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Semiconductor Industry: Indian Overview

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Printed and Published by Maneesh Prasad on behalf of Telematics Wire Pvt. Ltd.

Telematics Wire Pvt. Ltd.

D-98, 2nd Floor, Noida Sec-63 Uttar Pradesh-201301 Email: info@telematicswire.net

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SEMICONDUCTOR INDUSTRY **INDIAN OVERVIEW**

A RICHA TYAGI

Telematics Wire

here have been many revolutions that we as a nation have allowed to go by without taking plausible benefits and seize the opportunities for driving the growth of related industries. The crying need of many industries in the general and the automotive industry for semiconductor shortage, in particular, is a grim reminder as to how we have missed the electronics revolution ushered by the exponential growth in usage of semiconductors in the 70s and 80s which made many smaller and budding economies rich and way ahead of us in this domain.

Semiconductors have become ubiquitous elements in the manufacturing of any electronic gadget. The term Semiconductor essentially refers to a specific category of materials having their unique electronic properties which are used in the manufacturing of various types of standalone discrete semiconductor devices used in an electronic circuit. However, their major usage lies in an integrated circuit (IC) usually referred to as chips. An IC chip may consist of two or more numbers of semiconductor devices which can be even in billions in modern electronic gadgets. Here the term semiconductors is interchangeably used to refer to any single discrete semiconductor device or integrated

circuit (IC) chips.

Any and every product lying around us — whether it is an electronic gadget in the homes such as laptops, webcam, monitors, or vehicles like cars, buses, and trucks running on the road, there is always at least a tiny computing device fitted inside in the form of a chip that makes them work efficiently. As a matter of fact, the modern world relies on them.

Chips or Semiconductors are the braincenter of any electronic technology. With

the increasing demand and poor supply of automotive connectivity semiconductors, major economies globally are impacted. Automotive connectivity chips, that enable high capacity data networking, driver aids, and multiple electrical components, form a crucial component that silently powers the automotive and technology industry. There are different types of automotive chips for different use cases. In below fig.1 the types of automotive chips and their use cases are shown:



Fig.2 Source: CPB World Trade Monitor, ING Research

EXHIBIT 2: Type of automotive chips and use-cases				
Type of automotive chips	Examples	Use-cases		
Analog	A/D converters, D/A converters, amplifiers	Engine temperature monitor		
Optoelectronics	Sensors, actuators, image-sensors, LEDs	Dashboard lighting		
Discretes	Power transistors, rectifiers and diodes, RF chips	Airbags		
Logic	Microcontrollers, microprocessors, digital signal processors, FPGAs	Anti-lock brakes		
Memory	DRAM, SRAM, NAND flash, NOR flash	GPS navigation		

Source: Semi-Literate



Fig. 3: Source: OICA

EXHIBIT 1: A confluence of events contributed to the situation that the industries face today			
ġ.	Struggles during the COVID-19 crisis	During the pandemic period, most segments (except the industrial sector), experienced rapid expansion, resulting in an average increase from a 5-9% in semiconductor sales beyond the forecasted growth. Hence, when the auto sector's demand recovered faster than anticipated in the second half of 2020, the semiconductor industry had already shifted production to meet the demand for other applications	
(3)	Lack of new capacity	The semiconductor industry's capacity has expanded modestly but steadily – by around 4 percent annually, in line with sales. On the other hand, chip utilization has been consistently high (at or above 80%) in the past decade. While the <u>semiconductor industry has</u> increased its manufacturing capacity by nearly 180% since 2000, its total capacity is almost exhausted at the current high utilization rate.	
	Geopolitical tensions	Few consumer-electronics makers have considerably increased their chip-inventory levels to get through a period of limited access to semiconductor manufacturing due to geopolitical tensions. Estimates show that such stockpiling caused a surge in semiconductor demand of 5 to 10 percent in the wireless space – the equivalent of one-third of auto-market chip sales	
	Contract terms	The automotive industry has had a good reputation for stable demand in the past, however, semiconductor chip manufacturers are now committed to more conventional, longer-term contracts from other fast-acting industries.	
6	Limited stocks	Just-In-time manufacturing practices, which can minimize waste and increase efficiency by keeping on-hand inventory low, are widely leveraged in the auto supply chain. In normal times, the reduction of stock is financially beneficial; however, the practice causes immediate disruption of the entire supply chain in an unexpected shortage. Since many players didn't expect the chip shortage in 2020 and 2021, they likely had minimal stock available to weather the crisis.	
((•))	5G rollout and overlapping chip demand	Demand for semiconductor chips varies by the node size. Chips in the nano size ranges, the most advanced of 7 and 14 nanometers or miniature, are generally used in leading-edge technology applications, however aren't required by many automakers. An expansive 5G rollout requires many RF semiconductor chips manufactured at the same, larger node sizes as the auto chips are. The same are also used for power-electronic chips needed to boot up servers and PCs. That amount of overlap means that as the rollout of 5G occurs over the next few years, automakers might see a continuing scarcity of chips.	
Source: Future	eBridge analysis		

Fig. 4

Pandemic and its impact on semiconductor industry

This semiconductors and chips shortage crisis gained attention due to the increase in demand for personal computers, tablets, and smartphones at the peak of the COVID-19 pandemic, which largely rerouted the supply away from the automotive sector. And of course, during the pandemic, many companies had to shut down their factories in South Korea and Taiwan. Taiwan is the biggest provider of semiconductors in the world whereas Taiwan Semiconductor Manufacturing Company (TSMC) alone has more than 50% share of the global World Top Ten Semiconductors Companies by Market Cap as on Sep 1st, 2021

S.No.	Company	World Rank (Sep-01-2021)	Headquarters
1	TSMC	9	Hsinchu Science Park, Taiwan
2	Nvidia	11	Santa Clara, California, USA
3	Samsung	16	Seoul, South Korea
4	ASML Holding	26	Netherlands
5	Intel	49	Santa Clara, California, USA
6	Broadcom	56	San Jose, California, USA
7	Texas Instruments	73	Dallas, Texas, USA
8	Qualcomm	78	San Diego, California, USA
9	Advanced Micro Devices (AMD)	104	USA
10	Applied Materials	127	USA

Table 1: Source: Value Today

supply market. Power outages, the worst drought in 57 years in Taiwan, fire incident in Renesas Electronics in Japan, Storm Uri in Texas also contributed though not significantly but added to the perception of a global semiconductor crisis.

After the first wave of the pandemic in 2019, there was a steep fall in manufacturing activities the world over, as can be seen in the graph (fig.2) covering industrial production stats for China, Emerging Asia (primarily India and excluding China), Euro Area, Emerging Latin America and the United States.

There was also a temporary fall in electronic gadgets demand but the demand side recovered more quickly with the massive intervention of the governments and the central banks to make money available in the markets to restore the products' demands whereas manufacturing continued to lag behind the demand especially in the semiconductor segment. There was a relative easing of supply of more common family of semiconductors for electronic and electric products but automakers suffered from the lack of semiconductors which usually are more specific to the need of the automaker. ING's Bert Colijn says 'supply, not demand, is the problem for Europe's businesses as they fight

back against the coronavirus shock'. It is true almost universally for the automotive sector. Many production units either closed down or scaled-down their production which will take time to ramp up to meet the demand levels. With the vehicles becoming more and more software-driven, the dependency of the automotive sector on semiconductors continues to increase exponentially. Another push came globally from the rapid electrification of the automotive sector. OCAI data (fig.3) also indicates that the overall demandside recovered in the auto sector more rapidly after experiencing a fall in 2020. There was a buzz that supply cannot fulfill the demand which led to extraneous factors adding to the scarcity of semiconductors.

Chip Shortage impact on global automotive manufacturing

Most of the industries have been negatively affected due to the semiconductor chip shortage, among them, the automotive industry is severely affected. It all started when automotive companies underestimated vehicle demand in early 2020 due to Covid-19. According to some reports, 2020 saw a gap of around 2-3 million units between vehicle production and their

SOME HITS, SOME MISSES

Sales Estimates for August.















Bloomberg | Quint

Source : BloombergQuint Poll of Three Analysts

Fig. 5

sales, indicating a supply shortfall of around millions. Chip shortage was the primary reason behind the supply-demand gap.

For some time now, global automakers have begun to ditch some features and electronic capabilities to manage the chip shortages they face today. For instance –

- Japanese carmaker Nissan is reportedly phasing out navigation systems out from thousands of vehicles
- On its Arkana SUV, Renault has stopped offering a larger digital screen behind the steering wheel
- Stellantis has modified its Ram 1500 pickup vehicle so that the digital rearview mirror that usually comes as a standard is now only available as an upgrade option
- Rental car companies are also worried as they are not able to buy new vehicles they want. Hertz and Enterprise, a car rental company that profited from buying and leasing new vehicles, has reportedly resorted to buying used cars at auction instead.

Big automakers like Ford Motor and General Motors are expecting a huge cut

in earnings this year due to chip shortage. Ford expects its earnings to drop by about \$2.5 billion in 2021. GM expects the chip reduction to cut its earnings by \$1.5 billion to \$2 billion.

Chip Shortage impact on Indian Automotive Sector

A large number of semiconductors are used in any passenger vehicle, and any slowdown in the supply chain means a halt in the manufacturing operations. The global shortage of semiconductor chips has badly hit the Indian automotive sector. According to Dolat Capital, the automotive sector is facing the twin effect; semiconductor shortages and rising raw material prices besides increasing fuel costs. While retail demand is increasing month after month, the growing chip crisis is having an impact on production, especially in passenger vehicles.

Carmakers in India have been facing a major reduction in vehicle production because of the lack of availability of semiconductors. Automakers, including Maruti Suzuki India Ltd., Toyota India, and

S.No	Company	Products	Location
1.	Saankhya Labs	Semiconductor Solutions	Bengaluru
2.	ASM Technologies	Semiconductor Engineering	Bengaluru
3.	Broadcom Inc.	Semiconductor and Infrastructure Software Solutions	Bangalore
4.	Chiplogic Technologies	Semiconductor Design Services	Bangalore
5.	CDIL	Semiconductor Manufacturer	New Delhi
6.	MosChip Semiconductor Technologies	Fabless Semiconductor	Hyderabad
7.	Einfochips	Semiconductor Design Services	Ahmadabad
8.	Tata Elxsi	Al, Machine learning, NLP	Bengaluru
9.	Semi-Conductor Laboratory	R&D in Semiconductor Technology	Mohali
10.	NXP Semiconductors	Semiconductor Startup Incubation	Bangalore

Table 2

Mahindra & Mahindra Ltd have reduced production of vehicles substantially due to shortage of chipsets.

These carmakers have revised downward their dealer targets because of their inability to supply vehicles. Dolat Capital said, "Retail demand is 30-40% higher than wholesale resulting in inventory much below the normal level."

Recently Maruti Suzuki gave a statement that in September its production will tumble up by 60% due to chip shortage in Gurugram and Manesar plants. It is anticipated that the total vehicle production volume over both locations could be nearly 40% of the standard production. Tata Motors also announced that it will be forced to cut down output in the coming months due to a shortage of availability of semiconductors.

Automakers who were able to maintain their inventory beyond 'just in time' are less affected by the semiconductor crisis, as shown in Fig. 5 Ashok Leyland, Eicher (VECV), Bajaj Auto, TVS Motors, Tata Motors (CV), Eicher (RE), it could be anticipated as their sales are increasing. On the other hand, Maruti Suzuki, Hero Motor Corp, Tata Motors, M&M Cars, Escorts, M&M Tractor have had to stop their production due to low inventory.

Indian Manufacturing scenario

According to the India Electronics and Semiconductor Association (IESA), semiconductor consumption in India was worth US\$21 billion in 2019, growing at the rate of 15.1 percent. Research and development in this industry, which includes electronic products and embedded systems, generated about US\$ 2.5 billion in revenue. Yet, India lags in the establishment of semiconductor wafer fabrication (FAB) units – due to a weak ecosystem and shortage of resources as compared to more competitive bases like China and Vietnam.

The semiconductor companies can be divided into three types: chip manufacturers, fabless chip companies, and chip-equipment makers. Chip manufacturers have their own manufacturing plants. Fabless chip companies hire contract manufacturers to make the chips they design. Chipequipment vendors supply the gear and materials used to produce semiconductor products. A look at the table below on the

Fabless Chip Makers in India



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IT design and R&D engineers. The Indian semiconductor design market was projected to grow by a CAGR of 29.4 percent from US\$14.5 billion in 2015 to US\$52.6 billion in 2020. To bridge the gap, the Govt of India had granted Lols for setting up FAB hits in Gujarat and UP

most significant Indian Companies in the semiconductor segment indicates the near absence of manufacturing capacity in India when it comes to the manufacturing of semiconductor chips.

Semiconductor FAB units require not only huge CAPEX but also a matching OPEX as it requires uninterrupted water, electricity supply, highly skilled human resource, and the need for frequent technology replacement. This is why India's contribution to the industry has remained confined to its technical expertise in R&D, design, etc. due to its software competencies in IT design and R&D engineers. The Indian semiconductor design market was projected to grow by a CAGR of 29.4 percent from US\$14.5 billion in 2015 to US\$52.6 billion in 2020. To bridge the gap, the Govt of India had granted LoIs for setting up FAB hits in Gujarat and UP.

The stark reality existing in the field of Semiconductor Manufacturing in India came out in a TOI news report in 2019 which mentioned the cancellation of LoI granted to a consortium led by HSMC Technologies India for setting up the country's first electronic chip manufacturing plant. Going by the news, apparently, the government was then left with no proposal to set up any manufacturing plant for electronic chips, which are known as the heart of modern devices and considered strategically important in cyberspace. As per LoI, both the plants were to be set up with an investment of around Rs 63,000 crore. Post cancellation it was revealed that while the Government of Gujarat was willing to support any investor intending to set up a chip fabrication facility but did not intend to do it by itself, considering the investment required and the technologyintensive nature of the industry.

Gol thrust for Semiconductor Manufacturing in India

The Government of India is now trying to put India on the global map for semiconductor devices and chips and in order to overcome the capital-intensive hurdles. The government is actively seeking foreign capital to set up semiconductor manufacturing facilities in the country. India is setting up commercial semiconductor wafer fab units and the proposed locations are Greater Noida in Uttar Pradesh (about 40 km from New Delhi) and Prantij in Gujarat (about 50 km) from Gandhinagar.

Like most of the other countries in the world, India is also highly reliant on imports to meet the country's semiconductor requirements.

Coronavirus pandemic has acted as an additional driver for rethinking the relationship between stakeholders. It has reinforced the need for greater resilience in the supply chain and highlighted the requirement to foresee and assess the manufacturing context in order to recalibrate inventory management in times of crisis. There are therefore several initiatives taken by the central government, focusing on the evolution and alignment of government policies that explore the possibilities to make the most out of the existing landscape in semiconductor manufacturing in India.

According to the India Electronics and Semiconductor Association (IESA), semiconductor consumption in India was worth US\$21 billion in 2019, growing at the rate of 15.1%. Research and development in this industry, which includes electronic products and embedded systems, generated about US\$2.5 billion in revenue. Yet, India lags in the establishment of semiconductor wafer fabrication (FAB) units – due to a weak ecosystem and shortage of resources as compared to more competitive bases like China and Vietnam.

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The Ministry of Electronics and Information Technology has now embarked rebalancing our semiconductor on manufacturing capacity vis-a-vis our needs for this vital ingredient of growth. Presently under the Electronics Hardware Schemes, there are the number of facilitating schemes which include Special Economic Zones (SEZ), Electronics Hardware Technology Park (EHTP)/ Export Oriented Unit (EOU), Export Promotion Capital Goods (EPCG) Scheme, Duty Exemption, and Remission Schemes and Deemed Exports. Though these schemes intended to incentivize & accelerate the development of electronics hardware manufacturing infrastructure in the country, they did not cover a significant need for this objective. The capital infusion is a must to build an indigenous industry for manufacturing electronics components and setting up R&D in this most dynamically changing industry.

