of us have been have been cheated in past in this regard. For e.g. for Aircel SIM, in place of recharge or one year for which we paid in advance, but we got recharged for 1 month or so. How would we know about it till the data stopped reaching the DIMTS. We don't even know whether our GPS device is working. All we can do is reaching the call center at 9311900800, as they provide us with the real-time location of our vehicle. Earlier, we did not even have the number of call center at that time."

Who is at fault and what could have been done to have had better and positive response to this technology which in long run would benefit the transporters more than anyone. Based on discussion with industry and government officials it seems. Vehicle tracking is perceived as 'Policing' tool. Whereas there are benefits which amount to safety of driver extending to improved driving habit, low cost of maintenance and more; if they are exposed to entire vehicle telematics benefits. There is need to sensitise the community. The term- 'GPS' does make a jaw drop, but benefits of vehicle telematics, beyond GPS need to be spread.

Leadership/Management-

The administrative head would need a mandate like AIS 140 to ensure the smooth implementation of vehicle tracking, else it would remain a project whose success would be the function of interest of the officiating head of the institution.

ASRTU- The think tank of all the state road transportation corporations has to play proactive role in sensitising/incentivize the STC officials-Depot Manager, Supervisors down to the drivers. They have travelled across the world and have visited the best of public transport service globally. They have excellent understanding of how and where the things can change. Maybe MoRTH can 'link the dots' to make them play proactive role in reincarnation of STCs. DIMTS- It's not just a quasi-government organisation, it's a business model (Cluster bus service). If its success stories are true and acceptable why not have a time bound plan to implement it across the board or to the extent it can be replicated in various STCs in the country.

Absolute Autonomy:

A closer look at the combination of automotive megatrends - Electric Vehicle, Autonomous Vehicle, and Shared Mobility



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There are so many news, articles and events happening in the automotive world that it's easy to ignore and become immune to them. That's okay, since not much has been happening. If you follow automakers ads, it's the similar messaging from past many decades – better fuel efficiency, some extra leg room, jazzy infotainment, extended warranty support and many such likes. It's only in past few years that some interesting reports have started to trickle which can completely disrupt industry from how we know it. Let me quote a couple of examples to build the hypothesis.

First at Tesla where Elon Musk unveiled Roadster 2.0 prototype in Nov'17. It boasted features like 0-100 Kmph in 1.9 seconds, 400+Kmph top speed and a 1000+ Kms range. Twitter was soon abuzz with cynics calling it a pipe dream, and probably rightly so, considering current limitations of Electric vehicles (EV). Clearly, most of Auto OEMs don't agree with these skeptics and recently conducted Geneva Motorshow (March 2018) is a proof, where loftiest future concept vehicles revolved around EVs.

Second, a press release by GM which says that it will launch its first driverless car in 2019. And behold, after building cars centered at human driving experience for more than a century, this GM model will give away steering wheel and gas pedals, key component of driver's user experience. GM is among the dozens of incumbents and start-ups working rigorously to launch autonomous vehicles (AV) by 2020.

Now if we combine these emerging mega trends, embed it with the already fast adoption of ride-sharing application like Uber in urban youth, and fast forward to a not so distant future - a very exciting movement seems to be emerging – Absolute autonomy, a fleet of autonomous electric vehicles serving consumers on demand. Before digging into the impact of this shift, let's explore these incipient technologies in some detail.

Building blocks of absolute autonomy

The rise of Electrical Vehicles

In its August 2017 edition, the Economist wrote an obituary to internal combustion engine (ICE) based vehicles quoting 'It had a good run. But the end is in sight for the machine that changed the world'. A tall claim, which seems unfair to the field of technology that still commands more than 99% of automotive sales in the US. In 2016, EVs sold only 0.75 Million unit worldwide which is less than 1% of global automotive sales. In fact, its sales were more than 1% of total sales in only six countries, with China leading the pack. Then why has the Economist made such a radical assertion?

Electric cars had around 28% of market share in the early 1900s when the auto industry was set to take off. However, EVs lost to ICE because it performed poorly on key parameters: cost and performance. Over past 100 years, these factors have been the nemesis of EVs as at every stage EV had been dearer to build and had a much shorter range than ICE. Things started to shift in EVs favor from the early 1990s when Lithium ion was found to be an efficient replacement of lead acid or alkaline based batteries.

Cost of Lithium-ion battery has been significantly reducing, a battery which used to cost \$1000 Per KWh in 2010, now costs around \$130-150 per KWh and poised to reduce to \$73 by 2030 as per Bloomberg estimates . With falling battery prices (which is the costliest part of an EV) many experts conceive that EV prices will be competitive to ICEs by as early as 2025 without considering government subsidies.

Another important aspect of EV is its radical simplicity. In contrast to the ICE with thousands of complex moving parts in a vehicle, EV typically has less than 100 moving parts. This implies improved useful life, increased reliability and fewer requirements of aftersales services.

On top of these, there are many countries where the government is setting up regulations in favor of zero-emission vehicles. Further, there is a niche customer segment that genuinely believes in the clean energy and sees EV as a most viable option.

Clearly, EVs renaissance is happening. Bloomberg April 2017 article says that even oil companies agree that EV boom is real and by 2020 there will be over 120 different models of full EV across the spectrum . Bloomberg has forecasted the year 2038 when EVs sales will outnumber that of ICEs and EV fleet will be around 33% of the overall global fleet of the automobile .

Whatever moves can be automated: Automated Vehicles (AV)

Technology has made a huge leapfrog from the first self-driving competition arranged by DRAPA in 2004 when none of the competing cars could complete the course to today when we have many successful trials of self-driving cars by incumbents, technology companies, and start-ups. In fact, we have dozens of cars with partial autonomous capability already running on streets. The list includes likes of Mercedes Benz E and S class with drive pilot, Honda civic with sensing suite, BMW 740i with driver assistance, Tesla Model S, X and 3 with autopilot and Nisan leaf with pro pilot to name a few.

Combination of many technologies such as heavy electronics and sensors in cars, ubiquitous connectivity, advancement in computer vision and Machine Learning, simulation of driving patterns to train algorithms etc. has fuelled the recent advancement in autonomous vehicle performance.

A key enabler for AV technologies is the moving part LIDAR, which is basically multiple lasers (generally 32 or 64) mounted on rotating gimbal that spun around 360 degrees and has been proved to be most accurate in identifying objects, distances & velocity. Another alternate technology is to use multiple highresolution cameras; however, it's typically difficult to measure velocity with images. Cameras are typically supplemented with radar to measure distance and velocity.

Next few years will be quite interesting to watch out in this space. As per CB insight report, Autonomous vehicle ecosystem claimed 76% of total auto tech start-up funding (~\$4Bn) in 2017 . For faster adoption, many state's leaders are encouraging to run trials for self-driving cars in the city limits.

Who wants to own a vehicle: Shared mobility

On an average, a personal vehicle owner utilizes vehicle for less than an hour in a day. Still car ownership is so rampant since possessing a car is much more reliable, convenient and less costly than looking for cab service. In recent time with the advent of aggregators like Uber, Lyft, Ola etc. taxi services have got huge facelift since it addresses some of the core challenges of traditional cab services.

Rethinkx in its report titled "Rethinking Transportation 2020 – 2030" clearly pitches for future enabled by transportation as a shared mobility service. Story suggests that cost for shared mobility which is almost double today to owned vehicle (cost per mile for shared vehicle is roughly \$1.5 compared to \$0.75 of owned vehicle) will be lesser by 2030 (when a shared vehicle may cost \$0.5 per mile compared to \$0.75 per mile of owned vehicle).

The key factor in the rise of shared mobility is the inclination of millennial. According to Motor insurance survey done by BCG and Morgan Stanely, people aged 18-24 chose to opt for a cab aggregator 13% daily and up to 50% at least once in a month. In fact, as per University of Michigan Transportation research, this trend is not limited to only millennial. The rate at which people are opting for driving license is on the constant decline across the age group.