For the electronics industry, state-ofthe-art R&D facilities and qualified human resources are a necessity for the survival of any enterprise in this domain.

The manufacturing of semiconductors is highly complex and capital intensive. This is an expensive truth which the government of the day has accepted and acknowledged as evident from its recent thrust to incentives and make capital available for setting up chips and semiconductor manufacturing plants and also for capacity enhancement of the existing ones. Notable initiatives undertaken by the Indian government for the development of the semiconductor industry included the enhancement of allocations of Modified Special Incentive Package Scheme (M-SIPS) and the Electronic Department Fund (EDF).

Notably, two schemes spearheaded by MeitY are worth looking at for their contribution to this industry, one is Modified Manufacturing Electronics Clusters (EMC 2.0) Scheme which is a sequel of the Electronic Manufacturing Clusters (EMC) Scheme launched in October 2012 to provide support for the creation of world-class infrastructure for attracting investments in Electronics Systems Design and Manufacturing (ESDM) sector. The EMC 1.0 Scheme was closed for receipt of applications from October 2017. Another one is the Electronics Development Fund (EDF) policy which aimed at catering to the most crucial element that is funding to help Indian companies to take initiative in semiconductor manufacturing.

Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme (Ref: MeitY)

This is a new Avatar of Modified Electronics Manufacturing Clusters Scheme which was launched in 2012 and was closed in 2017. EMC2.0 was announced in April 2020 to create facilitating infrastructure for establishing electronics manufacturing in India. According to MeitY, the objective is to address the disabilities, by providing support for the creation of world-class infrastructure along with common facilities and amenities, including Ready Built Factory (RBF) sheds / Plug and Play facilities for attracting major global electronics manufacturers along with their supply chain to set up units in the country. This scheme will fortify the linkage between domestic and international markets by strengthening supply chain responsiveness, consolidation of suppliers, decreased time-to-market, lower logistics costs, etc. The EMC 2.0 Scheme provides financial assistance for setting up of both EMC projects and Common Facility Centres (CFCs) across the country (information available on MeitY portal). The EMC 2.0 Scheme will help the Indian industry in a big way but it has a perspective of supporting of electronic products and sub-assemblies covered in the scheme.

SPECS

In April, 2020 Government came out with a scheme to address the critical requirement

of semiconductor industry ie the availability of Capital with some incentives. SPECS, which stands for Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors, is to cater for requisite capital to domestic manufacturing of electronic components and semiconductors. Under SPECS financial incentive is capped at 25% of Capital outlay for those category of electronics items which have been brought in to the ambit of SPECS for financial incentive to the entities registered in India (Information available on MeitY portal).

Electronics Development Fund (EDF) policy

Electronics Development Fund (EDF) is another step by the government to make funds available through professionally managed funds which are drawing their seed capital from the government through EDF. These would provide risk capital to companies developing new technologies in the area of Electronics, Nano-electronics Information Technology and (IT)(Information available on MeitY portal). Can the gap in technology & manufacturing capacity in the semiconductor domain between India and global players be bridged in next decade?

According to a post in India Briefing, over 20 semiconductor manufacturing and designing companies in high-end, display, and specialty fabrication have reportedly submitted Expressions of Interest (EOIs) to set up manufacturing plants in India.

The government is open to introducing new incentives for chipmakers, beyond those detailed in the PLI scheme for largescale electronics manufacturing. It will likely be based on the investment coming in and the company's area of work, type of fab, and requirement. Earlier this year, the Indian government also sought proposals from interested applicants to either set up (and/or expand) semiconductor wafer/ device fabrication plants (FABs) in India or their acquisition outside India. To ensure targeted interest from foreign players, the government also invited leading international players. The proposals were to be submitted to MeitY by April 30, 2021. The notification about the Expression of Interest was available in Korean, Japanese, Hebrew, and Chinese - an indication of the expected investment interest from foreign



The government is open to introducing new incentives for chipmakers, beyond those detailed in the PLI scheme for large-scale electronics manufacturing. It will likely be based on the investment coming in and the company's area of work, type of fab, and requirement

players. According to a business standard news report in July 2021, the Ministry of Electronics and IT approved 14 eligible applicants under the Production Linked Incentive Scheme (PLI) for IT hardware. The target segments under the PLI Scheme for IT Hardware include laptops, tablets, allin-one personal computers, and servers.

PLI II came out in March 2021 and has been appreciated by media, industry icons but it is just the beginning of an uphill climb. The huge investment required, cutting edge technology and proven manufacturing processes in semiconductor manufacturing are one part, another important issue is the availability of qualified and trained human resources willing to opt for a career in semiconductor manufacturing.

The shortage of manpower is indicative from the Naukri.com job portal ad for filling up 60466 semiconductor jobs in Manufacturing. A substantial number of our electronics engineers coming out of engineering institutions every year tend to be swept off in the coding stream for want of job opportunities in electronics manufacturing. Trained human resources at a reasonable cost are going to be one more essential in setting up semiconductor manufacturing plants in India. Though we have the advantage of having a good number of engineering institutions with electronic streams, we need to create a brighter career path for young engineering pass outs to prefer semiconductor manufacturing over the jobs in the IT sector. \Box

Explained: The Chip Shortage Problem And Its Impact On The Auto Industry

🚈 SAURABH GUPTA & SIDDHARTH JAISWAL

Netscribes

n the past two years, significant disruptions have occurred to the once sophisticated yet fragile automotive supply chain, starting with the COVID-19 pandemic and followed by a global shortage of semiconductor chips. Historically, the automotive industry regarded its robust supply chain as a crown jewel mastering the concepts of just-in-time, which meant thousands of components arrived just in time for assembly. This resulted in OEMs maintaining on-hand inventory of critical parts/supplies that lasted for just about 25-30 minutes of operations in the event that suppliers stopped delivering. Due to no practical inventory, the semiconductor chip shortage caused assembly lines to halt, causing a second major blow to the automotive industry after COVID-19. Based on our initial estimates, chip shortages could result in a loss of nearly eight million units of production in 2021. That said, it is critical to examine what has led to a shortage of semiconductor chips and what needs to be done to mitigate such events in future.

Understanding the Semiconductor Chips Ecosystem:

Semiconductor chips are highly complex products fabricated using advanced manufacturing processes. They are used to power and run a vast array of electronic devices – from smartphones, cloud servers, and consumer electronics to automotive vehicles, Industry 4.0 automation, and critical infrastructure and defense systems.

Needless to say, these little components are highly sophisticated and complex. Across the semiconductor industry's value chain, our analysis indicates that companies invest 25-30% of their annual revenue in R&D, a ratio unmatched by any other industry, in addition to their extensive patent portfolios and large capital expenditures on equipment and operations. This clearly illustrates the depth and breadth of technical know-how necessary to lead and sustain in



Fig.1: The semiconductor value chain is highly complex and fragmented

this high-tech industry. Because of the deep technical expertise required at every stage of production, the overall supply chain has become highly complex, intertwined, and geographically interdependent (as shown in Fig. 1). The US leads in the early stages of design and equipment manufacturing, while East Asian countries (South Korea, Taiwan, and China) lead in chip fabrication, packaging, testing, and assembly.

This global interconnected structure has led not only to optimum chip supply

for various applications, but also to cost savings and performance enhancements at an exponential rate.

The complexity for the industry increases further as all the nodes still hold relevance for different industries and applications. For instance, trailing edge nodes (180nm – 40nm) are used by automotive and industrial OEMs for ADAS, autonomous, and other electronic features in vehicles and healthcare or production lines machinery built in 200 mm fabs.



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Fig.2: Accelerated development of semiconductor technology process nodes



Fig.3: Microeconomic supply-demand scenario of semiconductor chips industry

The advanced nodes (28nm, going down to 5nm and beyond) are used in wireless communications, servers, cloud computing and memory applications built in 300 mm fabs. According to industry association report, SEMI Fab Outlook, there are 10 new 200 mm fabs and 25 new 300 mm Si fabrication fabs expected to be operational by 2022, as what was in 2020. This is sufficient to indicate the foundries' focus on generating high margins through leveraging advanced bleeding-edge technology nodes.

How did the semiconductor industry land in this situation?

A number of factors have combined to alter the predicted trends and dynamics of the industry. In recent years, there has been a constant demand for edge devices and secular factors, such as AI, cloud, IoT, Industry 4.0, robotics, and autonomous driving. These factors fueled the growth of semiconductor chips.

The COVID-19 pandemic has accelerated companies' timeline for digital transformation, cutting short years of planned investment into a much shorter time frame. In addition, it provided the chip fabrication companies with a renewed growth vision from consumer electronics and work-from-home equipment, such as PCs, joysticks, gaming consoles, laptops, cloud storage, and webcams, to name a few.

Besides the usual business cycles, the industry has faced unprecedented turmoil from external factors, such as COVID-19 outbreaks, natural disasters, and changing consumer habits. Additionally, natural disasters like the Texas winter storm, Taiwan water crisis, fires in foundry facilities and the long-standing practice of automotive OEMs to engage in Just-In-Time (JIT) to keep costs low have contributed to the imbalance in the chips supply to OEMs across several industry and technology segments.

A ship blocked the Suez Canal for weeks, increasing logistics and freight costs by an average of USD 500,000 for shipping through South Africa's Cape of Good Hope or shipping by air.

Consequently, the short-term industry dynamics are characterized by the following trends: insatiable demand for technology solutions and shortage of chips to meet the demand. Long-term perspectives go far



Global Light Vehicle Sales (Mn Units) 2005-2022*



Quarterly fab utilization has increased above 90%

Fig.5: Quarterly global fab consolidated utilization

beyond a few 'transforming' applications, but rather a structural shift in which global economies are becoming increasingly automated and digital. Connected smart edge devices, with the advent of cloud and AI computing approaches, are driving exponential growth in data volumes.

"There is a cascading effect about to set in. With huge influx of investments to increase the fab capacities and expansion plans,

there is a long time to go before the returns start coming back in. This means, increase in prices of finished product at every node by around 15% and above, making the end customers shell out ~20-25% more from their pockets to purchase the same products with same features and specifications."

- Saurabh Gupta

Impact on the automotive industry

Although the automotive industry has always been cyclical in nature and directly correlated to economic volatility, most executives in this industry have learnt to prepare for and manage such shocks in the past. However, this time the backlash of COVID-19 and an unprecedented shortage of semiconductor chips has caught the industry off-guard. Fig. 4 showcases how the auto industry has evolved and its outlook.



Fig.6: New Vehicle E/E Architecture would reduce Semiconductor Content



Economics of Automotive ECU

Fig.7: Accelerated Adoption of ECU Module Consolidation due to Chip Shortage

Due to a faster than expected rebound in demand for new cars, the auto industry was the first to experience the effects of a shortage of chips. This surge was contrary to industry OEMs' forecasts, which had curtailed chips procurement at the start of the pandemic. Across the industry, it is known that a single chip wafer can take anywhere from three to six months to reach the OEM for assembly into the final product. This lead time and pre-allocation of chips has now become cumbersome for the industry. While companies like Ford, General Motors, Volkswagen, and BMW have stalled production, reduced vehicle production has also led to billions of losses across the industry. Ford estimates its operating losses will total USD 2.5 Bn for FY 2021, while General Motors anticipates losses of USD 1.5 to 2 Bn for the same period. The sales of a car were held up by a component worth no more than 1-2% of its cost.

"A nano-sized component worth not more than 1-2% of the car's

entire BoM cost has triggered the collapse of an entire multi-billion-dollar industry, and brought several production lines, assembly floors, and factories to the verge of shutdown."

- Siddharth Jaiswal

The problem continues! With edge devices also increasing exponentially, consumer electronics and technology

equipment also feel the strain of reduced chip availability. Companies like Dell and HP have witnessed its market share prices drop, while Apple announced losses worth USD 4 Bn because of lost sales in its Mac and iPad product line.

The way forward for the semiconductor industry

There's also a flip to the overall story. Even though the demand has been at an alltime high, the semiconductor industry's supply nodes have also been bottlenecks in the plan of meeting the demand. This has led to the foundries operating at near full utilization. Since Q2, 2020, foundries are consistently operating at over 90% utilization, which is not a sustainable long-term solution.

Thus, chip fabrication companies are left with a few alternatives, such as expanding existing fabs, building and operating new fabs, or distributing excess chip loading to alternative vendors. All of these, however, are not immediate solutions and will take anywhere from 12 to 36 months to materialize. While fab expansion costs around USD 4-5 Bn, building a new fab with R&D investment and equipment procurement costs nearly USD 30 Bn. In order to deliver long-term solutions, semiconductor companies and regional governments are in the process of finalizing investment budgets, policy incentives, and domestic buildup outlook. Leading foundries have budgeted almost USD 500 Bn to develop new chip fabrication fabs for different technology nodes globally, which is also influenced by the magnitude of incentives, tax regimes, talent pool available in various geographies. For instance, South Korea, already a leading region in the fabrication

segment, has coordinated to invest USD 450 Bn over the next 10 years, apart from USD 1.3 Bn worth of tax breaks and funding of 36,000 new professionals.

Our analysis of the overall landscape indicates that the equilibrium between semiconductor chip supply and demand will reach anytime between 2023 and 2024. However, with neither the demand stabilizing nor the supply of chips increasing in the short term, there is a high probability of the similar shortage situation occurring again in the future. It is now up to the industry to come up with new innovative solutions to this sticky situation.

"The entire situation is still far from getting resolved. In fact, it will worsen further, with OEMs resorting to stockpiling and excessive ordering to increase their safety stocks, thereby piling up the demand orders for the chip production companies. Once this hoarding practice settles and actual demand is met, will the normal state come for the semiconductor industry. And that seems difficult before 2023 or 2024!"

- Saurabh Gupta

The way forward for the automotive industry

With the situation showing no resolution in short term, the automotive industry would consider reducing the chip content per vehicle, i.e., ECU consolidation. Over the past few years, with the rise of electronic content and the transition to software-defined-cars, the existing patchwork approach is no longer sustainable.

Hence, the industry is exploring new vehicle E/E architectures that enable not just high electronic content, but also support the road to autonomous vehicles (as shown in Fig. 6).

The average number of ECUs in a car range from 80-100 today, however, with the new vehicle E/E architecture, this number will drop to 20-30, thereby reducing the dependency on semiconductor chip(s) significantly.

Additionally, to the above solutions, it's time to streamline and reevaluate the strategies of companies across the entire value chain to ensure sustained growth and to avoid reentry into similar situations.

The semiconductor industry should consider adopting a 5-R strategy: Rectify, Resiliency, Restore, Reimagination, and Refine. Maintaining business continuity plans, adjusting demand planning in real time, tracking competitive dynamics, updating product pricing, and assessing trade environments are all part of the job. Additionally, OEMs need to revisit their business and operations strategies to avoid being caught in such unforeseen circumstances again.

Apart from enabling and implementing resiliency tools, such as collaborative planning and real-time market and industry monitoring for the identification of real-time bottlenecks, they should categorize the input raw material components, such as semiconductor chips, according to their impact and probability of disruption risk. Netscribes is a global data and insights firm that helps organizations meet their sales, marketing, product development, and innovation needs.



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Surge In TFT Demand & Consideration For In Cabin Air Quality In Automotive Industry

⁄ ABHAY KATARIA

SHARP Singapore Electronics Corporation Pte Ltd

OVID-19 has made everybody more conscious towards hygiene, & air quality around us. At the same time we've become more connected & reliant on the internet since the start of the pandemic, a massive 47 percent increase in broadband information usage, and more gigabit and terabyte endorsers.

Usage of sensors has also surged and combined with edge processing or cloud processing with higher cognitive process algorithms delivers insights into our everyday life like never before. Further the emerging technologies like AI, IoT, Machine learning, Deep Learning etc. have created possibilities for solving many problem statements.

With more demand for comfort and up-to-date information, consumer wants to visualise the insights promptly & elegantly. This has drifted the in-car display market towards TFT (Thin Film Transistor) LCD (Liquid Crystal Displays) displays and created new market for in-vehicle air quality solutions. This article reviews TFT LCD displays and in-cabin (or in-vehicle) air purification solutions in the automotive space.

In Cabin Air Quality with respect to COVID-19 or other viruses

"In Vehicle Air Quality" is a major concern since this COVID-19 pandemic especially due to the fact that the infection is airborne. The question on everyone's mind is how can safe we make the air inside the vehicle cabin for personal and particularly shared mobility?

Cabin air filters (carbon or dust filters) were originally designed to get rid of large particles like pollen and dirt from your car's air. Consequently, they're not good at filtering smaller, submicrometer particles. Though newer technologies like HEPA (high efficiency particulate air) filters offer some relief, HEPA can stop particles only up to 0.3 microns. The virus particle is typically 0.004 microns. Clearly extraordinary times like current call for better technologies to cleanse the air like this Mckinsey article call for Ionic purifier help in cleaning air.

Sharp Plasma Cluster Ionizer Module certified by 30+ labs globally offers a strong solution to this urgent in vehicle air quality challenge. Plasmacluster Ionizer breaks moisture present in the air by an electric arc to release positive hydrogen (H+) and negative oxygen (O₂-) ions that form clusters to transform into OH radicals. The positive and negative ions are the same as those generated in nature by a waterfall.

The OH radicals cling to viruses or other pathogens and extract hydrogen (H) from their surface to form moisture (H2O). Extracting hydrogen from the surface of the virus or a pathogen, damages its defence, think of it as puncturing its spacesuit and therefore neutralizes the pathogen – so it is not infectious anymore.

Plasmacluster[™] ions purify the air and doesn't have any adverse effect to humans even at excessively high ion concentration

Tests conducted by Sharp, Nagasaki University & Shimane University have shown that Plasmacluster Ionizer can reduce airborne corona virus by more than 91% and adhered coronavirus by more than 99%. Besides the effectiveness of PCI technology in eliminating pathogens, allergens & VOCs has been tested and proven by more than 30 independent institutions from 10 different countries..

Where to place the Plasma Cluster Ionizer?

The way Sharp has designed it, and refined over years, makes it operational with a simple 12V supply. From a system integration point of view, this becomes a very straight forward module that does its job. SHARP Plasma cluster Ionizer can



be placed at HVAC output vent where air-conditioned air is introduced to the cabin. This will help positive & negative ions to scatter in air effectively and helps in cleaning the air.

Air quality parameters of in-cabin like ION counts generated by plasma cluster ionizer and other poisonous gasses monitored with the help of different sensors can be used to display on TFT screen which may help passenger to take decision before using the shared mobility.

Newer automobiles have multiple applications for the most recent TFT LCDs

Personal mobility is not just about getting from one point to other but about a comfortable and pleasing experience. Thus, present day passenger cars are embracing a suit of features to please vehicle owners and passengers such as:



- On-avenue entertainment,
- Concierge services & other desired services.
- Surrounding awareness (insights form sensors) / driver assistance / driver wellness etc
- A great user experience interacting with all these value added systems through a crisp and clear, smart display. TFT LCDs offer a good value proposition here.

Automotive display trends

With the rapid evolution of driver information/ assistance technology, cars are equipped with multiple displays like:

- Instrument cluster.
- Central information display,
- Mirror replacement displays,
- Multiple entertainment displays for the rear seats.
- Transparent Displays for Car Windshields and Window Advertisements
- Navigation
- Air Quality Information/Ion's concentration

Adding more and better displays to the car certainly calls for cost performance trade-offs. As the trend goes the decisions are made in the favour of adding such displays to enhance passenger experience.

Trends driving the automotive displays

Based on Display Type, The marketplace is bifurcated into LCD (Monochrome),TFT-LCD & OLED. TFT-LCD is anticipated to preserve the most important marketplace share, TFT sizing offers the best "cost – value" or "right cost – experience" proposition.

Instrument Cluster Market in Automotive Bifurcation by Size

- 5-8 inch
- 9–11 inch
- >12 inch

Entry level vehicles, mid-segment vehicles, and LCV's are equipped with a 5-11 inch instrument cluster that helps to maintain the overall cost of the vehicle. Greater than 12 inch LCD cluster is estimated to be the fastest growing segment of the instrument cluster market, by display size. Higher size digital instrument cluster can be seen to be increasing in demand with



increase in different features in a digital instrument cluster, and growing demand for vehicle aesthetics.

The Battery Electric Vehicle segment is estimated to be the largest growth market for the display instrument cluster. Asian region is estimated to be the largest market for Electric Vehicle. With increase in strict norms for emission Electric Vehicles sales is increasing at a rapid pace with increase in rapid development of charging infrastructure, zero-emission advantage, and government support.

As EVs tend to have much higher built in computational power, aptly dubbed as "computers on wheels" the UI (user interface) and UX (user experience) tends to be much elaborate demanding bigger and better displays

Impact of 5G and other Wireless Technologies

5G offers high internet speed, which helps in coordinating auto Display System with ingenious applications. These applications would require better quality rendering, which can trigger the interest for automotive smart display. This combined with autonomous driving will call for, giant size display panels, as opposed to the customary dashboards. AR and VR gadgets influence 5G to supply a much better experience. Both AR and VR require higher display resolution for better execution and experience.AR HUD (Head Up Display) is a high level driver assistance system which shows real time data & help driver to stay more active and focused. VR help vehicle retailers to decrease the display area size, cut expenses, and upgrade client experience all simultaneously. VR showroom help clients to sit in a chair and can have real time experience of driving the particular car..

How do I chose the right display for my car design?

The screens generally used in vehicles

range from 5 to 12 inches in size. While display technology updates are commonly associated with PC TV screens, automotive displays too are at the forefront of innovation. Several new technologies like Sharp's Free-form display for example are pioneered for Automotive market. The latest TFT LCD Display have great picture quality thanks to the increased pixel density, high brightness and contract and coatings that enhance visibility in a wide range of ambience lighting including bright sunlight, which is a necessity of automotive application.

The essential features for automotive displays are:

High Brightness & Anti-Glare: More brightness and higher contrast make the display clear even during bright sunlight conditions. Manufacturers enormously brought down surface reflectivity with anti-reflective coatings, making the display simpler to peruse during high-sunlight glare conditions. Progressive Super View Technology of Sharp for example gives extremely crisp image under sunlight without pumping more power from backlight which helps in maintaining the life and quality of product.





- Screen size & resolution: As we discussed, auto displays ranges from 5 inch to more than 12 inches. There's a trend toward bigger display sizes (up to twenty inches), with the reception of solid state and advanced digital cluster and thusly the movement toward HD resolution moving from wide VGA (800 x 480) to 720p and 1080p.
- Form Factor of Display: In Automotive most commonly used aspect ratio are for display size between 7" to 12.3" are 16:9 5:3 16:6.From Hatchback, Sedan to SUV height varies a lot and therefore Aspect Ratio plays a vital role for display selection. Recent innovation like "FREE FORM" help automotive designers to break free from the rectangle to any size or you can have any form factor of display.

Free Form Display has set the automotive world abuzz. Device that may be shaped to fulfil a large range of user needs due to the incorporation of IGZO technology and proprietary circuit design methods. Conventional displays are rectangular because they require a minimal width for the bezel so as to accommodate the drive circuit, called the gate driver, round the perimeter of the screen's display area. With the morpheme Display, the gate driver's function is dispersed throughout the pixels on the display area. This enables the bezel to be shrunk considerably, and it gives the liberty to style the LCD to match whatever shape the display area of the screen has to be.

- Interface: Low-Voltage Differential Signalling (LVDS) could be a popular choice for giant LCDs and peripherals in need of high bandwidth, like highdefinition graphics and fast frame rates and most ordinarily utilized in Automotive TFT application. It's an excellent solution due to its high speed of data transmission while using low voltage. Two wires carry the signal, with one wire carrying the precise inverse of its companion. The electrical field generated by one wire is neatly concealed by the opposite, creating much less interference to nearby wireless systems. At the receiver end, a circuit reads the difference (hence "differential") in voltage named between the wires. Therefore this doesn't generate any noise or gets its signals scrambled by external noise. The interface consists of 4, six, or eight pairs of wires, plus a pair carrying the clock and a few ground wires.
- Wide viewing angles: Centre stack



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Abhay Kataria is a pro in semiconductor industry, having contributed to application engineering, product marketing and business development in India. He is the marketing manager at Sharp Singapore. displays should be visible to both drivers and passengers, including those within the rear seat(s). LCD display modules are designed to provide the best contrast and readability in one of four directions known as the 'viewing angle' or 'optimal viewing direction.' These four directions are laid out in the shape of a clock. The top view is at 12:00 pm. and the bottom view is at 6:00 pm.

- Wide temperature ranges: Temperature ranges can typically span from -40°C to 85°C. Such high temperature range is required because in summer ambient temperature add up with the operational temperature of TFT where normally in desert area ambient temperature rise to 55°C in summer.
- Colour depth: Higher-resolution displays might have to upgrade from 18-bit red green blue (RGB) to 24- bit RGB to attain a wider colour gamut.
- Long display lifetimes and sustained production support: Displays must support design and production cycles of a minimum of five years, extendable up to 10 years because of vehicle warranties.
- Better refresh rates & response times: Keeping away from slacks is basic for warning indicators & navigation functions like maps and traffic updates.
- Low power consumption: Low power consumption enables better fuel consumption and allows components to be placed in "hot spots."
- Touch & Glass Bonding: Optical bonding is the method involved with overlaying touchscreens, glass or plastic cover lens and other display upgrades to a LCD. A layer of glue is incorporated between the cover layer and display to fill the air gap abandoned in a regular edge or gasket bonding. Optical Bonding helps in enhancing clarity, view ability, reduced reflections and make TFT more rugged which are critical factor in automotive application"

The trends in the automotive display & air quality are dynamic & exciting! This article attempts to get us started on this exciting drive. Are you ready to gear up to overtake these significant landmarks in technology mobility? (pun intended).



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Automotive Semiconductor Demand Dynamics & Outlook

⁄ ASIF ANWAR

Strategy Analytics

he modern vehicle architecture has evolved over the years with the amount of electronics increasing across the powertrain, body, chassis, safety, and driver information domains. Present vehicle architecture topologies typically consist of various ECUs which are then connected to actuators, sensors and displays. These distributed, decentralized E/E (electrical and electronic) vehicle architectures have typically incorporated one electronic control unit (ECU) per function / feature, with a new ECU is added each time a new function / feature is added.

With low end vehicles having 50+ ECUs, mid-sized vehicles 80+ ECUs and high segment vehicles with 110+ ECUs, the automotive semiconductor content has increased over the years with demand for semiconductors extending across all device types and includes processors, power, linear, optoelectronics, memory etc. Meanwhile, the move towards electrification is serving as a catalyst towards increasing semiconductor content per vehicle with increasing demand in particular for power electronics. Electrification is underpinning new platforms that include typically also implementation of advanced infotainment, ADAS (Advanced Driver Assist Systems) and autonomy.

Strategy Analytics has been covering the complex global automotive electronics market for decades, providing deep coverage at the system, semiconductor, and sensor levels. as well as a broad view of the whole value chain. Strategy Analytics' analysis concluded that global demand for automotive semiconductors in 2020 based on OEM vehicle production dropped by 9.7% to \$37.9B, averaged across all applications and including sensors. The steep decline was reflective of the COVID-19 pandemic impact felt by the industry, with complete production shutdowns occurring in the major light passenger vehicle production centers in the second quarter of 2020. Despite this production fall the continued growth in electronics penetration and sensing and control sophistication, especially in electrified powertrains, and to a lesser

extent, ADAS/autonomous technologies continued. Indeed, semiconductor company financial reporting all pointed to significant improvements in their automotive revenues for the second half of 2020 and this continued into 2021 as shown by Strategy Analytics quarterly automotive revenue index.

Strategy Analytics Automotive Semiconductor (Auto Semi) Index look at the quarterly financials as posted by ten of the leading publicly quoted automotive semiconductor companies. Collectively, these ten companies accounted for 64.5% of the global automotive semiconductor market in 2020 as presented in Strategy Analytics' annual Automotive Semiconductor Vendor Market Shares analysis.

The Strategy Analytics Auto Semi Index looks specifically at the automotive revenues for these companies. Using Q1 2019 results as a baseline set to 0, subsequent quarterly results for each of the companies are measured against this baseline with results above 0 indicating growth and results below 0 showing a



Exhibit 1: Typical Distributed E/E Architecture

Source: Strategy Analytics

contraction in revenues.

In 2021, automotive semiconductor demand was forecast to see a steep return to growth with the market forecast to grow as demand for vehicles returned across all regions, augmented further by continued momentum towards electrification. This forecast outlook included an anticipation of vehicle production stabilising globally, but ongoing risks associated with the shortage in semiconductor supply as well as additional waves of the COVID-19 pandemic hitting regional production centres are serving to temper the recovery.

The demand for semiconductors from the automotive industry extends across all device types and includes processors, power, linear, optoelectronics, memory etc. While individual occurrences such as industrial action or accidents can have an impact on the supply of semiconductors and chipsets for specific applications, these do not constituent the primary cause of the current shortages being experienced by the automotive industry. Instead, the primary cause can be traced back to vehicle production shutting down in the second quarter of 2020 resulting in automotive semiconductor demand being scaled back considerably as reflected in the sharp contraction observed in the Auto Semi Index.

A return in demand was led by Chinese vehicle production and was followed by a return to production in the other major production centers resulting in a sharp expansion in automotive semiconductor demand. However, the automotive industry was then faced with several issues in trying to make up both a shortfall as well meet the resurgent demand having effectively taking itself out of the queue for semiconductor supply.

- Changes in working and lifestyle patterns due to lockdowns shifted the focus for semiconductor suppliers towards supporting electronics equipment demand for smartphones, IT and audio-visual equipment as well as the introduction of new generation consoles from Sony and Microsoft.
- The dedicated semiconductor manufacturing capacity available for the supply of 8-bit, 16-bit and 32-bit MCUs, based on older process nodes and smaller diameter production, was quickly filled up and this was then



Exhibit 1: Strategy Analytics Automotive Semiconductor (Auto Semi) Index

Source: Strategy Analytics

further compounded by further constraints in the material supply chain.

With volume demand from the automotive industry paling in comparison to the demand from mainstream electronics, the major semiconductor suppliers naturally prioritized demand from the smartphone, IT, audio-visual and other consumer electronics, making it difficult for the automotive industry to move from the back of the queue.

In the first quarter of 2021, there were a further confluence of events that conspired to further impact semiconductor production including an earthquake in Japan and snowstorms in Texas, US. Another factor that semiconductor manufacturers needed to account for was a drought in Taiwan.

A fire at a Renesas facility represented another setback for the automotive supply chain (with companies such as Ford specifically referencing Renesas during their discussions of the semiconductor supply situation in management comments). Production at the affected 300 mm Renesas line is focused on MCUs and SoCs targeting automotive, industrial and other applications. An early assessment from Renesas suggested that the resumption of normal production would take at least one month but this was later revised to three months.

Renesas moved some production to other facilities as well as seeking additional support from its foundry partners allowing limited production to resume in April. There was also an accidental power cut at one of TSMC's facilities though the company's initial observations were that production was not impacted too much.

As we moved into the second half of the year, most of the semiconductor suppliers were able to report improving conditions as far as front-end semiconductor production was concerned.