Electric car and Autonomous vehicle: A perfect mix for shared mobility

The concoction of these emerging megatrends has a potential to completely disrupt and redefine entire automotive value chain. Though there is a big question when that cusp of inflection point would come, that's not what I want to focus. I want to explore if that future does come what it holds for entire value chain and all other related disruptions that it can bring along. Let's dig into some of the most likely impacts.

Disruption in operating model

When we plan to book an airline ticket do we bother if the craft is made by Boeing or Airbus? For most of us, barring few avionics enthusiasts, it doesn't matter. We care more about the carrier's reliability, cost, convenience and overall service. In contrast, for vehicle usage, we make very personal choices of which model and make suits our need. It may change with the advent of EVs, driverless car technologies and increased adoption of shared mobility.

In this new world, companies like Uber / Lyft may take a lead, or OEMs themselves can own fleet business in association with dealers/rental companies. A combination of any of these will dominate the market. Nature of car sales will shift towards B2B, where purchase criteria of fleet owners will be completely different than end customer. Used car sales will see a sharp decline considering no one will buy a car for personal usage.

Change in the product itself

When Daimler introduced its first Horseless carriage, it was nothing but a horse-drawn carriage purchased from another manufacturer with the added engine. Soon auto maker realized that vehicle needs to be redesigned to allow control to a human driver. Once the transition to full autonomy is over, we may see radical changes in auto design yet again. Steering wheels, clutches, breaks may go, the windshield may be used for some other purposes, and special purpose vehicles can be designed.

Ideo which is a leading design firm (famous for their design thinking approach) has designed many interesting car designs on their "automobility" webpage . They have also designed special purpose vehicles of future like a supermarket on the wheel, meeting room on wheel etc. Ford has patented a touchscreen windshield entertainment system and a retractable conference table with air bag.

Future vehicles may look completely different than how they appear today just like the today's cars are completely different than the horse carriage.

Impact on tier 1 supplier, spare parts business, and dealers

According to UBS report, LG, a new entrant in automotive sector provides 56% components of Chevy bolt, first massmarket EV with a range over 200 miles. LG provides entire electric powertrain and infotainment module. Same UBS report suggests that currently, highly profitable auto spare parts market may shrink by 60% in a decade once EV overtakes ICE vehicles. Electronic system would constitute over 50% of BOM of vehicle's cost of production.

With significantly less moving parts EVs require very less aftersales service. Additionally, many electronic parts can be repaired/upgraded remotely over the air. Tech companies will have a prominent role in spare parts business in the EV / AV world because of increase in electronic and software content.

Dealership model would get impacted hard as well since car ownership would be a thing of past - new sales, used car sales and car services won't be a consumer business. Dealers may need to change their business focus to stay relevant. They may begin to serve the fleets, provide space and services to the autonomous cars, provide battery charger network etc.

Impact on auto insurance and leasing companies

Globally, over 1 million people die in road accidents and the primary cause is a human error while driving. According to US Department of transportation 2010 report, total economic cost of car accident including property damage, medical, police, insurance etc in 2010 was around \$242Bn which was about 1.6% of US GDP. No doubt, auto insurance premium has been steadily increasing over time. However, this may change in the absolute autonomy future. It has been established that AVs will be a lot safer and predictable because of fast on-going learning, quicker adoption, and dissemination of learning across the entire fleet. BCG / Morgan Stanely report says that fully autonomous car will reduce collision by 95%. This would have an adverse impact on auto insurance premium. Also, ownership of insurance premium will shift from consumer to fleet companies. Insurance companies have started to foresee this future, the annual report of Allstate guotes that driverless car can have a disruptive impact on their business. Leasing companies will cease to function or should change business model since most of the sales will be done by the fleet. There will be significantly less used car sales since no one will own the vehicle. Car rentals will also have a similar fate in this time to come.

Infrastructure changes

City planners will have a tough time to redesign the infrastructure to support smooth transitioning of owned vehicles to autonomously driven electric vehicle's fleet. We may see many innovations to reuse existing infrastructure with things like dedicated lanes for AV or dynamic shifting of lanes. There will be a lot of space freed up since parking lot will not be needed and auto service centers will be less required. Traffic lights and regulation will not be necessary once we have complete autonomy and V2X (Vehicle to everything connectivity) technology in place. Charging network would need to be built just like we have gas station ubiquity currently. Tesla has been building its charging network across the US and likewise in Europe Ford, BMW, Daimler, and VW have united to launch a charging network program called IONITY.

Once complete autonomy gets in, we may even see a prohibition on human-driven cars considering safety concerns. Car ownership won't begone, it will be more like a fun thing than utility. Humans may be allowed to drive cars for the recreational purpose at the only designated area.

Energy-hungry combination of EV and AV

Complete electrification of the vehicle

will need an enormous and sustainable energy source. Heavy power consumption by AV cars adds to the woe and can have a bad impact on a range of the electric car. Electricity intake of AV increases mostly because of the computer, added weight, and power needed for many sensors like LIDAR, camera etc.

Currently, transportation takes around 1/3rd of energy consumption of US and is primarily sourced from gasoline. Now with the rise of the autonomous electric fleet, this consumption will go away and can, in fact, be routed to create an energy source for the battery charging. Advancement in sustainable energy sources like solar and wind will also boost the energy requirements needed for EVs.

Impact on other industries

Overall the impact will be profound and not limited to automotive and transportation-related industries. For eg, the Low demand of gasoline will have a severe impact on Oil & Gas industry and may trigger a devaluation of dollars causing an economic impact on multiple industries. Convenient stores and shopping malls may start to disappear with car ownership gone and everything delivered at door. Real estate may get impacted, as property prices can go down since people could afford to live far away from work considering they don't need to drive to work. On the other hand, consumers can potentially save equivalent to up to 10% of wage increment giving them more option of spending . Possibilities are boundless.

This future remains precarious with immense technological issues confronting

Cheap battery with higher range essential for mass market EV adoption

Cost of Lithium-ion battery has been reducing over the past decade, but it is still significantly dearer which results in high cost of ownership of EVs. Cobalt, which is used as Cathode, is the scarce element in Lithium-ion battery and results in sustained high price. Cobalt is highly concentrated in Congo where the unstable political situation and use of child labor impinge its production. John Goodendough Professor at UT Austin, who is behind Lithium-ion battery invention, seems to be working on a substitute for Cobalt by using glass electrolyte made of sodium. Another promising invention is by a team from Bristol University and Surrey University by using supercapacitor for EVs which has extremely-fast charging capabilities.

These are still early days for breakthrough considering technical challenges. Many start-ups and major players are working on making next big discovery on electric storage. Further to making mass scale battery production, facilities like Tesla's Gigafactory are taking lead.

Innovations to make AVs cheap, reliable, secure and scalable

LIDAR is the central component of AV which at the current price of around \$60-70k is quite expensive and impractical. There is a lot of research happening to convert this moving part to solid state and within 2-3 years its price may fall dramatically to under \$250. Another alternative and cheaper technology is the use of multiple high definition cameras with Radar and currently, Tesla is pioneering it.

There are various other technology advancements happening in AV space including standard platforms for AVs, ensuring V2X interface compatibility, the requirement for HD maps to assist computers in driving, simulation of driving to train computers with millions of miles driving in the virtual world, training to adopt localization of driving pattern in different countries.

To address high power consumption by AVs, chip makers are working towards special chips for AV electronics which will consume lesser electricity. Data ownership and security remains another area of major concern.

When will this happen?

Smartphones meteoric rise has shown that in this technology-driven world if a radical innovation suits the economics of masses, it's adopted in market instantly.

Obviously sheer fun, pride and experience of driving and owning a vehicle will not vanish, however, as a society we may see one of the biggest transformations in the transportation system.

Auto industry veteran Bob Lutz sums up the feeling in the industry circle by quoting within 20 years human-driven vehicles will be legislated off highways. Certainly, next decade will see lots of exciting things materializing in this space.....

GoMentum Station in California



GoMentum Station is a testing ground for connected and autonomous vehicles at the former Concord Naval Weapons Station in Concord, California. Picture Courtesy: www.gomentumstation.net

GoMentum Station in Concord, California is the center of cutting edge transportation research in America. Spread in an area of about 5000 acres, it was formerly a naval weapons station but now is the nation's largest secure testing facility for autonomous and connected vehicle technology.

The Station is built on a public/private partnership model, it allows the private sector space to innovate and test at the same time giving access to the public sector to new technologies being developed. This helps facilitate informed policy, regulation and planning decisions. Contra Costa Transportation Authority (CCTA), a public agency formed by Contra Costa leads the collaborative effort and facilitates a partnership among multiple AMs; OEMs and Tier 1 suppliers; communications suppliers; technology companies; researchers and academia; public agencies and other partners.

These entities converge in research development, testing validation and commercialization of Connected Vehicle (CV) applications and Autonomous Vehicles (AV) technologies to



define the next generation of transportation network infrastructure. The station's unique and varied terrain and infrastructure allows for the latest developments in transportation technology to be safely tested in similar conditions found on public streets. Being located in the San Francisco Bay Area it enables easy access to the world's top technology companies.

It has got partnerships with companies like Lyft, Sumitomo electric and agencies like American Automobile Association (AAA) and Toyota Research Institute (TRI). The station is also collaborating with bodies like Intelligent Transport Systems (ITS) Japan and Netherlands' Coast-to-Coast Smart E-mobility program. In India, automotive sector has a large share in GDP and is going through a transitory phase. Several companies are working on developing autonomous vehicles in the country. Automotive Research Association of India and Cognizant Technologies are working on India's first indigenous autonomous car. Minda iConnect and Microsoft India recently have entered into a strategic collaboration to locally develop connected vehicle technologies. Indian automaker Tata Motors is also working on the autonomous cars framework in India and developing semi-autonomous vehicles.

Apart from these, there are various startups that are working on self driving technology like Flux Auto, Hi Tech Robotic Systemz, Netradyne, Auro Robotics etc. All these developments point out to the dire need of institutions like CVTA and testing sites like GoMentum in India. The government should take inspiration from the initiatives like these to device policies which help create a favorable ecosystem for research and innovation in the country.

Source: Official Website - gomentumstation.net

WAY FORWARD

Insight into Future Connected Vehicles



The automotive industry in India is at a cross roads and the ultimate direction and the horizons automotive sector covers will depend upon the emergence of a collaborative ecosystem in automotive sector. Industry 4.0 is an era of co-creation that we are getting into and where the traditional industry and the auto industry have to come together. Technologies like Deep Learning, Machine Learning, Robotics, AI etc. will power the cars of the future. Data Analytics is enabling the development of innovative business models and new revenue streams.

A very pertinent issue was pointed out in a recent conference that in the era of smart cars, who is going to be the OEM? Is it going to be the traditional guys or the tech companies?" A simple question which really cannot be answered in plain terms.

"In the era of smart cars, who is gonna be the OEM? Is it going to be the traditional guys or the tech companies?"

- Ms Debjani Ghosh President designate NASSCOM

Ubiquitous connectivity will be redefining the whole concept of intelligent transport or smart mobility. It will be dominated by Connected Vehicles which would be a selfmanaged, self-aware, and self-enabled. It is difficult to define a connected vehicle as it is changing so dynamically. It is changing at a fast pace because the automotive industry and the world of consumer electronics are converging like never before. As a vehicle is becoming more and more a combination of technologies from different industries, the technology disruptions in various other industries will be influencing the automotive industry in future. What do these connected vehicles of future will have in store for consumers, policy makers, technology developers and manufacturers? This has to be deliberated upon by all the stake holder groups and multiple industry segments which are converging and shaping the future of vehicles. Or shall we say a future vehicle which seems to be fast developing into a powerful mobile computing platform with seamless connectivity amongst humans and their digital world.

"As tomorrow's car is going to be a computer on wheels, there will be a paradigm shift from product-oriented approach to product+ service-oriented approach".

> - C V Raman Sr. Executive Director, Maruti Suzuki

It's yet not too late to deliberate on the horizon of future connected, autonomous mobility and their potential to bring

a paradigm shift in our view of future transportation. Whereas industry has to put its cards together to continue to be globally competitive, it's the government of India which will play the vital act of being an enabler for developing the requisite ecosystem. While innovations in technology is taking place at a faster pace than ever before, there is a need to put in place the adequate policy, legal and regulatory frameworks for connected vehicles in our context. There is no ambiguity that Government of India will be coming up with measures to deal with the imperatives and exigencies coming up in the days to come. But the pertinent issue is whether it would be with speed enough and in time, so that nation gets the benefit of emerging opportunities in Industry 4.0 and hopefully objectives of AMP 2016-26 are achieved. It has to be a proactive exercise to gain an insight into global arena without losing sight of Indian environment.

"The IT and electronics industry, automotive industry and the government need to work together as bodies to really come up with lasting solutions. Here, connected vehicles will have a role to play".

> - Jnaneswar Sen Sr. VP – Marketing & Sales, Honda Cars

Connected vehicles and intelligent, integrated transport system can greatly help in reducing congestion, pollution, increasing safety and lead to better city planning. Traffic congestion on Indian roads has been a major issue during peak hours especially in metro cities and we can pretty much double or triple the throughput of same roads just because the cars are connected. Road Safety, rather its lack of it, is another major concern for the government and industry, and it should be taken as a national objective in terms of reducing the fatality rates. These are the big issues where IT and electronics industry, automotive industry and government need to work together to reduce accidents on our roads, as well as to bring in certain measure of discipline in our traffic. In such a scenario, connected vehicles will have a role to play as technology is the key.

"As far as the connected vehicle part is concerned, I look at it from two most important aspects. First being the Safety aspect on the roads wherein a platform, in which very vehicle on the roads or highways is connected, will be a game changer. The second one is Connect to outside world. "

- Shri Anjum Parwez, IAS Secretary (M&UDA), Govt. of Karnataka

Moreover, reluctance of OEMs in sharing data with third parties is an impediment and there is a need of open platform where applications can be hosted by third parties and along with that development of standards has become crucial.

"We are still moving from Bharat stage IV to Bharat stage VI, policy needs to catch up with tech trends and we have come up with the concept of innovation, legal framework to accelerate innovation through policies for quicker adoption of technologies by the government and private sectors."

> - Shri Priyank Kharge Hon'ble Minister of State for IT, BT and Tourism, Govt. of Karnataka

While regulatory framework to address issues like data security, privacy and legal liabilities in connected ecosystem will have to be put in place but choice of shareable data should be left to the customer. Effective storage, analysis and monetization of data, the new currency has become the need of the hour as a connected vehicle will generate and need to have 25 gigabits per hours of processing capacity. The automotive industry needs to address the evolving customer expectations of buying intelligent products. At the same time, it has to ensure data privacy and security while keeping the total cost of vehicle ownership affordable for customers.

"Data Monetizing has largely started playing in spaces surrounding vehicles from Insurance to operations, to personnel support to the Maintenance activities to mention a few data monetization opportunities".

> - Meetul Patel Chief Operating Officer, Microsoft

"Electronic components that get into a vehicle started going up so the import component in the vehicle is going up, by leaps and bounds. We need to take this into account. The total cost of ownership of the vehicle has to be affordable."

- Shekar Viswanathan Vice Chairman & Whole-time Director, Toyota

According to a new report by Counterpoint's Internet of Things Tracker service, the global connected cars market is expected to grow 270 per cent by 2022 with more than 125 million connected passenger cars with embedded connectivity to be shipped during 2018-2022. Globally, large investments are being made to ensure the research and development of autonomous and connected vehicles. Germany has set up an ethics committee to understand autonomous driving, AI, and the software's ability to understand who is to be saved and not to be saved in case of car crash. Further, in the US, standards are being developed and updated all the time. With the EU General Data Protection Regulations (GDPR), manufacturers and suppliers in the connected cars ecosystem - both within Europe and in other countries who could be handling European data – need to consider how they will comply with the jurisdictional overlap and varying requirements of data protection regulations around the world.