Companies such as Infineon that had to shut down facilities in the first quarter of the year because of the snowstorms in the US reported that they were operating at pre-shutdown levels with revenues not fully able to capture the underlying growth opportunities. Renesas had ongoing issues with returning production at the N3 Building (300mm line) of its Naka Factory (located in Hitachinaka, Ibaraki Prefecture) to the output levels prior to the fire. In particular, the company has suffered a series of problems since then with manufacturing equipment which resulted in shipments levels (as reported on July 29) falling to 90% of the volumes prior to the fire.

Despite these challenges, Infineon, Renesas and the other semiconductor suppliers were able to report increases in revenue, gross margin and operating margin for its automotive business as well as a growing order backlog. Unfortunately, the bottleneck at the frontend was replaced with headwinds at backend processing facilities as a resurgence in COVID-19 cases at backend manufacturing and R&D operations in Malaysia, India and Taiwan hampered the ability of the automotive semiconductor industry to meet both



Exhibit 3 Automotive Semiconductor Market 2019 and 2020

Source: Strategy Analytics

current and ongoing demand over the forthcoming quarters.

The combined impact of semiconductor shortages in general, combined with these other events served to limit the much-vaunted recovery in light vehicle production. Major OEMs have steadily increased the frequency at which they are reporting adjustments to their production schedules citing the ongoing impact of semiconductor shortages. Even those companies that were initially better prepared, e.g., Toyota are now regularly advising of adjustments to their production lines as the impact of the semiconductor shortage has snowballed. This has also resulted in OEMs adopting a range of measures to alleviate the situation which include:

- Temporary shutdown of production lines.
- Ongoing reduction in shift hours through the next six to nine months.
- Allocation of semiconductor and other resources to production lines focused on the most profitable and/or high-volume brands and nameplates.
- Vehicles produced but with final finishing delayed until certain components are secured.
- Vehicles produced with certain non-critical components missing that

allow a vehicle to be finished with the final production vehicle noting a minor reduction in aesthetics, performance or fuel economy.

Strategy Analytics analysis of the ongoing challenges in the supply chain suggested that this would result in vehicle production being impacted further than originally estimated with the loss in production attributable to semiconductor constraints as high as 5 - 10% for 2021. Comments from TSMC, automotive OEMs and the broader supply chain earlier in the year suggested that while the overall semiconductor shortage may last into 2022 and possibly even through to 2023, the situation for the automotive industry would start to see signs of improvement from Q3 onwards limiting the overall impact to light vehicle production.

Unfortunately, as we start to see calendar year third quarter financials being released at the time of writing, it does appear that the combined impact of semiconductor shortages, a resurgence in COVID-19 and other associated issues around materials supply will translate to actual vehicle production growth being curtailed to around 3% to 5% year-onyear.

At the same time, automotive

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semiconductor suppliers look set to continue reporting robust financials for the third quarter suggesting that there is a growing mismatch between automotive semiconductor industry revenues and actual vehicles being produced. Regrettably, this raises the possibility that despite the best efforts of the supply chain, double bookings will lead to excess inventory in play that will serve to limit automotive semiconductor industry growth in 2022 and 2023.

Longer term, the prospects for semiconductor automotive demand remain strong, led as stated earlier, towards trends that favour vehicle electrification, ADAS (Advanced Driver Assist Systems) and Autonomy and connectivity. This means that the average semiconductor content in a vehicle will grow at a CAAGR (compound annual average growth rate) of 6.2% over the 2020 – 2025 timeframe. The move towards electrified platforms in particular dictates an increasing weight given towards power semiconductors. The incumbent power semiconductors Silicon-based IGBTs (insulated are gate bipolar transistor) and MOSFETs (metal oxide semiconductor field effect transistor) and leading suppliers of these power semiconductors include Infineon, Rohm, STMicroelectronics, ON Semiconductor and others. These incumbent technologies are starting to see growing competition from wide bandgap technologies such as SiC (silicon carbide) and GaN (gallium nitride) and this trend is accelerating over the next five to ten years with all the major suppliers of power semiconductors investing in these wide bandgap technologies as they see increased demand. By 2028 electrification and ADAS will account for 50% of automotive semiconductor demand and this will translate to growing demand for power semiconductors and advanced processor chips. Despite the shortterm challenges being faced presently, rising vehicle production and associated system demand will translate to the forecasted compound average annual growth rate (CAAGR) for automotive semiconductors, including sensors, over the 5-year period 2020 to 2025 to be +12.4% with the market holding potential to be worth between \$77 to \$81 billion by 2028.



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Chips, Modules & Automotive Electronics

A RAJESH GOPALAKRISHNA

Murata

o the word "Chips" lately send tremors down your supply chain (the spine of any manufacturing activity)? If no, then you must be extremely lucky and a super planner with extreme foresight!! Nonetheless, one need not be worried – it's a completely temporary phenomenon which will soon pass.

The chips or semiconductor technology has overcome serious challenges in the past - both in terms of technology and markets - and is now advancing at the pace of a tornado. Everyone is interested to have a slice of it and reign supremacy amongst equals. Needless to say, the investments that are being solicited by various countries with an array of incentives, subsidies and other "carrots" speaks volumes of the scheme of things. Ever since Robert Noyce, over 60 years ago, introduced the first integrated device (preceded by the invention of the transistor) at Fairchild, the evolution of this "wonder sand bundle" has been stupendous and in today's reality there is no product or use case untouched by it. Think of the ubiquitous hand phones, routers, massive Data centres, the electricity grid, transportation elements or even the toys that our children play with including the factories that manufacture all these are powered by Chips. The list could go on, but in the context of this article will restrict to Automotive.

Dawn of Electronics in Automotive

Every one of us at some point in time have made use of the automobile in some form or the other as part of our daily routine. Appropriate to recall Daimler's invention of the gasoline engine, Benz patenting his 3 wheel motor car – Model No. 1 – and much later Ford effectively pioneering (for automotive) the fabled moving assemblyline for mass production of the Model T making it more affordable. The kick-off to the usage of electronics in automobiles go back to 1955 when Philco's all-transistor

(12 to be precise) radio was loaded onto the Chrvsler's Imperial models. This was followed up by the use of silicon diode rectifiers in the lighter Alternator which began to replace the Generator enabling handling of larger electrical loads. Much research activities were conducted across various manufacturers in the US, Germany and Japan leading to improvisation of current issues faced then by their vehicles. Ignition systems became available with discrete solidstate electronics reducing mechanical wear improving engine efficiency. The next big success with use of electronics was the introduction of a computerized ABS helping improve vehicle safety. Meanwhile, the MOSFET was invented that revolutionized the semiconductors field and the Microprocessor (though the actual originator is possibly clouded) was born - the brain (or some may say heart) of most electronics systems. This is considered as one of the watershed moments in the engineering world and the emergence of the semiconductor giants that all of us know today.

With the invention of the transistor and microprocessor, internal combustion engines transformed from pure mechanical to electro-mechanical to fully electronic control solutions fuelling the quest for efficiency and optimization as well as meeting the increasingly stringent CAFE norms. It indeed has been a long journey since General Motors introduced the first microprocessor based electronics system in a car around 1980 though Electronic Control Module (ECM) existed prior with limited electronics. Further ahead, other areas like Airbags, Transmission Control, Navigation, Infotainment, Safety and comfort applications evolved within a vehicle with its own control unit. The Electronic Control Unit (ECU), with time, has advanced into a compact and complex module or sub-system that continuously challenges the boundaries of existing innovations in automotive electronics. So what is an ECU?

ECUs, as the name suggests, are devices that control specific functions within a vehicle. They are usually built with Chips or Integrated Circuits along with other electronic components that typically receive various inputs, process them as per specifications and provide necessary instructions for an appropriate output response. Apart from the hardware content, each ECU has specific software or firmware with various interfaces and



Common ECUs found in a vehicle



Device availability from Murata by application

communication protocols to effectively execute its given function. Effectively, it is an embedded system that controls the electrical systems internally within a vehicle and of late progressing to connect with other vehicles and infrastructure as well as the cloud. Typically, modern cars have about 70 ~ 150 ECUs packed in their architecture based on the features and options available on the vehicle. Some of the more common ECUs found are Engine control module (ECM), Body control module (BCM), Airbag module, Powertrain control module (PCM), Transmission control module (TCM), Telematics Control Module, Suspension control module (SCM), Infotainment Module (IVI), Battery Management System (BMS), etc. each with their own processor, memory and software. Murata offers a large selection of Auto grade devices that constitute key elements of these modules.

Semiconductor technology development

While the automotive system development is complex in itself with seamless inter-operability amongst the various sub-systems; the semiconductor technology has to keep pace and stay ahead in the innovation cycle to complement the efforts of the automotive OEMs. It would be good to note that the chips required for automotive applications are a notch higher than the consumer products thus driving higher cost to meet these specifications; some of the key attributes are as below.

Higher Temperature requirement -

typically need support from -40°C to 125°C

Reliability requirements – AEC Q100 Functional safety – ASIL safety levels PPAP – Consistency and change/risk management

Semiconductor technology has transformed exponentially in all aspects - transistor density, packaging, form factors, manufacturing processes, et al - the demand for more innovation from almost all applications pushing the levels of automation has kept surging the revolution in chips development. This demand has leapfrogged the search for newer materials to transcend the saturation of Silicon as it possibly reaches the limits of Moore's Law. Research in semiconductors materials are on a fast pace with new compounds like GaN, Graphene, Pyrite being developed as potential replacement for Si and GaAs. This nanoscale chip then necessitates improvement in thermal management as they get much smaller, packed with multifold powerful features creating hotspots impacting performance. Researchers at UCLA are discovering materials like Boron Arsenide (BAs) that can be integrated into the semiconductor chip design for a better thermal management at full load performance in future electronics packaging. Chip technology will continue to evolve with the latest news on the 2nm announcement from IBM and MIT/TSMC spelling out some breakthroughs to the next logical node. Are we on the path to an angstrom (Å)!!!

Transformation of vehicle architecture

Meanwhile. the vehicle itself is metamorphosing into a smart intelligent machine that would serve many other facets of human needs other than just being transported. The machines are becoming green, mean, lean, selfdriven and fully connected. Vehicle architecture, with every new generation and functionality enhancement, thus far has created a rather large and complex maze of networked ECUs offering no more room for flexibility and expansion. This leads to the tipping point of reconsidering the vehicle architecture as it becomes unsustainable to add more control modules within for new features. Automotive OEMs and Tier 1s are already working on alternate vehicular architectures with the semiconductor manufacturers driving in sync and propelling industry collaboration to define protocols and release chips that will enable these new Centralized architecture. Many of us would be now familiar with terminologies like Domain Controllers and Zone controllers, which are driving the shift in vehicle network architecture. Announcements are in place for Domain controllers being adopted by some of the well know OEMs/ Tier1 and



Application areas for Murata Automotive Modules



Scalable Cluster/Telematics Connectivity Platform Concept to Prototype to Mass Production

even our own indigenous automakers are beginning to ponder on the transition. Domain controllers consolidate features from multiple ECUs into a single domain enabling better efficiency, merging functions and SW platforms speeding communications as well as OTA updates for future expansion. Zonal architecture is a step ahead in integrating multiple unrelated functions with a spatial orientation thus compacting wiring harness, connectors and reducing weight. Expectation is that fewer controllers with same processor architecture will be present for software compatibility and platform migrations for new feature integration.

The progressive path would be to consider a full Zonal architecture in the future, but will it be prudent to partake a hybrid model to channelize and optimize the benefits prior to a full transition. Would this lead to a fully centralized processing architecture and if so when and will the automotive industry embrace it? Coupled with the developments in the telecom world rolling out 5G (6G) networks, AI & ML as well as availability of sophisticated sensor devices, the march continues unabated. So much so for the module evolution.

A quick glimpse of the automotive

module offerings in the connectivity space for some target applications from my company, Murata Electronics.

Innovation and feature enhancements are not just in the domain of the 4 wheelers or CVs, the dense population of motor cyclists in our country are not far behind in the demand for technology imbibement into their joyous ride on 2 wheels. One such solution that we offer is a bespoke design of a fully connected cluster with Telematics for any OEMs/ Tier1 in partnership with a leading Chip innovator in the automotive domain; a quick peek as below.

The way ahead

Automotive Electronics trends clearly indicate the age of the fully connected car, largely electric and autonomous, spurring the demand of high performance semiconductors and modules that will essentially ensure the safety of its own passengers within as well as those outside. The future vehicle is expected to be a "Mobile on Wheels" focussing on the rider experience rather than the driver experience, echoing the need for increased comfort, ambience and productivity. The average semiconductor content within the vehicle is estimated to be around \$350 (2x for EV) and expect to go up

to \$3000 for a fully autonomous vehicle as postulated by some industry reports. Several experts feel that more than half of all automobiles sold will be electric by 2030, which is not so far in the horizon. These new requirements and future aspirations (geo-political included), will drive the creation of a more collaborative eco-system developing highly powerful and integrated devices in multiple technologies - Chips, Modules, MEMS, ranging, batteries, wireless technologies, energy harvesting or even Hydrogen fuel cells. Given the ongoing chip supply situation and new vehicle architectures being defined. Automotive OEMs are increasing direct exposure to work with the semiconductor suppliers, which until now has been the domain of their Tier1, who in turn are considering investments in fabs and chips of their own.

An important aspect, will be the visible changes in the automotive value chain which would transition from the existing Tiers (of suppliers) to a Hub & Spoke model further moving potentially to a matrixed fusion between players (suppliers, telcos, tech giants, OEMs) and product cycle (design to after sales). This will enable the emergence and sustenance of new players in the eco-system as well as the need for crafting relevant business models. Some of these include shift to online sales, pay per use, subscription models and most importantly monetizing the enormous data that would be generated in the connected era that may realize up to a whopping 50% of the revenues. Software will play a key role in the advancement of vehicles and in today's car there is approximately 100 million lines of code.

As vehicles become increasingly automated and software defined (on a lighter vein supported by hardware), there could be close to 500 million lines of code required to smoothly run tomorrow's cars. All these will propel several new entrants into the eco-system raising the demand for strategic multi-level linked partnerships within this playground for the best user experience of their patrons.

In conclusion, there seem to be a dream run awaiting all participants in this space, with a better and safer world but a long road ahead. Brace up, interesting and exciting times !!



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Rajesh heads the Product Marketing, Application Engineering and Business Development activities of Murata Electronics India. Is focussed on fostering partnership with design houses, semiconductor companies and system integrators in the ecosystem to provide innovative technologies and solutions in the Mobility and IOT world. He has prolific experience and understanding of the Indian electronics industry leading the market efforts of several semiconductor companies previously.



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Industry Insight

Booming of personal security in India turning challenges into solutions

SIDDHANT SOMANI

Teltonika India



ecurity is more important than ever in today's world. According to the Ministry of Corporate Affairs of India annual reports, the annual spending on Security and Welfare in India is 1.6 trillion Rupees. This article will discuss how the use of IoT devices can solve many issues in the Security segment.

IoT devices can be used as a security tool in a variety of ways to track and trace individuals & raise an alarm in case of emergency. Alerts can be enabled by security personnel, police or any other controlling unit and hospitals in case of a medical emergency. Another challenge in today's world is tracking and locating pets and farm animals if they go missing.

The use of real-time data, SOS and Geofencing can help to increase the security of people and animals. Organizations who seek to increase security in other use cases can leverage the same device for the safety and security of their employees.

Areas Where The lot Security Solutions Can Be Used

Offices and Banks

Security Personnel is present in almost every organization, but they are not capable to provide immediate help to those who are in need. If someone assaults an employee or poses a threat, how can an employee call for help without being noticed and how much time it can take to raise the alarm? Let's suppose an IoT device with an SOS button or a 2-way voice communication function is fitted under the table. Once it has been pressed, the security personnel receives an alarm and can react immediately. Such IoT safety solutions can be helpful for Cashiers, Bank Managers or any other type of front desk employees.