Though fully automated vehicles for public transit are still many years away, connected



Vehicle Display at Connected Vehicles 2018



Exhibition at Connected Vehicles 2018

semi-autonomous cars can enhance the in-vehicle experience while ensuring road safety for all. These cars are expected to generate a huge amount of data and making these huge data transfers seamless, secure and affordable requires 5G network connectivity, adequate road transport infrastructure and IT-enabled solutions. It is to be noted that most of the software being built for autonomous driving is being developed and tested in India. States like Karnataka have started introducing innovative concepts like regulatory sandboxes and data sandboxes to open up new opportunities in the area of connected and autonomous vehicles (CAVs). Many patents have been already filed by Bosch and Continental while MBRDI, the R&D arm of Daimler, has made a lot of effort in building a data and technology practice from Bengaluru.

"What we are starting this year itself, as a precursor to the innovative ecosystem of Karnataka are regulatory sandboxes and data sandboxes which allows innovators to experiment which may or may not be within the purv iew of current legal framework. We are also starting an idea bank where people can register their ideas which will be promoted, and government will be holding those ideas as a trustee while ownership will remain with the individual."

> - Shri Raj Kumar Srivastava Advisor, Dept of IT, BT & S&T, Govt. of Karnataka

CAVs are expected to reduce human error, which is considered as one of the major factor contributing to the increased number of road accidents. However, we still lack a legal policy framework for autonomous driving. In our context, where there are close to 500,000 road fatalities every year (as per MoRTH), there is a need to match the pace of development taking place across the world to bring in advanced mobility solutions, which is of utmost importance.---

Blockchain in Automotive

The integration of technology of blockchain and automotive industry is capable of providing solutions to some of the most pressing automotive issues. Blockchain is distributed ledger technology i.e. a shared database that exists on multiple computers across a distributed network.

It is a peer-to-peer structure, rather than a client-server arrangement and is composed of blocks, which are simply transaction records. The blocks contain contents and an identifying header and each block is time-stamped. The each block is linked to the preceding and following blocks, forming a blockchain.

It uses a distributed network of computers is to reach a consensus on whether or not a transaction is valid. Once added to the chain, blocks cannot be altered, to prevent unauthorized access to data public and private keys are used.

Blockchain offers advantages like security, high execution speed, transparency, cost reduction etc. In automotive industry, it can find application in vehicle safety and data security, supply chain transparency, manufacturing, automotive financing, smart contracts, infotainment etc.

Several companies are now working on blockchain to come up with better products, for example, Porsche in collaboration with the Berlin-based startup XAIN is currently testing blockchain applications directly in vehicles. This makes the Zuffenhausen-based company, the first automobile manufacturer to implement and successfully test blockchain in a car. XIAN uses the strengths of modern machine learning algorithms, particularly reinforcement learning, to stabilize its own Ethereum-based lowenergy Blockchain. The company aims to use distributed machine learning to train self-driving cars on the basis of local data, such as weather conditions.

Toyota Research Institute (TRI) is also exploring blockchain and distributed ledger technology (BC/DL) for use in the development of a new mobility ecosystem that could accelerate development of autonomous driving technology.

For this, TRI is collaborating with the MIT Media Lab (MIT ML) and other industry partners to foster a digital environment where users – both businesses and consumers – may securely share driving and autonomous vehicle testing data, manage ride-share and car-share transactions and store vehicle usage information that could be used in the setting of insurance rates.

Another company PARKGENE has developed a scalable blockchain-based platform that enables drivers to book parking directly from individual parking space owners at lower prices, with convenience. The company through its

Toyota Research Institute (TRI) is also exploring blockchain and distributed ledger technology (BC/DL) for use in the development of a new mobility ecosystem that could accelerate development of autonomous driving technology.

decentralized technology aims to supply new parking spots in already crowded cities, which now remain unutilized, by enabling not only peer-to-peer but also the seamless integration of all existing parking technology.

CarBlock, a new company has been launched that intends to use the decentralized blockchain ecosystem, specifically designed for future transportation applications. The company aims to the major pain points in the current connected car and transportation industry like data ownership, data collection, data exchange, Application Infrastructure etc. •••



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TECH UPDATE

Imaging Radars: All Weather Reliable Sensors for Assisted & Autonomous Tech



Rakesh Kumar Founding Director Steradian Semiconductors

Rakesh Kumar has experience in developing complete solution including Firmware & Systems. Rakesh led the WLAN RF for 2 generations in TI. He has co-authored 2 IEEE papers and holds 8 issued US patents.

What is an Imaging Radar?

The self-driving car industry is developing rapidly & there is an immense focus on the autonomous tech from many established as well from the new entrants. The search is on for a reliable sensor which can work in adverse weather conditions (fog, rain & dust) and gives adequate navigational information on terrain and moving objects. Radar is the most reliable sensor in inclement weather as the Radar frequency spectrum is least affected by these weather conditions. Radar has been used in Aviation & Military for many years, where limited numbers of objects were tracked. Present day Radars as used in Automotive do not provide enough resolution to define the shape/size of the object. That's where the imaging radar helps bridge the gap. 4D imaging radar (which gives location, velocity, size & shape) with machine learning enables terrain mapping & object classification.

If your goal is to detect a car in front of you (or driving towards you) and get its velocity, the present RADAR can be sufficient. However, if you are trying to determine the precise location of an item, generate a terrain map,



Figure 1: Imaging Radar Solution Board with Steradian RFIC

like dividers or shoulder fencing, an Imaging Radar will do much better.

Sensors for Autonomous Driving

There are various sensors used in Automobiles for Advanced Driver Assistance Systems (ADAS) and Autonomous Driving. Table 1 is a comparison of various sensor used in Automotive. From the table, it can be inferred that Radar & Camera complements each other and the combination is capable of replacing every other sensor technology.

There will be multiple fusion (Radar plus Camera) sensors used in a car. Front looking imaging radar helps in navigation through all weather conditions.

Corner & Side radar helps in lane change & blind spot detection. These can be nonimaging (Object tracking) radars to lower the cost of the sensor. Steradian IC is cost optimized for both imaging & object tracking radar applications: this flexibility allows the same chip to cater all applications.

Primary use of Radar Sensor:

- Front Radar is the most critical and getting mandatory by ENCAP in Europe. This serves the important function of Collision Detection, Warning, Mitigation and Avoidance.
- 2. Corner & Side Radars take care of



Camera View



Camera + Radar

Figure 2: Classical Radar & Imaging Radar Comparison

the driver by monitoring the threats moving along-side. They are used for blind spot monitoring / blind spot detection, lane change assistance and lane departure warning system. This can be used for early deployment of airbags in an imminent collision.

3. Rear Radar: These are looking backwards for possible rear ending and Cross Traffic Alert to help you detect approaching vehicles while backing up.

Differentiation

Steradian focus is in building a world class Imaging Radar System. If one were to develop imaging radar solution with existing Radar ICs, the build cost will run into several hundreds of dollars, whereas with Steradian IC. the cost can be kept 3-4x times lower to enable wider segment adaption. We at Steradian have developed world's most compact 28nm Millimeter-wave Imaging Radar chip to maximize the pixels per square-mm. The IC developed at Steradian is optimized for Performance, Power & Cost for Imaging Radar. Our flexible solution enables a very large number of antenna sensors which brings 4D imaging through Radar to a reality.

On the imaging system side, Steradian has



Camera + Imaging Radar

Parameter	Ultrasonic	Lidar	Radar	Camera	Imaging Radar
Range	*	***	****	****	****
Resolution	*	****	*	****	***
Velocity	**	***	****	*	****
Snow/Fog	****	**	****	*	****
Cost	****	*	***	****	***
Color/ sign	NA	NA	NA	****	NA

Table 1: Ranking of various Automotive Sensors (higher is better)



Figure 3: Automotive sensor placement (Courtesy: ADI)

developed & demonstrated the algorithm. Steradian technology is widely appreciated by the industry: Steradian was selected as the winner for the 2017 Qualcomm Design Contest, MG Motors Innovation Drive 2017, IESA Most Innovative Product 2018.