Women Security

Women's security is one of the most emerging and sensitive problems in today's world. According to the National Commission of Women, already 23 722 safety complaints have been made by women in 2021.

Travelling from work to home, being on a business trip or walking to a grocery store alone might pose a risk for women's security. Although there are safety tools, such as pepper spray, shock gun or others, they are usually not effective and can be used against the victim. To increase the security of a person, an IoT tracking device with an SOS Alert button is an effective solution, which helps to discreetly call for help or inform a relative, security guard or police officer.

Lone Workers

Lone workers usually don't have any close supervision and travel to distant locations where they are at great risk of accidents. Having a personal tracker with an SOS Alert button could help to inform the authority or their family if they are in any danger or their life is at risk. Such a solution could help lone workers to feel safe and, if needed, call for help instantly. One more thing that is worth mentioning is a No-Movement Alert that sends an automatic alert message if the worker is not able to move. In that case, the responsible person can immediately send help to the tracked location.

Sports

In a sports event like cycling, marathon, kayak or other, an athlete cannot be traced throughout the race. The checkpoints are far away with a distance of at least 1 or 2 km. In this case, the athlete can be tracked between the checkpoints using an IoT device. A medical or emergency alert can be raised through IoT devices by using a SOS button, while the athlete can be tracked using the GPS location.

School Children

Even though children are safe in schools and home using 21st century gadgets, such as a close circuit camera, they need to be secure in the playgrounds, school bus or on their way home. There is always a fear of a missing child. Kids could be kidnapped or face other dangers while they are alone. A smart IoT device could help to track children and help them to easily raise an alarm when necessary. This would increase the security of children and parents could relax while their children are outside learning new things.

Drivers & Security Personnel

Crimes happen everywhere – in the streets, at home, at offices or even on public transport. Taxi drivers, bus drivers, cargo transport drivers face enormous stress during their shifts, and attacks happen when they are focused on the road. How many lives could have been saved if they called for help immediately? IoT tracker can help to raise an alert quicker than with a phone in the event of an accident and save drivers' life. Imagine a device, where a simple press of a button can instantly get assistance and alert the authorities. Security guards can also benefit from this during patrolling at night. This can minimize the callto-action time to a minimum.

Pets and Farm Animals

Have you ever lost your pet? How did you find it? Or is your pet lost forever? These questions themselves evoke emotions. It can take a lot of effort to find a beloved pet or farm animal. This could be prevented by the use of an IoT tracker. A tracker attached to the collar of the animal helps to continuously monitor the location and easily find them if they go missing.

What is an IoT Security System?

IoT Security system is a smart tracker, with its main features such as SOS button, 2-way voice communication module with a GPS technology and data cellular connectivity with a SIM Card. These functionalities are widely used in the USE CASES mentioned above. Configuration of the device is limitless, and the use cases list could be even more extended. If you are looking for a solution, which can increase the security of employees, family members, kids, pets, guards or lone workers the IoT device is the most effective solution for you. It simply sends a pre-recorded message and informs the responsible person even if there is no signal available inside a building. Overall, the design, features and configuration possibilities of the IoT device help to prevent crimes and increase security.

Key Points Important to Highlight

- Security Management: Where an individual can be tracked and be provided with instant help in case of emergency.
- Health Emergencies. As the devices has a SOS button and can make calls, it can also help an individual to get emergency health services.
- Drivers attacked. As well it can help to in-

crease the safety and response time when public transport drivers are being attacked, where a driver can create an alert for any mishaps on the road and they can quickly receive help from the authorities near them.

- Safety of Kids. The IoT device is a perfect tool to increase safety of kids at school or parks. Kids can be con- tinuously monitored and in a case of emergency, family members or authorities can act quickly to provide the required help.
- Farm Animals. If any of the animals goes missing during grazing or any circumstances, they can be tracked and brought back to home

Revolution in Security with lot

As discussed IoT solution earlier, we see great potential for increasing security in a variety of sectors. This solution generally adds many values, such as quick response time, real-time monitoring & increases personal security. Here in India, security is becoming more and more important, and IoT can help to achieve safety goals. From children & women to lone workers and office employees, IoT trackers can help us to protect everyone and every day. These systems can be used by the police, fire Fighters & hospitals to decrease the response time for any mishaps in the area. Moreover, it can be used on a greater scale to increase security in the city. Since the market requires such a solution, more and more companies are trying to supply the needs. One such company is Teltonika. Located in the heart of Europe, Lithuania, with experience of more than 24 years in developing IoT solutions, they are working since the revolution of 2G has started in India. Teltonika currently has more than 1700 Employees worldwide and 28 offices in more than 18 countries. Teltonika's mission is to help people and they are achieving this with smart IoT solutions. Teltonika provides a 2-year warranty for all of its products. 🔲

AUTHOR

SIDDHANT SOMANI

Manager (Business Development) - Mobility Teltonika India

Enthusiastic, goal and team-oriented sales professional having a diverse experience in IoT catering to different industries. Looking after range of products from EV Mobility, Personal and Asset trackers in India.





KIA CARNIVAL LIMOUSINE 7 STR



Kia has launched the updated version of the Carnival in India. The Carnival gets a new top-spec Limousine Plus variant and Kia's new logo as part of the update. The price of the Kia Carnival Limousine Plus is Rs 33.99 lakh. Kia Carnival will be available in four trims – Premium, Prestige, Limousine and Limousine Plus. It will still be offered as a 7, 8 and 9-seater MPV

Safety Features

- NCAP Rating- 5 Star (ANCAP)
- Overspeed Warning 1 beep over 80kmph, Continuous beeps over 120kmph

- Emergency Brake Light Flashing
- Airbags 6 Airbags (Driver, Front Passenger, 2 Curtain, Driver Side, Front Passenger Side)
- Tyre Pressure Monitoring System (TPMS)
- Child Seat Anchor Points
- Seat Belt Warning

Braking & Traction:

- Anti-Lock Braking System (ABS)
- Electronic Brake-force Distribution (EBD)
- Brake Assist (BA)
- Electronic Stability Program (ESP)
- Hill Hold Control
- Traction Control System (TC/TCS)



Locks & Security Features:

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

Telematics Features:

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

Entertainment, Information & Communication Features:

- Wireless Charger
- Smart Connectivity Android Auto (Yes), Apple Car Play (Yes)
- Integrated (in-dash) Music System
- Touch-screen Display
- ✤ Display Screen for Rear Passengers
- GPS Navigation System
- 6+ Speakers
- USB Compatibility
- Aux Compatibility
- Bluetooth Compatibility (Phone & Audio Streaming)
- MP3 Playback
- AM/FM Radio
- iPod Compatibility
- Steering mounted controls
- Voice Command

Instrumentation:

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



PORSCHE CAYENNE E-HYBRID

Specifications:

- Engine 2995 cc, 6 Cylinders In V Shape, 4 Valves/Cylinder, DOHC
- V8 Petrol engine
- Fuel Type Hybrid
 (Electric + Petrol)
- Max Power (bhp@rpm) -456 bhp @ 5250 rpm
- Max Torque (Nm@rpm) -700 Nm @
- Max Engine Performance -335 bhp @ 5300 rpm, 450 Nm @ 1340 rpm
- Max Motor Performance 134 bhp @ 2800 rpm, 400 Nm
- Drivetrain AWD
- Transmission Automatic (Torque Converter) - 8 Gears, Sport Mode
- Emission Standard BS6
- Turbocharged

- Battery Placed Under Rear Seats
- Electric Motor 1 Permanent magnet synchronous Placed At Integrated with Transmission
- Regenerative Braking, Idle Start/ Stop, Pure Electric Driving Mode

Safety Features:

- NCAP Rating- 5 Star (EURO NCAP)
- Overspeed Warning 1 beep over 80kmph, Continuous beeps over 120kmph
- Emergency Brake Light Flashing
- Airbags 9 Airbags (Driver, Front Passenger, 2 Curtain, Driver Knee, Driver Side, Front Passenger Side, 2 Rear Passenger Side)

- Middle rear three-point seatbelt
- Middle Rear Head Rest
- Tyre Pressure Monitoring System (TPMS)
- Child Seat Anchor Points
- Seat Belt Warning

Braking & Traction:

- Anti-Lock Braking System (ABS)
- Electronic Brake-force Distribution (EBD)
- Brake Assist (BA)
- Electronic Stability Program (ESP)
- ← Full-Time Four-Wheel-Drive
- Hill Hold Control
- Ride Height Adjustment
- Hill Descent Control



- Limited Slip Differential (LSD)
- Centre Differential Lock

Locks & Security Features:

- Engine immobilizer
- Central Locking Remote
- Speed Sensing Door Lock
- Child Safety Lock

Telematics Features:

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

Entertainment, Information and Communication Features:

- Smart Connectivity Android Auto (Yes), Apple Car Play (Yes)
- Integrated (in-dash) Music System
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- Touch-screen Display
- 6+ Speakers
- USB Compatibility
- Aux Compatibility
- Bluetooth Compatibility (Phone)
- MP3 Playback
- CD Player
- AM/FM Radio
- iPod Compatibility
- Steering mounted controls
- Voice Command

Instrumentation:

- Digital Instrument Cluster
- Electronic 1 Trip Meter
- Average Fuel Consumption
- Average Speed
- Distance to Empty
- Digital Clock
- Low Fuel Level Warning
- Door Ajar Warning
- Adjustable Cluster Brightness
- Gear Indicator
- ✤ Shift Indicator
- Heads Up Display (HUD)
- Analogue Tachometer
- Instantaneous Consumption

Need for restructuring the E/E architecture with the rise in ACES mobility

⁄ PRADNYA NANIR

M14 Intelligence

he world is witnessing a major transformation in the mobility industry, at faster pace than ever. Vehicles are on the verge of taking full control and reliving drivers off their duties. More connected, highly autonomous, fully electric features are what OEMs are endeavoring to offer in the passenger cars with an aim to position themselves among the top automotive innovators. Moreover, opening opportunities in the ACES (autonomous, connected, electric, and shared) mobility has disrupted the entire automotive value chain, thereby revolutionizing the business models of majority stakeholders.

Perception of environment is the basis for vehicles to drive autonomously and ensure high level safety. As the industry moves toward increasing functionalities and features, vehicles tend to become more complex structures. Sensors and advanced control units with a perfect blend of Artificial Intelligence (AI) and Machine Learning (ML) algorithms is enabling the carmakers to achieve the desired level of technology breakthroughs in today's automobiles. This is changing the entire topology of vehicle systems and electrical/ electronic vehicle system architecture (E/E Architecture) is the prime element.

ADAS and Evolution of E/E architecture

Advance Driver Assistance System (ADAS) functionalities are no longer restricted to just the vehicle safety, but also to the certain level of autonomy. As the industry progresses towards deploying higher level of autonomy features, it is prerequisite to add advanced sensor systems, higher computing power, and complex architectures. Sensors such as 4D radars and LiDARs involve high perception computing and large data processing. The next-generation vehicles are expected to generate 5-20 TB data by next decade. V2X and autonomous vehicles are also responsible for creating a shift in data transfer protocols. Design and deployment of these systems certainly is a complex task and requires advance control units and refined architectures that could accommodate the increasing data throughputs. And identifying and re-structuring the E/E architecture is the impending challenge for the tech players.

Not only the advanced driver assistance system (ADAS), but every connected, telematics, and electric feature constitute the electrical wiring and electronic components of vehicles. The cost associated with these technologies and stringent time-to-market further adds pressure on OEMs, tier-1s and system integrators. The technology players are modernizing their solutions and trying to serve the industry developing customer-specific E/E bv architectures that ensures the inclusivity of all the functional architectures. However, there is a need for a uniform architecture that balances all interdependent requirements and design that serves all the modern vehicle technologies along with higher level of autonomy functions.

The E/E architecture traditionally used in the vehicles was distributed type and has evolved to domain centralized. With the increasing ADAS features, OEMs have realized the need to shift from distributed E/E architectures to domain controlled, where the data generated from multiple sensors could be processed simultaneously. Tesla is the notable example for implementing domain control architecture for its Autopilot system. All the complex autopilot functionalities and the software updates are enabled to perform seamlessly through this type of architecture.

However, with the further innovative feature additions, it is expected that the E/E architecture will evolve in zonal ECUs with server-based architecture. The Zonal ECUs are designed to connect the sensors and actuators data to the centralized vehicle servers, thereby reducing the wiring complexity. Moreover, the safety critical applications such as Emergency braking and Air bag control system are expected to perform real-time in zonal ECU architecture. The centralized architecture is expected to become the predominant vehicle architecture as it significantly reduces the number of wires and increases the overall computing power of the vehicle. This will also assist OEMs in controlling manufacturing costs and increase the flexibility to add more software features to enhance the AV capabilities. The Zonal ECU with centralized computing is expected to be the most sophisticated E/E network architecture and perform seamlessly and independently. However, implementation of zonal ECUs with centralized E/E architecture will create a disruption in the supplier ecosystem.

Impact on Supplier Ecosystem

The emergence of software segment in the vehicle and its progression towards overtaking the hardware segment is creating a change in the automotive supply chain. The dependence on software has opened the path for software companies to climb up in the supply chain. The new entrant and other software firms have joined tier-2 companies to serve directly to the tier-1s and OEMs. Acquisition of software companies and start-ups is the major strategy being followed by tier-1s to stay ahead in the race.

As the industry will adopt centralized E/E architecture, the OEMs will require to consolidate software platforms in vehicle hardware. And the future expected implementation of 5G and Artificial Intelligence (AI) will further increase the dependency of OEMs on the software players. In this scenario, OEMs are expected to work closely with specialized software

providers for defining a platform for every vehicle model. This will create a vendor lock-in situation and supplier switching would become an expensive and noncredible choice. The major challenge that the OEMs will face is limited flexibility and compromises.

OEMs are required to take few strategic considerations to deal with the changing supplier ecosystem. Automakers are involving in strengthening their in-house software capabilities and developing fullstack competencies. This is being done either by talent acquisition, investment in software development companies, or acquiring business units. Also, OEMs are speeding up the time-to-market for new E/E/ architecture solution by centralizing the Software and E/E architecture departments. Tier-1s are increasing their capabilities in E/E architecture and software market by jointly working with OEMs to define new E/E architectural structures. Few of the tier-1s including Veoneer, Continental, and Bosch are investing in software capabilities and creating a dedicated development, integration, and validation tool chain to enable continuous integration and development. Component suppliers are taking steps towards developing specialized software capabilities to ensure the fulfillment of OEM requirements. Few of the tier-2s are even successful in by-passing tier-1s and directly partnering with OEMs.

This sift from vertical tiers to horizontal collaboration with suppliers is the one of the notable disruptions in the automotive industry, today.

The ADAS & AV software and E/E architecture industry is holding a potential of \$500 billion market by the end of this decade

The industry is facing magnitude of change with the emergence of Autonomous Connected, Electric and Shared (ACES) mobility. Advancement in technology have enabled a major shift in consumer behaviours, innovative business models, change in supplier ecosystem, and rise of start-ups within the mobility space. Software including AI and ML have played significant role in driving this market.

As software in vehicles is becoming prominent, most of the advanced functionalities are expected to be enabled through software. The mobility industry is witnessing a shift of trend towards ondemand services. Connected features, telematics, infotainment will no longer be a part of hardware systems in the vehicles, over-the air updates will be more frequent. Also, the architecture is expected to be more scalable and sustainable, giving rise of Service -Oriented-Architecture (SOA) which can be used across all the vehicle classes, applications, and ADAS features.

Since, software and E/E architecture remains the biggest focus area for all the leading automotive players, the industry has witnessed some of the largest M&As and partnerships in the software and E/E market space during last two years which recorded an aggregated capital flow of whooping \$100 billion.