Business Outlook

Worldwide, the Automotive Radar market is poised at 20% CAGR*, with >6B\$ TAM* projections, the radar market presents an opportunity for the innovation driven startup like Steradian. All major OEMs are including ADAS features in the cars and plan to launch AVs in next 2-3 years. Imaging radar systems as being developed by Steradian fills in the need for an all-weather, fail safe, terrain mapping system fundamental to enabling Safe, Assisted and Self driving technology. This solution has the potential to bring in a mass market radar revolution by delivering the technology at the correct price point. Beyond developed countries where the ADAS/Autonomous tech is being swiftly adopted, we see this technology being well placed for developing nations such as India where poor road conditions, fog & insufficient lighting causes millions



Figure 4: Steradian 4D radar

of accidents every year. The dire need, the tech and the price point make the imaging radar to see early adoption as a safety device in the after-market as well. The tech is not limited to road traffic and can find applications in rail collision avoidance and Drones for surveillance. Gesture recognition is an interesting consumer application of the Radar technology.

Automotive safety-Indian context

India has a high road accident rate - the reasons are many and most of which are detectable & preventable using a highresolution Radar tech. Imagine driving a car in dense fog on a highway with a visibility of 2-3 Meters. Typically, the driver can neither clearly identify the vehicle in front, nor can he judge the location of the divider gaps for a U turn. In winter, expressways are frequent witness to serious pile-up involving multiple vehicles due to low visibility. Another common place situation is of driving on an undivided road at night & blinded by oncoming traffic highbeams. Steradian 4D Radar technology comes as a life saver due to its ability to map the road space in bad lighting and inclement weather - the two primary reasons for accidents.

*Source: https://www.prnewswire.com/newsreleases/global-and-china-automotive-millimeterwave-radar-market-2017--market-size-will-hit-nearly usd6-billion-in-2021-300533957.html



The next-generation mobility will disrupt insurance, public transport, personal vehicle ownership, automobile manufacturer and many others. The future vehicle technologies are evolving and subsequently going to blur the boundaries between physical and digital world. In such a scenario, it becomes imperative to create a focused platform to connect industry leaders, analysts, stakeholders, professionals and consumers to prepare for disruptive change that will continue to provide opportunities in the future transportation.

DRIFT Alliance will be working closely with the telematics device and service provider as interface with various regulatory and policy making bodies.

For joining DRiFT Alliance, send mail to: info@driftalliance.org

TECH UPDATE

Permanent Magnet & Induction Motors for Electric Vehicle

Electric vehicles are gaining ground and many automotive companies are launching their electric cars. It is expected that in future electric vehicles will be the main mode of transportation.

These vehicles are cleaner and more efficient as they have less number of moving parts than IC engine vehicles. They run on electric drive systems, electric motor, which converts electrical energy into mechanical energy, is the major part of the propulsion subsystem of the electric drive systems.

Induction Motor is one such type of motor which is popular in electric vehicles. It is followed closely by Permanent Magnet motors. Well known electric car Tesla model S relies on induction motor while motor in Nissan Leaf and recently unveiled Porche's Turismo concept vehicle is permanent magnet synchronous motor.

Induction motors have benefits like low cost, high reliability and maintenance-free operation. It is an asynchronous type of motor so the rotor always rotates at a lower speed than the magnetic field. It relies on electric current to turn the rotor and produce torque. The electric current is generated through electromagnetic induction from the magnetic field of the stator windings. Induction motors can be used without a variable frequency drives (VFD) and are also cheap to manufacture.

However, conventional control of induction motor such as variable voltage, variable frequency cannot provide the desired performance and they also suffer from lower efficiency as well as power density compared to their permanent magnet counterparts.

Permanent magnet synchronous motors are thus gaining popularity due to high power density, compactness and current availability of power electronics needed for effective control. Also, these motors are designed to be more powerful while also having a lower mass and lower moment of inertia, high torque-to-current ratios, high power-to-weight ratios, and robustness.



According to an Allied Market Research, the world PMSM market is likely to generate revenue of \$31.1 billion by 2022, growing at a CAGR of 10.9% from 2016 to 2022. Asia-Pacific is expected to dominate the PMSM market in terms of revenue as well as volume.



Image Courtesy of New Energy and Fuel.com

PMSM IM **Benefits Benefits** Smooth torque Excellent dynamics possible with proper control High efficiency High speed High torque/volume operation possible High pull-out Low price and torque possible simple construction Good heat Durable Several supliers dissipation \rightarrow good overloading available capability **Drawbacks Drawbacks** Expensive Complicated control • Danger of Always lagging demagnetization of power factor the magnets Low efficiency with Poor field lighter loads weakening The permanent magnet synchronous motor has features of both induction

The permanent magnet synchronous motor has features of both induction motor and brushless DC motor. Like a brushless DC motor, it has a permanent magnet rotor and windings on the stator. However, the stator structure with windings resembles that of an induction motor.

Permanent magnet synchronous motor relies on magnets to turn the rotor, which spins at the same speed as the PMSM's internal rotating magnetic field. They cannot run without a drive and a VFD is required to precisely control the speed of the PMSM to meet the application requirements for pressure, flow, volume, etc. Permanent magnet motor solutions thus tend to have a higher initial cost, despite recent increases in the price of permanent magnets, they are still profitable.





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Industry Update: India

JLR and Waymo will together develop selfdriving electric vehicle for Waymo's driverless transportation service

Jaguar Land Rover and Waymo have entered into a long-term strategic partnership. Together, the two companies will develop the first premium self-driving electric vehicle for Waymo's driverless transportation service.

Jaguar Land Rover and Waymo will work together to design and engineer selfdriving Jaguar I-PACE vehicles. Waymo Jaguar I-PACEs, equipped with Waymo's self-driving technology, will start testing later this year. On-road testing and capturing real-world data will allow Waymo and Jaguar Land Rover engineers to refine technology and deliver optimum safety and reliability. Up to 20,000 I-PACEs will be built in the first two years of production and be available for riders of Waymo's driverless service, serving a potential one million trips per day.



Image Courtesy: Waymo

The Jaguar I-PACE was launched earlier this month and is the company's first fullelectric SUV. It is all-new from the ground up and is a no compromise, desirable and practical electric performance car. Jaguar Land Rover is committed to investing heavily, becoming automotive leaders in autonomous, connected and future electrified technologies.

To date, Waymo is the only company with a fleet of fully self-driving cars — with no one in the front seat — on public roads. Later this year, Waymo will launch the world's first self-driving transportation service allowing members of the public to use Waymo's app to request a vehicle. Mahindra Electric and Zoomcar partner to promote the concept of shared mobility of electric cars in India



Mahindra Electric has announced partnership with Zoomcar. Under the aegis of this strategic association, both companies will encourage and promote the concept of shared mobility of electric cars in India.

This partnership will enable individuals to buy the new all-electric Mahindra e2oPlus on ZAP, Zoomcar's fractional car ownership program. The ZAP program allows individuals to purchase the e2oPlus on Zoomcar's self-drive platform, list the vehicle on a dynamic basis whenever idle, get bookings from Zoomcar's customer base and earn cash to help offset the monthly ownership costs (by sharing in the profit on a daily, weekly and monthly basis).

Wipro and State Bank of India join global electric vehicles initiative, EV100



Global software firm Wipro and State Bank of India (SBI) have joined The Climate

Group's, global electric vehicles initiative, EV100. Wipro will begin rolling out its plan in the Indian cities of Delhi, Bangalore, Hyderabad and Pune, involving nearly 2000 vehicles, before also addressing international markets. As interim goals, the company expects to scale up the use of EVs to 500 in the next three years and 1,000 by 2023. SBI will transition its vehicle fleet to EVs in major cities by 2030. As part of this commitment, the bank will also set up charging stations in major residential spaces to support the uptake of EVs by staff.

Power Minister R K Singh launched the National E-Mobility Programme

Shri R K Singh, Union Minister of State (IC) Power and New & Renewable Energy, launched the National E-Mobility Programme. The Programme aims to provide an impetus to the entire e-mobility ecosystem including vehicle manufacturers, charging infrastructure companies, fleet operators, service providers, etc.