Moreover, the time-to-market of Autonomous Vehicles (AVs) on public roads is much closer than anticipated. China, the U.S., Singapore, and other Western European countries have unveiled public operations of robotaxis and autonomous last-mile delivery vehicles (in specific ODDs). This is driving the tech players to speed up the development and implantation of advanced software and design scalable architectures that can execute the complex operations of AVs.

The breakout of COVID-19 pandemic though has dented the growth of conventional automotive industry, the software and E/E architecture market had an insignificant impact. This sector is anticipated to show a market growth of 8 percent by 2030. The ECUs/DCUs accounts for largest market share and expected to grow at moderate rate. This is because the price erosion is expected to have counteracting effect on the rising sales of ECUs/DCUs in the ADAS and autonomous driving application. Rising adoption of Electric Vehicles (EVs) has driven the surge in the growth of power electronics market.

The ADAS and AV software market is majorly attributed to the industry's focus on developing computer vision, AI, and Machine Learning (AL) algorithms along with cyber security. The only software industry is expected to witness over 12 percent CAGR by next decade.

The ADAS software and E/E market growth differs with the change in level of autonomy and electrification. For example, the electronic content and software algorithms are largely different in level 1 vehicle than that in higher level of autonomy. Also, the system differs with different powertrains such as ICE, BEV, PHEV, etc. Thus, the growing demand for AD systems, and electric powertrains will drive the market growth of software and electronics and open opportunities for companies in this space. The competition in the market is aggressive and companies including Veoneer, Continental Engineering Services, Aptiv, Elektrobit, Siemens Digital Industries Software, Bosch Mobility Solutions are among the top players. OEMs and Tier 1s are repositioning their strategies as they are currently not equipped with the software talent. The major focus of these players is on co-developing the technology with new tech entrants either by partnership or acquisition. OEMs and Tier-1s are combining their resources to re-structure the E/E architecture and find a solution that better fits for today and scalable for future innovations. However, this change in the strategic developments amongst the industry players has created a ripple effect down the entire supply chain.

All the stakeholders in the ACES ecosystem are embracing the strategy of working collaboratively to re-structure and redefine the E/E architecture capabilities that will allow a level of sustainability in this disruptive industry and sharply reduce the time-to-market for truly autonomous vehicles.

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Pradnya is a technology strategist with years of experience as technology consultant in niche markets of Aerospace, Defense, and Automotive industry. Being one of the founding members at M14 Intelligence, she is contributing towards developing high-growth research practices and strategies so as to enable clients to accelerate growth and position in the emerging tech industries.



INTELLIDASH PRO

Car and Driver and The Fesco Group, a market-leading manufacturer of innovative consumer technology solutions introduced the Intellidash Pro, the much-anticipated wireless version in a series of plug-and-play dashboard-mounted IPS touchscreen smart displays. The Intellidash Pro allows drivers to wirelessly integrate their smartphones for a complete Apple CarPlay and Android Auto experience.





FEATURES:

- Connectivity Technology: Bluetooth, USB
- Connectivity Technology: Bluetooth, USB
- Control Method: Touch
- Audio Output Type: Speakers
- Controller Type:
 Google Assistant, Android

SMART DISPLAY: Link wirelessly with Apple CarPlay to put all your smartphone's best features in a clean, safe, and easy-to-use touchscreen securely mounted on the dashboard of your vehicle. Handle navigation, messages, phone calls, music, SiriusXM, and more WIRELESS-LY. You can even link your device's Siri Assistant to control the Intellidash Carplay Receiver.

SIMPLE INSTALLATION: The included suction mount secures Intellidash PRO to your dashboard or windshield and can be easily removed and stored when not in use. Comes with a shockabsorbing gel strip that you can lay under the INTELLIDASH to protect from rattling and contact with your dashboard.

BUILT-IN USB CHARGING PORT:

Connect your INTELLIDASH PRO to your iPhone using a charging cable to the USB-C port located on the side of the unit and you're done. The WIRELESS connection allows for both access to car play, YouTube, Waze, SiriusXM Radio (subscription required) apps while your device is charging. **VOICE CONTROLS:** Uses your smartphone's AI assistant TRUELY WIRELESSLY to make calls and play your favorite music without taking your eyes off the road. The INTELLIDASH PRO has built-in speakers as well as an FM transmitter to allow you to broadcast your music from your phone to your car speakers via the radio.

BLUETOOTH ENABLED: Pair your phone to your INTELLIDASH via Bluetooth. So you can listen to music and make calls while you are not using Carplay. XM Satellite Radio (Must Install the app on your iPhone device. You will need a cellular data plan to stream without a Wi-Fi connection, subscription required) Listen to over 150 streaming music, news, sports, and talk radio stations through Intellidash.

AMBRELLA CV2FS



Ambarella's ASIL B-compliant CV2FS combines high-performance and power-efficient computer vision acceleration, superior image processing (ISP), and H.264 video compression in a single SoC. Ambarella's highly efficient CVflow® computer vision engine delivers deep neural network (DNN) processing and a dedicated stereo vision accelerator to enable efficient implementation of mono and stereo algorithms for the next generation of intelligent automotive cameras.

Ambarella CV2FS-A0-RH

Y3VBCA S012438

CV2FS

CV2FS

Key Features:

Computer Vision Engine CVflow®

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- CNN- / DNN-based processing to enable detection, classification, tracking, and more
- Dense optical flow engine
- Tools for high- and low-level algorithm development
- CNN toolkit for easy porting with Caffe, PyTorch, TensorFlow, and ONNX

Stereo Processing Engine

 Enabling generic obstacle detection, terrain modeling, and more

Advanced Image Processing

- Multi-exposure line-interleaved HDR
- Real time multi-scale / multi-FOV generation
- Hardware dewarping engine support
- Multiple camera support
- LED flicker mitigation
- Superior low-light processing

 RGGB / RCCB / RCCC / RGB-IR / monochrome sensor support

High-Efficiency Video Encoding

- 8MP30 H.264 video encoding performance
- Flexible multi-streaming capability
- Multiple CBR and VBR bit rate control modes
- Smart H.264 encoder algorithms

Functional Safety

- Error correcting code (ECC) protection of on-chip memory on DRAM
- Central error handling unit (CEHU)
- Processing island targeted to meet ASIL
 B requirements; safety island targeted to meet ASIL D requirements

Target Applications

- Single- / multi-camera ADAS
- DMS and in-cabin solutions
- Single- / multi-channel electronic mirrors with BSD
- Parking assistance systems

Omnicomm: Telematics Experts in Fuel Monitoring



Are fuel price rises impacting your business?

Fuel prices have increased 21 times in 2021, with diesel prices increasing by ₹ 6.08 per litre. By the end of July, diesel was priced at ₹ 89.93 per litre. The rise in fuel prices will have a devastating impact on the economy, which is still recovering from the Covid-induced crisis. According to the Economic Times, transporters and freighters are seeking a 10-15% freight cost increase, primarily due to low margins. Profits have decreased while fuel costs remain at an all-time high, contributing to about 50% of total operational expenses.

An All India Study* reports that the transport sector consumes 70% of diesel, followed by agriculture (about 13%). The remaining 17% comprises industry (9.02%), mobile towers (1.54%) and others (6.45%) including gensets for non-industrial purposes, civil construction, etc.Fleet managers can't control fluctuating fuel costs, but they can properly track fuel usage to achieve a reduction in fuel consumption. Smart fuel monitoring solutions aid efficient fleet management and improve fuel savings.

Telematics trends 2021: Are you ready?

Manually collecting fuel data, lost receipts, human error and/or intentionally distorted data results in inaccurate budgeting and inefficient resource management.

It is time for businesses in India to add fuel monitoring to telematics solutions and get transparent real-time data to monitor refills, pilferage, vehicle idling, harsh driving, and even vehicle performance and scheduled maintenance. Take control of fuel operations and start saving money with Omnicomm advanced fuel monitoring solution!

What is Omnicomm fuel monitoring solution?

With over two decades of industry experience, Omnicomm is a leading manufacturer and developer of IoT-based fuel management solutions.

Omnicomm fuel-level sensors are the most accurate and reliable in the market, with

an 8-10 year lifespan and the highest ingress protection rating (IP69K) making them suitable in the toughest conditions. The new Omnicomm LLS 5 sensors include Fuelscan technology that automatically adapts to fuel changes while maintaining 99.5% accuracy. Unique Fuelmetrix technology filters noise in fuel data due to vibrations. Omnicomm products work with Omnicomm's advanced fleet monitoring and analytics platform (Omnicomm Online) as well as third party software, and are customisable according to the customer's needs.

OMNICOMM partners (FMS providers, ERP vendors, IoT SDP vendors) serve customers in industries including logistics and transportation, railroads, telecommunications, oil and gas, ships and vessels, mining, agriculture and construction. Omnicomm partners benefit from reliable and durable equipment, lifetime support, seamless integration, excellent training and sales support.Through its legendary fuel sensors and robust fuel APIs, Omnicomm is creating an ecosystem of fuel and energy saving solutions for diverse industries.

Road construction machinery: Saving fuel and improving agility for 6 of top 10 road construction companies in India

Omnicomm's partner Locate 360 develops industrial asset tracking and productivity improvement solutions for several leading NHAI contractors. Omnicomm's sensors and fuel APIs monitor receipts, issues and consumption throughout the fuel supply chain at remote sites, enabling Locate 360 to create a cost index for every operational asset. Site operation managers can identify and redeploy unused assets, check fuel pilferage and track production costs, while contractors report 20-30% fuel savings.

Heavy lifts and cranes: Fuel monitoring helps manage fuel costs.

Barkat Cranes, a leading crane rental company in India, faced rising fuel costs and a lack of transparency in fuel usage data from far-flung stationary assets. Omnicomm's partner RTG Trackers developed a customised fuel monitoring solution, using Omnicomm's technology to validate refuelling and consumption. The client immediately identified inefficiencies and saved up to 300+ liters of fuel per crane per month. Transparent fuel data improved asset planning and management. RTG and Omnicomm have deployed solutions for heavy lifts across more than 50 locations in India.

Telecom towers: 25-30% fuel savings and 5-10% less electricity consumption for leading Indian mobile service provider

A mobile tower consumes 5-15KW of electricity and up to 1,000 litres of fuel every month. About 40% of towers have a backup battery bank and diesel generators. Omnicomm India has teamed up with energy analytics partner Mindshift Analytics to develop a telecom tower energy monitoring solution for a leading mobile service provider in India. Omnicomm fuel sensors mounted on diesel g enerators work with IOT gateways to continuously monitor and consolidate data in the cloud, providing complete visibility of fuel and energy consumption, DG set efficiency and battery efficiency. This has resulted in fuel savings of 25-30% and further energy savings of 5-10%. Using ML algorithms to detect anomalies early, infrastructure managers can plan advance replacements, optimize workforce journeys and prevent catastrophic site outages.

Conclusion:

Monitoring fuel is more crucial than ever before. Efficient fuel usage contributes to savings, which in turn increases profitability.

Omnicomm fuel monitoring solutions provide essential data-driven insights and tools to drive business optimization, efficiency, cost reductions and the ability to stand out from the competition.

*Study was conducted by M/s Nielsen (India) Pvt Ltd for Petroleum Planning and Analysis Cell (PPAC) of Petroleum Ministry.



Refining & Redefining Vehicle Telmatics



Basic Telematics Devices



TS101 Basic

Track Trace and Driving
Behaviour

- IP65 rating
- Accelerometer
- Track & Trace
- RS232*



Bharat 101

 Track Trace and Driving Behaviour
 Serial Port with multiple I/Os

Optional CAN & RS485



OBD II

Track Trace and Driving Behaviour
Advanced Diagnostics through CAN & K-Line
Plug and Play
Accelerometer

• J1939

11929



TS101 Advance

- Track Trace and
- **Driving Behaviour**
- Serial Port
- IP65
- 8 I/Os
- Accelerometer

渝 Advanced Telematics Devices



DriveAssist -4G LTE

- Track Trace and Driving Behaviour
- Android-based smart telematics device
- 5" touch screen
- P2P Live Streaming
- \cdot Advanced Diagnostics through CAN
- $\boldsymbol{\cdot}$ ADAS through dual cameras and Dash CAM

AIS 140 Certified

UX101 -4G LTE

Track Trace and Driving Behaviour

- Video Telematics
- Advanced Diagnostics with 3 Channel CAN
- Wifi & BLE*

🚓 Solution for Electric Vehicles



TS101 Basic EV

- 9V-90V support
- State of charge & range anxiety
- Advanced diagnostics through CAN

For more information: www.itriangle.in sales@itriangle.in +91-9739974445

Note:

Features may vary based on the devices & requirements.
All of our devices support FOTA and have an internal battery

te:

Internet of Things (IoT) Security What is it, and how can I keep my devices secure?

A PREETI AGARWAL

What is IoT?

The Internet of Things (IoT) refers to the billions of physical devices ("things") that are embedded with sensors, software and are connected to the internet. Besides the everyday objects like kitchen appliances, thermostats, baby monitors, IoT devices also include sophisticated autonomous cars and industrial tools. At an even larger scale think of connected defence equipment, medical devices, and entire smart city infrastructure.

This internet connectivity makes the devices digitally intelligent enabling them to exchange data with other devices and systems over the internet without human intervention.

The IoT fabric is becoming smarter, growing exponentially and rapidly merging the digital and physical worlds. IoT enhances the way we live and improves the quality of life.

I believe IoT is an opportunity, and it will be significantly instrumental in

saving the planet and help the humanity

Why does IoT need to be Secure?

The Internet of Things (IoT) solves important business concerns while also posing significant risks. IoT is also being used in the critical infrastructures that contribute highly on the economy, it makes security measures for IoT systems very critical mainly due to its increasing connectivity. Security is one of the biggest concerns with IoT as the devices expose both consumers and enterprises to IoTtargeted cyber threats and privacy issues.

As per McKinsey projections, by 2023, there will be 43 billion IoT devices connected to the internet. Most of the IoT devices (98% source: IoT business news) are not designed with the "security first" principal. IoT device traffic is unencrypted and exposes confidential information to the attackers. Around 51% of IoT devices have security vulnerabilities that are like

open doors for the attackers. Legacy IoT devices like medical imaging devices and industrial automation equipment runs on obsolete and unsupported software and are not frequently updated. This declines the overall security posture of the environment and make IoT a low hanging fruit for the attackers. Attackers easily get a foothold on the IoT device compromising a vulnerability like a weak password. Once a cybercriminal gets access to one device, they can use lateral movement techniques to find other vulnerable devices in the network and do severe attacks like ransomware, cryptomining, password stuffing and remote code execution.

Some of the companies also collect data from the sensors in IoT devices and monetize it. This may include PII data. Cyber criminals may use this information and combine with other data fragments to compromise privacy. These attack trends have made users wary of the



I believe IoT is an opportunity, and it will be significantly instrumental in saving the planet and help the humanity

consequences of the security breaches reducing the adaption of IoT. For any transformation, it is essential to build the consumer trust and ensuring security is in-built from design.

Understanding IoT Security Challenges

The security of critical infrastructure networks has conventionally been ensured by isolating the networks from the outside. However, these networks are becoming integrated with information networks to enable business innovation, and recently there have been demands to connect them to external networks to enable coordination with IoT-driven remote maintenance and other services.

Several IoT appliances/devices cannot be patched with security fixes as a result almost all devices will be at risk. Hackers are now actively aiming IoT devices such as routers and webcams because their inherent lack of security makes them vulnerable and easy to compromise.

These IoT security challenges are partly due to the technical nature of IoT ecosystem as well as due to the unique security requirements. Technical ecosystem has unique characteristics and must deal with scalability, distributed, heterogeneity, low energy, and omnipresent nature of IoT devices. Authentication, confidentiality, integrity, and end-to-end security, on the other hand, are the inherent security requirements.

Referring to ITU IoT reference model that is composed of four layers as well as management capabilities and security capabilities. Security aspects need to be looked at each layer.

Fulfilling these requirements is difficult given the constraints and limitations in computational and power resources.

Identity & AUT Hentication

IoT devices and objects should be able to recognize and authenticate each other. When many entities (i.e. devices, humans, software etc.) are involved authentication becomes difficult. An academic survey found that there are more than 80 difference authentication mechanisms proposed or implemented. There is no authentication standard at this point. Authentication can also become more complex due to the scale and size of the IoT fabric.

Compute Power

Because IoT devices have limited computing and power capabilities, designing, and implementing encryption or authentication methods is difficult. For maximum IoT security, these cryptographic algorithms must be able to work on small devices and compatible with the device's compute capabilities. Lightweight and pluggable solutions should be created and deployed to match the limited compute power of IoT devices.

IoT Device Heterogeneity

IoT devices are heterogeneous in terms of their capabilities, communication protocols, technical interfaces etc. This poses serious challenges when trying to secure the end-to-end security that requires the devices to share information and collaborate.

Establishing secure sessions and secure communication becomes complex with a variety of communication technologies at play. Organizations face a problem designing and executing security protocols that cover such a wide range of diverse IoT devices. When designing defensive measures to ensure IoT security, keep these characteristics in mind.

Key Mistakes that put your Business at Risk

Following are some common mistakes/ ignorance that can result into fatal cyberattacks:

- Not having a security and privacy program
- Security not being incorporated into the product designing and ecosystems
- Insufficient security understanding and training for engineers and architects
- Lack of visibility & Insufficient monitoring of devices and systems to expose security events
- Immature incident response practice Refer https://w-se.com/the-owaspiot-top-10-list-of-vulnerabilities/ for OWASP top 10 IoT vulnerabilities.

How to Secure IoT Devices?

IoT security needs to be a multi-layered approach starting from securing the



It is important to use only the permitted software in IoT devices as the opensource libraries and components many times have inherent security vulnerabilities that opens door for attackers. It is important to keep the device software updated with latest patches installed.

devices, network, perimeter, and the other parts of the IoT ecosystem that are specific to the given environment.

It is important to use only the permitted software in IoT devices as the open-source libraries and components many times have inherent security vulnerabilities that opens door for attackers. It is important to keep the device software updated with latest patches installed. In addition, the devices should authenticate before joining the network to ensure that only trusted entities have network access.

Because IoT endpoints have limited processing and memory, it is recommended to leverage firewall and perimeter security layer to filter malicious traffic transmitted closest to the ingress point.

With reference to ITU IoT reference model, different layer has different security requirements:

- Application Layer: Authorization, authentication, application data confidentiality and integrity protection, privacy protection, security audit and anti-virus
- Network Layer: Authorization, authentication, use data and signalling data confidentiality, and signalling integrity protection

- Device Layer: authentication, authorization, device integrity validation, access control, data confidentiality and integrity protection.
- Specific security capabilities are closely coupled with applicationspecific requirements, e.g., mobile payment, security requirements.

When designing the security of IoT devices, you must consider the custom security procedures in addition to conventional security procedures. It would be best if you assured device security, network security, and the overall security of the IoT architecture and system.

To secure IoT devices, you can use the following security best practices:

- Deploy tamper-resistant IoT devices: Deploy tamper-resistant IoT devices that are disabled when tampered with.
- Make physical security a priority: Physically isolate devices and allow only authenticate human access.
- Install fixes and update firmware: Upgrades, firmware updates, and patch installations should all be done as soon as the manufacturer releases them.
- Perform dynamic testing: This method reveals both code flaws and hardware security issues.
- Protect data when disposing of IoT devices: Define protocols for disposing of IoT devices as they become obsolete. Devices that have been improperly discarded might represent a threat to privacy and be used for a variety of harmful reasons.
- Use strong authentication: Always use strong passwords and change default passwords as this makes the



Source: ITU-T Y.2060 IoT Reference Model

device vulnerable to password stuffing attacks.

- Adaptive authentication should be encouraged: Contextual information and machine learning techniques are used in adaptive authentication, also known as context-aware authentication (CAA), to assess the risk of malice. The user will be requested a multi-factor token if the risk is high.
- Strong encryption and protocols should be used: Use robust encryption in various IoT protocols to ensure secure data transmission (Bluetooth, Zigbee, Z-Wave, Thread, Wi-Fi, cellular, 6LoWPAN, NFC, etc.)
- Reduce device bandwidth usage: Avoid being a target of IoT-borne distributed denial of service (DDoS) attacks by limiting network capabilities and bandwidth to the absolute minimum required for the device to function.

AUTHOR

PREETI AGARWAL

Cyber Security Researcher, Internet of things (IoT), Cloud Architect, Technology Strategist & Tech Influencer

- Limit the detection of these devices on the network: To reduce the attack service avoid leaks of sensitive personally identifiable information (PII) close the unwanted ports on the device. To allow only the authorized clients to discover the IoT device, you'll need correct service mechanisms and authentication protocols.
- Divide the network into segments: Virtual local area networks (VLANs), IP address ranges, and their combinations categories help break large networks into smaller local networks. This allows you to depict distinct segments controlled by firewalls by creating distinct security zones.

Conclusion

As your organization's IoT grows, you must ensure that adequate IoT security solutions are implemented and proven to be effective in protecting your distributed assets from cyberattacks. To keep your internet-connected devices safe and secure, use the security principals as mentioned above in conjunction with IoT security software. In this article I wanted to touch upon the IoT specific cyber security challenges and best practices. We have just scratched the surface of the IoT world, and I believe the possibilities are endless. I am eager to see us all go to the next stage where we embrace IoT with confidence and trust.



Decrease fuel thefts by up to



Reduce fuel costs by up to

15%

Discover where your fuel goes

Fuel is typically one of the largest fleet expenses. Finding ways to minimize fuel spent can substantially improve the bottom line.

Callcomm Ble fuel level sensors (Escort) provides intelligent tools to keep track of fuel consumption and easily detect fuel thefts.



Optimize fleet efficiency by up to





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Signs of a Bad Transmission Control Module (TCM)

∕∕**▲** UpFix



A very surprising situation that is not so common is to be stuck in one gear. This sometimes happens when the transmission module faces some serious problems and glitches. It can be a dangerous scenario but mostly it's just about a little discomfort if the gear is stuck in the 1st or 2nd. One can easily put the car into motion if the gear is stuck on either of the two but if it is stuck on a higher gear you may not be able to drive it to the service station

ars are an amazing invention and also a very convenient asset to everyone. They make life easy and save us from wasting a lot of time on travel. Though sometimes it is possible that your beloved car can start giving you problems. These problems are sometimes related to small malfunctions like a flat tire and sometimes they are major problems like engine malfunction. Problems like these can cause a lot of problems and delays in your everyday life. It is thus better to see these problems coming in advance so that you can try to get things repaired and save money.

Thus you should always look out for symptoms that point to upcoming problems of a bad transmission. These signs are not that hard to pick up but not everyone is able to see them. So let us list some signs of a bad transmission control module so that you can keep an eye out for them.

Check Engine Light

Probably the easiest and the most efficient way of looking out for transmission control module problems is to keep an eye on the check engine light. If the check engine light comes on it mostly means that there is some problem with the transmission system and the engine. You can run a few basic tests to understand where exactly the fault is but you can cross out things like low engine oil or a flat tire. While running the tests your car will be connected to a scanner which will show different codes for different problems in the car. If the code P0700 is showing then there would definitely be a problem with the transmission control module.

Unintended Gear Shifts

In automatic transmission cars, most of the transmission is dependent on the control module. If there is a problem with your transmission then your car will shift into gears at the wrong time. Another symptom that your car might show is when the gear shifts into neutral while driving without warning. Such problems are mostly very dangerous as they can cause serious accidents at high speeds.

Higher Gear Shifting Issues

Have you sometimes noticed that you have problems shifting into a higher gear? You try to go from 2nd to 3rd but it feels that there is something acting against you trying to do so. This means that there is a problem with the transmission which needs to be fixed as soon as possible.

With an automatic transmission, a similar problem can arise which shows a slightly different symptom. You might notice sometimes that it is time for the transmission to shift to a higher gear but this does not happen. The RPM keeps increasing and the transmission does not up-shift the gear. When this happens it simply means that there is a problem with the transmission control module. Letting such problems continue will lead to even greater problems that will burn a hole in your pocket.

Lower Gear Shifting Issues

Similar to problems with shifting to a higher gear, there are problems while shifting to a lower gear which points to problems in the transmission module.

You're on a one-lane highway and you see a short window of opportunity to overtake the guy in front. To get the acceleration you obviously have to downshift but you find some resistance that does not let you successfully downshift. This is a sign that there is something wrong with the transmission.

An automatic transmission, like a transmission control module mazda 3, also sometimes faces issues with downshifting. Ideally, when you decrease your speed your transmission control module should automatically downshift the gear. Though there are times when this does not happen and this can point to problems in the transmission control module.

You should get this looked at as it can be a big problem

Unable to shift out of a gear

A very surprising situation that is not so common is to be stuck in one gear. This sometimes happens when the transmission module faces some serious problems and glitches. It can be a dangerous scenario but mostly it's just about a little discomfort if the gear is stuck in the 1st or 2nd. One can easily put the car into motion if the gear is stuck on either of the two but if it is stuck on a higher gear you may not be able to drive it to the service station.

Delay in Shifting

Transmission shifting delay is quite a common problem and is seen in many old cars. Shifting delay is basically when the gear takes more time than usual to shift to an upper or lower gear. This can cause a lot of problems while driving, especially when you are going uphill. Delay in gear shifting will result in you losing speed rather than gaining it.

It also becomes a dangerous situation when you are trying to overtake a car and you accelerate but because of the delay, the car does not pick up the acceleration. This can cause serious accidents so you should always take the delay problem seriously and get it fixed as soon as you can.

Bad fuel economy

This is not the most serious problem out there related to a faulty transmission control and is neither dangerous but it is still a problem. Fuel economy plays a huge role in today's world because first of all bad fuel economy means spending more money and secondly the world is running out of fuels very quickly so a car that

gives lower fuel economy is considered bad for the environment.

So if you realize that your car is consuming more fuel than normal then you should get it checked quickly. It may point to some minor or major problems with your transmission control module.

A person mostly faces many issues with a car irrelevant of regular servicing. There are many types of problems that one can face and a faulty transmission control module is just another one of them. These modules are not very easy to fix and the problems can keep on increasing iof you keep ignoring them. That also means that the price of repairs will keep going up. So it is advisable that you always get such problems fixed as from UpFixifyou see the aforementioned symptoms in your car.



How the rise of vehicle electronics & connectivity will impact the future of automotive manufacturing

LAWRENCE VIVOLO

Dell Technologies

To define a future-proof infrastructure architecture for Smart Factory, we must start by understanding the future of automotive manufacturing. The future car, and its ecosystem & lifecycle, will define its infrastructure requirements.

The dramatic growth of electronics content in vehicles in recent years is driving major changes in the automotive industry. While Advanced Driver Assistance Systems and Autonomous Driving (ADAS/AD) development have been a major focus, electrification of the vehicle drivetrain has recently become very significant as companies seek greener alternatives to the internal combustion engine. At the same time, vehicle connectivity, 5G availability are both seeing unprecedented growth. All of these factors are driving semiconductor content within each car higher at a time when the pandemic has taught us that traditional just-in-time manufacturing methodologies don't necessarily work for semiconductors.

What's exciting though is that onboard electronics and 24x7 connectivity bring with them new opportunities – from manufacturing quality improvement to enhanced customer experiences and even new streams of revenue – some of which haven't been discovered yet. The one common thread is data. Data is king. The more access vendors have to real-time data, whether from in the smart factory or from the customer's connected car, the more opportunity to benefit. But only if companies are prepared to leverage it.

Dell Technologies has been working extensively with Original Equipment Manufacturers (OEMs) and Tier 1 Automotive suppliers for many years and recently sponsored a Ward's Automotive survey focused on future vehicle design trends with emphasis on the impact on infrastructure requirements. Wards surveyed over 300 global automotive professionals from OEMs; Tier 1 and Tier 2 suppliers; a mix of manufacturing operations; quality; supply chain; and purchasing professionals to help us define the future requirements of vehicles. Once we understand what the future car looks

like and what kind of ecosystem is needed to build it, we can then define the future infrastructure requirements for Smart Factories.

One of the first areas that the survey focused on, for obvious reasons, was electrical and electronic system challenges. From the survey it became clear that there is a great desire for creation of a futureproof architecture for in-car electronics. This is supported by the fact that companies are moving toward a service-oriented architecture that is software defined. Interestingly, the survey respondents also placed a high priority on a future proof architecture for their data center.

To understand why companies are moving toward a software-defined car we only need to look at some of the recent luxury cars on the road today. As was noted by Bosch, it is not uncommon for a luxury car to have over 100 electronic control units (ECUs). Each ECU has its own software,



Major Vehicle Electrical & Electronic System Challenges

Key insights:

- Future-proof architecture invehicle & in the Data Center
- Flexible E/E
- Enable OEMs OTA and new feature updates
- Functionalities-as-a-service
- Cope with fast changing technologies (e.g. Al)
- Transition to SoA and the vehicle as a platform
- Key enabling Technology: Al

WARDS INTELLIGENCE. DELLTechnologies

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As highlighted by the results of a 2020 Wards Intelligence/Dell Technologies survey, the automotive supply chain and automakers in particular are focusing their efforts to develop future-proof and flexible E/E system architectures that can easily adjust to features and requirements of future generations of vehicles.

ADAS/AD data management at scale



D&LLTechnologies

For SAE level 5, we must capture multiple exabytes of data, and will require hundreds of CPU cores and thousands of GPUs to conduct testing. And all that data still must be stored for decades.

and the total software content in many cars is already over tens of millions of lines of code. They estimate that a fully autonomous car could increase the software content to nearly 500 million lines of code. A look at how ADAS solutions are being built today makes this easy to understand.

The Society of Automotive Engineers (SAE) has divided the level of autonomy of a car into 6 levels, with SAE Level 0 being non-automated and SAE level 5 being fully automated. Most advanced cars on the road today are SAE level 2. SAE Level 3 cars are just now starting to appear. If we take a closer look at these cars, what we see under the hood (pun intended) are multiple ADAS subsystems, (blind-spot detection, pedestrian detection, adaptive cruise control, etc.) that have been interconnected to create an advanced capability. Self-parking is one obvious example that combines multiple subsystems. The problem here is that typically each subsystem comes with its own ECU and software. As you interconnect them, another ECU is added, and software must then be written to perform "sensor fusion", which enables multiple sensors to work together. If we look at the sensors, many have their own ECUs as well. Further complicating the situation is the fact that there are multiple bus standards being used within the typical car. Add it all up and you have a very complex, safety critical system

that can be difficult to debug and maintain.

So this brings us to the future-proof invehicle architecture. By moving to a serviceoriented architecture, where there is only one ECU (or a few), maintaining the vehicle becomes significantly easier. In essence the vehicle of the future will be like a cell phone - where all the hardware is preinstalled and all you need to do is download an app to enable it. If you think about it, this isn't really new. Many cars today come preequipped with satellite radio and all you need to do is purchase a subscription (and maybe download some updates). The car of the future will be very similar, except you'd be buying and downloading advanced features like emergency braking, blind spot monitoring, or even full autonomy. What's exciting for the OEM is that this can create new revenue streams - like renting features. For the customer, this is also exciting. It's easy to imagine the customer that doesn't drive very often, and therefore doesn't need full autonomy (or maybe couldn't afford to buy it up-front). But that customer could be interested in buying it for a weekend to drive to/from the mountains. That represents incremental revenue for the OEM, and a benefit for the customer as well.