The Programme will be implemented by Energy Efficiency Services Limited (EESL). EESL had procured 10,000 e-vehicles last year and will issue a new tender very soon for 10,000 more e-vehicles to cater to the growing demand. With these 20,000 electric cars, India is expected to save over 5 crore litres of fuel every year leading to a reduction of over 5.6 lakh tonnes of annual CO2 emission.

Energy Efficiency Services Limited (EESL), under the Ministry of Power, Government of India, is working towards mainstreaming energy efficiency and is



implementing the world's largest energy efficiency portfolio in the country. Driven by the mission of Enabling More – more efficiency, more innovation, EESL aims to creating market access for efficient and future ready transformative solutions that create a winwin situation for every stakeholder.

Karnataka Government strengthens its collaboration with Intel and Mobileye

The Karnataka government, since November 2017, is working on 'Automotive Safety Innovation' project with Intel India – along with Mobileye, an Intel company – as its technology advisor. In the first phase of the project, Mobileye's Collision Avoidance Systems (CAS) equipped school buses were used to identify potential accident spots in the eastern part of Bengaluru. CAS are systems having vision analytics that provide real-time warnings of potential collisions, giving the driver enough time to react and avoid or mitigate the accident altogether. The project identified 'Grey Spots' i.e. areas with a high volume of warnings. This information will the provide state authorities with sufficient information to improve the road safety infrastructure.

The data sets captured from the 'Automotive Safety Innovation' project could be leveraged by the high technology ecosystem, city planners, the traffic department, and state agencies including startups, to provide remedial measures and help Karnataka achieve road safety in India...



Micromax plans to enter electric vehicles and battery market



Micromax aims to enter electric powered vehicles and battery production market, according to media reports. The company is in final stage of completion of checking out procedures for the electric vehicles and has given go-ahead for a number of its lithium battery classes. The company has received the nod for lithium batteries for e-rickshaws and e-automobiles....

BlackBerry and Jaguar Land Rover collaborate to develop technology for next-generation vehicles

BlackBerry and Jaguar Land Rover have entered into a multiyear agreement to collaborate and develop technology for the automotive manufacturer's next-generation vehicles.

As part of the agreement, BlackBerry will license its QNX and Certicom technology to Jaguar Land Rover, as well as assign a team of engineers to support in the development of new Electronic Control Unit (ECU) modules. The first ECU project will be a next-generation infotainment system.

BlackBerry currently provides OEMs around the world with state-of-the-art technology to protect and mitigate hardware, software, applications and end-to-end systems from cyberattacks.



Mahindra Group and Ford Motor Company will jointly develop new SUVs, compact electric vehicle and connected car solutions



From left to right: Jim Farley, Ford executive vice president and president of Global Markets, & Peter Fleet, Group vice president & president, Ford Asia Pacific with Rajan Wadhera, president, automotive sector and Dr Pawan Goenka, Managing Director, Mahindra and Mahindra Ltd. Image Courtesy: Ford

SD Mahindra Group and Ford Motor Company will jointly develop new SUVs, and a small electric vehicle. The two companies recently signed five new memoranda of understanding (MoU) to further strengthen their strategic alliance and accelerate the development of key products for consumers in India and emerging markets.

The MoUs, which are non-binding, mark the progress made by the two companies since announcing their alliance in September 2017.

Under the initiatives, Mahindra and Ford will leverage their strengths in the utility vehicle space to co-develop a midsize sports utility vehicle (C-SUV).

Built on the Mahindra platform, the new SUV will drive engineering and commercial efficiencies and will be sold independently by both companies as separate brands. Mahindra and Ford also agreed to evaluate co-development of a compact SUV and electric vehicle, along with sharing powertrain portfolios, including the supply of Mahindra powertrains to extend Ford's product range. Building on the collaboration, Mahindra and Ford also announced plans to co-develop a suite of connected car solutions for consumers. Teams from both companies will continue to collaborate and work together, for a period of up to three years, to develop further avenues of strategic cooperation such as extending support for Mahindra in global emerging markets, including Ford's manufacturing and distribution network and collaborating to address future mobility needs. •••

ISRO to transfer the technology of the cheaper version of space batteries to the automobile industry for commercial use in e-vehicles

Indian Space Research Organisation will transfer the technology of the cheaper version of space batteries developed by it to the automobile industry for commercial use in e-vehicles. ISRO has developed technology to reduce the cost of space batteries which it will transfer to the (automobile) industry for its commercial use with the help of NITI Aayog.



ISRO/Image Courtesy: AFP





12.0

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Representational Image

Tata Motors collaborates with Wabco to provide ADAS features like CMS and LDWS solutions on its commercial vehicles

Tata Motors has become the first OEM to provide Collision Mitigation System (CMS) and Lane Departure Warning System (LDWS) solutions on its medium and heavy duty commercial vehicles. The company for the purpose is working in collaboration with WABCO India. Tata Motors will implement WABCO's pioneering technologies which have been optimized for India's operating conditions.

Through this partnership, Tata Motors is providing safety

technologies in their vehicles, like Electronic Stability Control (ESC). Automatic Traction Control (ATC), Hill Start Aid (HSA), a Collision Mitigation System (CMS) and a Lane Departure Warning System (LDWS). The company had also deployed Electronic Stability Control (ESC) for medium and heavy duty commercial vehicles last year. Now the company offers Collision Mitigation System (CMS) and a Lane Departure Warning System (LDWS) for PRIMA and SIGNA trucks.

This ambitious goal is aimed at reducing the number of road accidents, increasing vehicular as well as occupant safety, in a broad range of visibility conditions. Offering enhanced operational efficiency, the systems will also help reduce operating costs for fleets.

The WABCO Collision Mitigation System (OnGuardASSIST)

- Warns of moving, stopping and stationary vehicles ahead even in poor visibility conditions
- Active braking on moving and stopping vehicles when the

system detects an impending collision

- Helps mitigate or avoid impending rear-end collisions to enhance safety
- Helps to avoid fatalities, injuries and accident-related costs
- High bandwidth enables accuracy in object detection
- Improves driver effectiveness across all levels of experience
- Optimizes vehicle uptime with less maintenance and repair requirements

The WABCO Lane Departure Warning System (OnLaneALERT)

- Helps vehicle drivers to remain within road lanes
- Recognizes lane markings and evaluates vehicle position
- Warns the driver with an audible alarm
- Alerts the driver to take corrective action to prevent unintentional lane drift
- Helps avoid potential collisions and lane departure road accidents
- Supports the driver in maintaining their attention levels and encourages the use of turn signals

Research conducted by India's Ministry of Road Transport and Highways on Indian expressway and highway accidents reveals that the majority of road fatalities are caused by loss of vehicle control resulting in rear-end collisions, unintended road departures and vehicle rollovers. It is expected that this move will help reduce driver error and will significantly enhance commercial vehicle safety on India's roads....

NXP and AliOS partner to further drive the development of smart cars in China

NXP and AliOS, the operating system for Internet of Things (IoT) solutions developed by Alibaba Group, have entered into a partnership to further drive the development of smart cars in China. The partnership aims to install the AliOS system and NXP's automotive infotainment solution in millions of vehicles in China by 2020.

The collaboration will help build a nextgeneration smart cockpit enhanced by multi-screen display, artificial-intelligencedriven interaction and secure Over-the-Air (OTA) updates. •••





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Industry Update

Geely selects Autoliv and its software joint venture Zenuity to develop and produce the first Level 3 advanced driver assistance systems



Image Courtesy: Autoliv

Autoliv together with its software joint venture Zenuity, been selected to develop and produce the first Level 3 advanced driver assistance systems for Geely. Autoliv was selected as supplier for Geely's Level 3 project, which includes ADAS electronic control units and software, radar systems, as well as mono vision and stereo vision camera systems.

Waymo bringing its self-driving technology to trucks



Waymo will launch a pilot in Atlanta where self-driving trucks will carry freight bound for Google's data centers. The company, over the past year, has been conducting road tests of Waymo's self-driving trucks in California and Arizona. This pilot, in partnership with Google's logistics team, will let the company further develop its technology and integrate it into the operations of shippers and carriers, with their network of factories, distribution centers, ports and terminals.

Globalstar forms a new division to support future connected and autonomous vehicles and intelligent transport



Image Courtesy: Globalstar

Globalstar has formed a new division to support future connected and autonomous vehicles and intelligent transport, Globalstar Automotive. With more than 600 million connected vehicles expected to be on the road by 2025 and with the market for automotive connectivity projected to increase to \$103 billion by 2030, Globalstar, a provider of global mobile satellite communications services, seeks to leverage its two-way global and broadcast capable network to assist automakers to comply with the latest safety regulations, deliver over-the-air (OTA) software updates, increase location accuracy and improve reliability for autonomous vehicle operation.

Magna and Lyft to jointly fund, develop, and manufacture self-driving systems



Image Courtesy: Lyft

Magna and Lyft have announced a multi-year collaboration in which the companies will jointly fund, develop, and manufacture self-driving systems. In addition, Magna will invest \$200 million in Lyft equity. The establishment of this partnership is subject to regulatory approval.

Partnership details include:

- Lyft will lead the co-development of the self-driving system at its Palo Alto-based self-driving engineering center
- Magna will lead manufacturing and join Lyft's development team onsite, contributing their vehicle systems knowledge, safety and ADAS expertise, and manufacturing capabilities
- Lyft and Magna will share jointly created IP and utilize Lyft data to improve systems
- Lyft will utilize Magna's vast automotive experience for its fleet's self-driving systems
- This scalable technology is expected to be market-ready over the next few years and can be deployed across the industry through Magna.

Groupe PSA and Harman working together to build a comprehensive cybersecurity strategy



HARMAN International and Groupe PSA are working together to build a comprehensive cybersecurity strategy for Groupe PSA's next-generation connected and autonomous vehicles platform. The announcement marks a two-year joint work relationship between the two companies, spanning across multiple projects– from analyzing potential threats, through security design, to a feasibility study of advanced Intrusion Detection Systems for ADAS, Autonomous and Next-Generation vehicle network architectures. •••

NTU and Desay SV partner to develop robust cyber security and cyber resilience for automotive



Image Courtesy: NTU Singapore

The partnership aims to develop new technologies to make automotive electronics more cyber secure. Both parties will leverage future technology and innovation to develop robust cyber security and cyber resilience in every stage of product design and development.

Baidu unveils Apollo 2.5 and launches Automotive Cybersecurity Lab

Baidu has unveiled Apollo 2.5, the latest iteration of the open autonomous driving platform, which now supports autonomous driving on geo-fenced highways. Apollo 2.5 further expands its capabilities into a wider range of applications and scenarios.

It implemented a geo-fenced, high-speed autonomous driving scenario, and reduced 90% of the sensor cost to better facilitate autonomous driving development. The latest iteration also includes vision-based perception, real-time relative mapping and high-speed planning and control.



CiDi, a Changsha-based intelligent driving research institute, has integrated Apollo 2.5 into a truck that can run autonomously on geo-fenced highways. Image Courtesy: Baidu Online Network Technology (Beijing) Co., Ltd

Apollo 2.5 offers more efficient development tools, including a visual debugging tool, a data collector for HD maps and a simulator for cloud-based autonomous driving, to further enhance developer efficacy.

In addition, Apollo's recently-launched data and technology project, ApolloScape, will release new large-scale autonomous driving datasets and next-generation simulation technologies in China. Baidu also announced the Apollo Automotive Cybersecurity Lab. The company has teamed up with China Automotive Technology and Research Center and China Academy of Information and Communications Technology to launch its automotive cybersecurity lab.----

Netradyne plans to launch Driveri RiskMap



Image Courtesy: Josh Fisher / Fleet Owner

The new feature analyzes the comprehensive data captured through Netradyne's Driveri platform. It recognizes and clusters specific driver behaviors which represent favorable or risky situations for the driver, fleet or general public. ...

GM to invest more than \$100 million to upgrade its facilities to build Self-driving cars

General Motors announced it will build production versions of its Cruise AV at its Orion Township assembly plant in Michigan. Roof modules for GM's self-driving vehicles will be assembled at its Brownstown plant. GM will invest more than \$100 million to upgrade both facilities. Roof module production has already begun and production of the fourth generation Cruise AV is expected to begin in 2019.

The Cruise AV, which the company plans to commercialize in 2019, is the first production-ready vehicle built from the ground up to operate safely on its own with no driver, steering wheel, pedals or manual controls.



A self-driving GM Bolt EV is seen during a media event where Cruise, GM's autonomous car unit, showed off its self-driving cars in San Francisco, California, U.S. November 28, 2017. Image Courtesy: REUTERS/Elijah Nouvelage

Self-driving cars can now operate in Arizona without a safety driver behind the wheel.

Arizona has decided to allow self-driving cars to operate in the state without a safety driver behind the wheel. Doug Ducey, the Governor of the state signed an executive order making the operation of autonomous cars without safety driver legal as long as Image Courtesy: Waymo they conform to all federal and state safety standards.



The BMW Group opens autonomous driving campus



Image Courtesy: BMW Group

The BMW Group has opened autonomous driving campus in Unterschleißheim. The BMW Group's campus for autonomous driving is a state-of-the-art centre of excellence that covers every base. The company

took the decision to pool together its development expertise in the fields of vehicle connectivity and highly / fully automated driving at a single location.

Hyundai Mobis testing its autonomous car **M**.BILLY



Image Courtesy: Business Wire

Hyundai Mobis is testing its autonomous car M.BILLY on the roads around the world. The autonomous driving test car will be equipped with sensors originally developed by Hyundai Mobis.

There will be eight different types of sensors including frontview camera (1), radar (5), lidar (1), ultrasonic sensor (12), surround view monitoring (SVM, 4) and total of 25 sensors. At the moment, M.BILLY only has front-view radar developed by Hyundai Mobis but the rest will be installed from the third quarter of this year in line with the development schedule. •••

Baidu receives Beijing's first batch of licenses to conduct open road tests for its autonomous vehicles

All vehicles that apply for the license must undergo over 5,000 kilometers of closed course training in addition to capability evaluations, which include the ability to follow traffic rules and handle emergencies. Also, the safety drivers are required to undergo no less than 50 hours of training in order to engage and take control of the vehicle in case of an emergency.



JLR working on project to develop self-driving cars that can 'see' around corners

Jaguar Land Rover with Highways England, INRIX, Ricardo, Siemens, Transport for West Midlands and Warwick University is working on a project to develop vehicles that can 'see around



Image Courtesy: Jaguar Land Rover

corners' and through obstacles, improving the capability of self-driving cars. Named AutopleX, it is a £4.7 million project funded by UK. AutopleX will combine connected, automated and live mapping tech so more information is provided earlier to the self-driving car. This enables automated cars to communicate with all road users and obstacles where there is no direct view, effectively helping them see, so they can safely merge lanes and negotiate complex roundabouts autonomously. •••

Magna wins LiDAR business with BMW

Magna and its partner, Innoviz Technologies, will supply the BMW Group with solid-state LiDAR for upcoming autonomous vehicle production platforms. MAX4, a fully integrated, customizable and scalable platform that can enable up to



Image Courtesy: Magna

Level 4 autonomous driving in both urban and highway environments. MAX4 contains the sensing and computing building blocks – including RADAR, LiDAR, cameras and ultrasonic sensors, as well as an ADAS central computing module. While Magna has demonstrated via MAX4 the capability to develop a complete autonomous platform, it collaborated with Israeli LiDAR provider Innoviz Technologies to integrate automotive-grade, solid-state LiDAR into its autonomous driving platform.



Ford Co-Pilot360

Ford Co-Pilot360, the most advanced suite of standard driver-assist technologies among full-line brands, aims to help people around the world more safely and confidently face congested roads – today and tomorrow. Image Courtesy: Ford

Ford Co-Pilot360 to be rolled out in key global markets starting this fall

Ford Co-Pilot360 will be rolled out in key global markets starting this fall, the company has announced. The move aims to help customers drive more safely and confidently amid rising congestion and distractions.

Ford Co-Pilot360

Ford Co-Pilot360 is advanced suite of standard driver-assist technologies. It includes automatic emergency braking with pedestrian detection, blind spot information system, lane keeping system, rear backup camera and auto high beam lighting. Automatic emergency braking – called precollision assist with pedestrian detection – that can help drivers avoid collisions with other vehicles or pedestrians who might accidentally cross in front of the vehicle's path. If a potential collision is detected, a warning flashes and alert sounds, and if the driver's response is not sufficient, the system can automatically apply the brakes to help minimize a frontal collision.

Blind spot information system:

Blind spot information system, or BLIS, uses radar to identify a vehicle entering the blind spot and alerts the driver with an indicator light in the side-view mirror. Cross-traffic alert can warn drivers of traffic behind when slowly backing out of a parking spot or driveway.

Lane keeping system:

Lane keeping system has three functions:

- The first can notify drivers through steering wheel vibration that they need to correct course when the system detects the vehicle drifting close to lane markings
- The second provides steering torque to steer back toward the center of the lane
- Third, a driver alert system, continuously monitors driving pattern using a forward-looking camera and provides visual and audio warnings when the system estimates the driver's vigilance level to be less than that of an attentive driver.

Octo partners with RCI Bank and Services to provide its telematics services and advanced big data analytics

Octo Telematics (Octo) has entered into a global partnership with RCI Bank and Services to provide its telematics services and advanced big data analytics to enhance the driving experience of drivers worldwide. As part of its sales process, RCI Bank and Services will offer customers the option to include an Octo device in their car to make their vehicle uniquely tailored to them and their driving style. Octo will use its big data analytics to develop a complete profile of each driver and vehicle. This profile will include a driving score which measures each motorist's unique style, as well as monitoring the condition of the vehicle. This will allow RCI Bank and Services to provide made-to-measure services based on each driver's driving profile. Created and wholly owned by Groupe Renault, RCI Banque S.A. is a French bank specializing in automotive financings and services for the customers and dealership networks of Groupe Renault (Renault, Renault Samsung Motors and Dacia) worldwide, the Nissan Group (Nissan, Infiniti and Datsun) mainly in Europe, Brazil, Argentina and South Korea and through joint ventures in Russia and India, and Mitsubishi Motors in the Netherlands. RCI Bank and Services has been the new commercial identity of RCI Banque S.A. since February 2016.----

BMW i Ventures invests in Blackmore Sensors and Analytics, a developer of FMCW Lidar

Blackmore Sensors and Analytics has raised \$18 million in a Series B funding round led by BMW i Ventures. Additional investment came from Toyota AI Ventures, Millennium Technology Value Partners and Next Frontier Capital. Blackmore Sensors and Analytics is a developer of frequency-modulated continuous wave (FMCW) lidar for the automotive industry. FMCW LIDAR can give accurate measurement of short distances. It can also detect objects at greater range with less power. •••

Affectiva Automotive AI, a multimodal in-cabin AI sensing solution

Affectiva, leader in Artificial Emotional Intelligence, has announced Affectiva Automotive AI, a multi-modal in-cabin AI sensing solution. Affectiva Automotive AI identifies, in real time from face and voice, complex and nuanced emotional and cognitive states of a vehicle's occupants, to deliver comprehensive people analytics. This allows original equipment

QUICK TAKEAWAY

- DENSO Corporation to increase its shareholding in Renesas
- Avis will add 10,000 Toyota vehicles to its car rental's expanding fleet of connected cars
- With the addition of Washington, more than 1,600 intersections across the U.S. support Audi's Traffic Light Information
- The BMW Group and Sila Nanotechnologies partner to drive production of Next-Gen electric vehicles
- The BMW Group and Daimler AG to merge their mobility services business units
- Valeo partners with start-up Ellcie Healthy to accelerate the development of smart connected eyeglasses for driving
- U.S. expresses higher levels of resistance than most nations to autonomous vehicle, says lpsos report
- ViaVan, the joint venture between Via and Mercedes-Benz Vans launches of its shared ride service in London
- OPTIS and Elektrobit partner to enable virtual testing of AR HUD systems
- Toyota and Park24 tie-up for a trial car sharing service in parts of central Tokyo
- ŠKODA AUTO merges its carsharing portal HoppyGo with SmileCar
- NTT Docomo partners with Valeo to jointly develop and offer next-generation connected-cars and mobility services
- Alibaba Group conducting self-driving vehicle tests
- Toyota and Lexus to start deployment of DSRC systems on vehicles in US from 2021
- Hyundai Motor America Selects Verisk to provide Usage-Based Insurance to its customers

manufacturers (OEMs) and Tier 1 suppliers to build advanced driver monitoring systems (DMS), as well as differentiated in-cabin experiences that span the autonomous vehicle continuum.

Affectiva's solution also enables developers of automated driving systems to improve their technology for use in robo-taxis and other highly automated vehicles (HAV) in the emerging Automated Mobility sector. •••

HARMAN and Daimler introduce augmented reality navigation

Debuting in the next generation Mercedes-Benz A-Class as a part of the Mercedes-Benz User Experience (MBUX), the system combines Daimler and HARMAN technology to provide turn-by-turn directions with AR visuals to transport the navigation user interface into the digital age. •••

Ford, JLR and TMETC demonstrate cars communicating with each other to notify drivers of available parking spaces

The companies demonstrated how cars could communicate with each other to notify drivers of available parking spaces – without the need for any additional parking bay sensors. Transport Systems Catapult was also involved in the trials. •••

NVIDIA introduces a cloud-based system for testing autonomous vehicles using simulation

NVIDIA has introduced a cloud-based system for testing autonomous vehicles using photorealistic simulation creating a safer, more scalable method for bringing self-driving cars to the roads. Named NVIDIA DRIVE™ Constellation, the computing platform is based on two different servers. ••■

Dell Technologies joins Automotive Edge Computing Consortium (AECC)

Dell Technologies has joined the Automotive Edge Computing Consortium (AECC) in support of its mission to evolve network architectures and computing infrastructures to make managing automotive big data smarter and more efficient. The companies like Denso, Intel, Toyota, NTT Docomo, Ericson are some of the other prominent members of the AECC....

IEEE and American Center for Mobility (ACM) sign MoU to help accelerate development and deployment of technical standards

The American Center for Mobility and IEEE TEC will identify needs for standards, as well as validation and conformance testing requirements, as part of the agreement. IEEE TEC and the American Center for Mobility will also promote the importance of standards, interoperability and validation and testing compliance....

EVgo and Maven to construct a dedicated DC fast charging network



Image Courtesy: EVgo

EVgo has entered into an agreement with Maven, General Motors' car sharing brand, to construct a dedicated DC fast charging network available to Maven Gig Chevrolet Bolt EV drivers. This agreement builds upon the success of EVgo and Maven's current pilot programs powering Bolt drivers in seven major US cities. •••

Huawei and Groupe PSA showcase the first connected vehicle



DS 7 CROSSBACK using Huawei's connected car technology debuts in Europe at Huawei's booth at the Hannover Messe 2018. Image Courtesy: Huawei and Groupe PSA

Huawei and Groupe PSA recently showcased a DS 7 CROSSBACK, the first connected vehicle resulting from their partnership covering all of the Group's connected vehicles, announced in November 2017. DS 7 CROSSBACK is the first vehicle to use Groupe PSA's Connected Vehicle Modular Platform (CVMP) and is equipped with Huawei's OceanConnect IoT platform and Cloud services supported by Huawei, giving customers access to new connected services. Using Huawei's OceanConnect IoT platform, Groupe PSA has built its Connected Vehicle Modular Platform (CVMP) for its connected vehicles, which is deployed globally using Cloud services supported by Huawei.....

Renault-Nissan-Mitsubishi joins DiDi Chuxing in DiDi Auto Alliance

Renault-Nissan-Mitsubishi has joined as partner DiDi Auto Alliance (the D-Alliance), which was formed by DiDi Chuxing ('DiDi'). The DiDi Auto Alliance is an intelligent ride-sharing alliance initiated by DiDi that aims to empower and redefine smart mobility. == ■

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