Note that 24x7 connectivity really expands the opportunities for the OEMs to enhance services. Telemetry data from the vehicle can be analyzed in real-time to predict

part failures and direct the customer to a dealership before something catastrophic happens. Likewise, with historical driver data, they can selectively offer extended maintenance contracts. Additionally. telemetry data can be transmitted back into the Smart Factory. Predictive quality, which uses real-time data streaming along with historical data to predict when a part will fail during manufacture, can be extended to predict, during its manufacture, that it will fail after it has shipped and is in actual use. This reduces warranty costs while improving quality. All this is exciting, yet the most significant aspect of connectivity is the opportunity for new revenue streams in that OEMs can collect by offering new data-driven services. Maintenance of the car is one obvious example. Another could be pushing restaurant coupons based on driver history and real-time location. The truth is that we don't know what the future will bring, but if we provide the data, someone will figure out how to profit from it.

And that brings us to the demand for the future-proof data center. Today, companies that are experienced in ADAS / AD development know that careful planning is needed to manage the enormous amounts of sensor data that must be collected for AI algorithm design and validation. Our experience has shown that a typical SAE level 2 vehicle requires on the order

Dell Autonomous Drive Ecosystem

This drawing does not necessarily represent all of the connections or equipment required for a complete solution. It is provided as a high-level overview.

Illustrated partners are a recommendation and can be replaced to meet the requirements.



Scope of partners is often not limited to a single box.



The Dell Autonomous Drive ecosystem is an open software reference architecture for AI development that allows automotive companies to automate data management and tool flow orchestration – freeing Data Scientists to focus their time on what they do best – AI Algorithm design.

5-10 petabytes (PB). SAE level 3 grows that requirement to 50-100+ PBs. Many have predicted that SAE level 5 storage requirements will be measured in exabytes. Already companies must think carefully about how they build their data centers for ADAS/AD. Now we also have to think carefully about the factory.



Smart Factory is very similar to ADAS/AD development in that both are AI-dependent and rely on large amounts of data to power the process of training and continuously refining AI algorithms In the typical factory today, parts run through various stages of production, with quality checks at the end of each stage. In spite of our best efforts, some parts that pass all up-stream inspections will still fail at the very end. This occurs when there are lessobvious defects in the parts that inspections miss – often because they simply don't know how, where, or why to look for them. This is where the power of AI comes into play.

To deploy AI we first must collect lots of data across the factory floor – all the typical data we would normally use for inspections (Ex: machined part tolerances, chip diagnostics), plus less obvious data (relative humidity, air temperature, power line noise, floor and/or machine vibration, acoustical data, solder source, part images, etc). Parts failures are also tracked.

The data is then analyzed, and AI algorithms used to predict when parts will fail. For example, it could be determined surface-mount chips will develop solder cracks whenever the solder temperature is at the highest temperature band, the air pressure is low, and a nearby drill press is generating excessive floor vibration. With this knowledge, these parts can be rejected (and corrective measures taken) before they are fully assembled. A similar concept can be applied to engine block casting, with x-ray imaging used to detect cracks, and AI to predict cracking. Predictive maintenance is very similar – except here the algorithms are analyzing the manufacturing floor equipment and for the above example, would predict that the drill bit in the drill press needs replaced before excessive vibrations cause part failures and a temporary factory disruption.

Smart Factory is very similar to ADAS/ AD development in that both are AIdependent and rely on large amounts of data to power the process of training and continuously refining AI algorithms. Though Smart Factories don't generate data at the magnitude of ADAS/AD, they can still generate petabytes of data when imaging data is collected. Surface-mount chip installation is one example where imaging is used to track precise chip alignment, which directly impacts quality.

So factory data centers are already expected to grow in size. Now add hundreds of thousands of connected vehicles, each on the road streaming data back to the factory across 5G, 24x7 and it's obvious that total data is going to grow. So it's no surprise that the survey indicated that a future-proof data center is also important. No one wants to

Future-proof Smart Factory Infrastructure



D&LLTechnologies

In the future, the Smart Factory will connect the entire lifecycle of a vehicle, from supplier to customers, improving product quality and customer experience.

invest in massive amounts of infrastructure today, and then realize later that it doesn't scale – forcing a fork-lift upgrade a few years later. This is why the industry is looking for an infrastructure architecture that is futureproof - that can adapt and grow with the data.

The good news is that there are solutions available that are architected for precisely this sort of situation. Dell's Autonomous Drive Ecosystem, for example, is used by our ADAS/AD development customers. These customers already see exponential growth of PBs of data, and through experience, know that a well-architected infrastructure is more than simply storage at scale. The future architecture must deliver consistent, high performance to feed hundreds of GPUs and thousands of CPUs concurrently for algorithm development and validation - even as their ADAS/AD infrastructure scales out over the years. The same infrastructure must include hardware and software that both enables data storage and management. Sensor data, for example, must be indexed - it must be searchable by Data Scientists. Such an AI-centric infrastructure architecture is easily adaptable to the future Smart Factory, which itself is AI-centric.

It is worth noting that though infrastructure capable of capturing and maintaining data for AI development is essential, it is useless if your Data Scientists do not have the tools to use it. This was reflected in the same Ward's survey, which noted that Data Scientists spend far too much time preparing data for AI development vs. using data for AI development. This was one reason why Dell Technologies introduced an ecosystem of partners that collectively, provide an open software reference architecture for AI development. With the right partners, companies can automate their data management and tool flow orchestration freeing Data Scientists to focus their time on what they do best - AI Algorithm design.

In the future automotive Smart Factory, the focus will be on connectivity, where the Smart Factory itself is going to extend to the customers; enabling predictive quality and predictive maintenance to leverage post-production data. The future Smart Factory will also extend backwards to include suppliers. The supply chain will itself become connected and stay connected for the life of the vehicle.

The Dell Technologies Automotive Hub is updated frequently with new events and content related to ADAS/AD, Smart Factory, and the Dell Autonomous Drive ecosystem. For more information on Dell Technologies solutions for automotive, please visit DellTechnologies.com/ Automotive.



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Rising Deployment in Automotive & Transportation Industries Fuel Demand in Hardware Security Module (HSM) Market

⁄ REVATI MAHAJAN

Transparency Market Research

ccording to a research report by Transparency Market Research, the global hardware security module (HSM) market is anticipated to grow at a stellar CAGR of 11.4 % over the forecast period of 2019 to 2027. It also projects that the global hardware security module (HSM) market will reach the evaluation of US\$ 6,592.5 million at the end of the forecast period in 2027. Rising security concerns pertaining to digital data of various corporations and enterprises around the world is one of the major factors propelling growth in the global hardware security module (HSM) market. However, high cost associated with implementation as well as for upgradation of various hardware security modules may hinder the growth of the global hardware security module (HSM) market in coming years.

USB Tokens & Smart Cards Segments to Witness High Growth Rate in the HSM Market in Near Future

Solutions in the global hardware security module (HSM) market can be defined as pieces of hardware as well as their associated firmware or software placed inside or even attached to a specific hardware in order to serve various cryptographic functionalities. Applications for the product offerings in the global hardware security module market (HSM) include database encryption, secure sockets layer or SSL, PKI or credential management, application level encryption, authentication, document signing,

code signing, and payments processing. Segments in the global hardware security module (HSM) market by product type include remote interface, smart cards, local interface, and USB token. Remote interface segment accounted for the largest share in the global hardware security module (HSM) market in 2019. However, USB tokens as well as smart cards segments are expected to witness rapid growth in the global hardware security module (HSM) market in coming years.

Key industry verticals using the solutions from the global hardware security module (HSM) market industrial government, and are manufacturing, retail and consumer products, transportation, hospitality, BFSI, technology and communication, energy and utility, healthcare and life sciences, and automotive, among others. BFSI segment held the largest share in the global hardware security module (HSM) market in 2019.

However, transportation as well as automotive segments are projected to expand at a stellar rate during the forecast period. Key factor influencing this trend is rising deployment of hardware security modules in both industry verticals.

North America to Dominate the Hardware Security Module (HSM) Market

Major regions operational in the global hardware security module (HSM) market include North America (including Canada, the United States, and rest of the North America), Asia Pacific (including

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China, India, and rest of the Asia Pacific). South America (including Argentina, Brazil, and rest of the South America), Europe (including Germany, the United Kingdom, France, and rest of the Europe), and Middle East and Africa (including South Africa, Gulf Cooperation Council countries, and rest of the Middle East and Africa). Geographically, North America is anticipated to dominate the global hardware security module (HSM) market over the forecast period. Key reasons behind this trend are strong adoption as well as high penetration of various security modules and large presence of established vendors in the region. Furthermore, other regions poised to display significant growth in the global hardware security module (HSM) market over the forecast period include Asia Pacific and Europe.

Players in Hardware Security Module (HSM) Market Engaged in Strategic Partnerships

Some of the most prominent players functioning within the global hardware security module (HSM) market include Utimaco GmbH, Thales e-security, Inc., Ultra Electronics Group, SWIFT, Hewlett Packard Enterprise Development L. P., Futurex, IBM Corporation, Gemalto NV, and ubico. Major vendors and developers in the global hardware security module (HSM) market are focused in enhancement as well as development of more feasible solutions for various end users. Several players in the global hardware security module (HSM) market are also engaging in collaborations and strategic partnerships to expand their consumer base. For example, Atos SE formed a strategic partnership with a company called 'Orange Cyberdefense' in 2019 in order to offer secure mobile terminal communication solutions.

Reference link:

https://www.transparencymarketresearch. com/hardware-security-modules.html

Capitalize on Connected Car Data!

▲ TUSHAR BHAGAT

Uffizio India Pvt. Ltd.

Introduction

Autonomous vehicles or self-driven cars are certainly a few years away from us, but we have connected cars on our roads now-and they have limitless potential. The automotive industry has been the hotbed for innovation for decades, and that has birthed connected vehicles. What makes these connected vehicles unique is that they can communicate with an automotive OEM or a fleet owner's cloud infrastructure via the internet. Meaning they have unlocked the door to inexhaustible vehicular data, which can be accessed over-the-air! Some commentators predict connected cars will create up to 4,000 gigabytes (GB) of data per day-that's over 1,400 terabytes (TB) of data per year. Big data generated by these vehicles provide incredible insights into vehicle health, driver behavior, traffic patterns, and maintenance. Analytical tools can help convert this data into rich information, which can be used by fleet managers to leverage profits.

Connected Car Data

According to a report published by McKinsey, the revenue pool generated by connected car data monetization, at a global scale, might add up to \$450-\$750 Billion by 2030. Connected car data is usually generated by the vehicles' ECUs (Electronic Control Units), CANs (Controller Area Networks), and even infotainment systems. (A modern car may have up to 70 to 100 ECUs!) All this data is available to fleet managers via the cloud infrastructure. So, if a car door is unlocked, or there is some trouble with the vehicle's engine, or if the coolant temperature is higher than expected, or if there is a slight decrease in the vehicle's tire pressure-fleet managers will get to know about it in real-time!

How to make the most of connected car data?

Data without analytics, sadly, has very little use. Granted that a modern connected car provides users with a plethora of accurate and real-time data. But what's next? Raw data needs to be processed so it can be effectively used by apps and services to better the driving experience. Here are few big ideas to get started:

- Data needs to be acquired and stored in a secure and agile cloud environment
- There is a need for standardization so that results are consistent and can be understood universally
- Systems need restructuring to meet the consumer's expectations of privacy and security

 Deploy the right type of analytical tools to facilitate data-driven decisions

Connected car data provides additional insights and can be more pragmatic than the already existing data knowledge. Fleet managers can yield the benefits of telecommunications, telematics, and ITS (Intelligent Transportation System) to understand what's happening on the road and within the car.

Connected Car Data and Fleet Operational Costs

Fleet managers in several industries will benefit from connected car data. Fleet managers can use this data to increase overall safety, security, and vehicle efficiency—all this while lowering fleet operational costs.

Insurance costs

Insurance companies will be the first to know every time a car is in an accident. Video data, vehicle speed before the collision, driver behavior, and other important analytics will be available for review. With CVs, insurance companies will recreate the moments right before the collision and will be able to pinpoint who was at fault. This will be extremely advantageous not only for the policyholder, as data can be useful in exempting faultless drivers. As a result, excellent drivers will be able to reap the benefits of zero liabilities and will not have to suffer from unnecessary premium hikes.

Maintenance Costs

Connected car data enables the predictive maintenance of vehicles. Real-time data regarding the vehicle mileage, hours of service (HoS), ambient temperature, fuel levels, RPM, and more will always be available at the user's fingertips. Data obtained from sensors is used to identify maintenance issues before they become worse and completely shut down the entire vehicle. This data helps the fleet managers design suitable maintenance schedules and can keep out expensive corrective or post-breakdown repairs.

Fuel Costs

It is no surprise that fuel consumption and fleet mileage are directly related to driving behavior. Better drivers produce better fuel economies! Connected cars allow fleet managers as well as drivers to monitor these parameters. Fleet managers can access details about acceleration, deceleration, idling times, harsh-braking, average speeds, total driving miles, and more. One can read this information in conjunction with peaks and dips in fuel efficiency—and understand how these factors influence fuel usage. Optimize fuel consumption with connected car data and see your fuel costs plummet to the ground.

Conclusion

The forces of connected car technology and telematics have combined to create opportunities for improvement. Fleet managers can leverage real-time data to attune their current practices. Using analytical information smartly, vehicle managers can maximize their fleet's performance. Truly, connected cars have caused an explosion of data, and it is time we learn to monetize it!

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NEWS HEADLINES

- Upstream Security recognized by Frost & Sullivan for its contribution to the automobile industry
- Authenticom launches
 ContactVia helping car dealers
 enhance consumer relationships
- Discount Tire and Motorq offer connected fleet insights platform
- Upstream Security raises \$62M in Series C financing round
- HAAS Alert raises \$5 million to expand cellular V2X network nationwide
- Strategy Analytics: Solutions like Cybellum help meet the cyber security challenges facing the complex automotive supply chain

Lynk & Co has launched "always on and connected" car



Lynk & Co has launched its "always connected" car. The vehicle uses the internet of things (IoT) network and infrastructure from Orange Business Services to deliver connected services to drivers. In-car technology has been designed to be as easy to use as possible with no hidden extras. All cars have large configurable touch screens and telematics that are always connected to the internet and the car's cloud. Orange has worked closely with Lynk & Co and its sister company CEVT, an innovation, and technology company within Geely Holding, to build a solution that enables the Lynk & Co business and operations model. Each car will benefit from Orange's IoT Managed Global Connectivity solution, which provides secure and seamless integration between connected car services, internet access and online tracking. This allows it to provide downloadable billing reports and predictive maintenance updates.

Look out, pothole! Mercedes-Benz further expands Car-to-X communication



Large potholes are a safety hazard because if drivers do not recognize them in time, they can no longer take evasive action or reduce their speed. Mercedes-Benz is now increasing safety with additional Car-to-X functions. New C-Class and S-Class models as well as the EQS can detect potholes or speed bumps. If the chassis control unit registers such an event, and the "Car-to-X Communication" service

is activated, the information is sent to the Mercedes-Benz Cloud in real-time via the mobile phone network, together with positional data. Mercedes-Benz passenger cars in the vicinity are informed, and the events are displayed with icons on the navigation map. About ten seconds before the relevant lane section is reached, an audible warning is given and the icon is visually highlighted. Newgeneration C-Class and S-Class models and the EQS can detect potholes when a certain threshold value is reached during sudden suspension compression and rebound, and this also occurs at the rear axle after the front axle with a certain time delay. A similar algorithm is used to detect speed bumps: in this case, detection is via the compression and rebound sequence.

BlackBerry IVY to provide secure vehicle-based payments

BlackBerry Limited announced a new solution to deliver highly secure vehiclebased payment capability to unlock a connected car payments market that is projected to reach over €530 billion by 2030. This vehicle-based payment solution will create new opportunities for automakers to offer a vast array of payment services and develop previously untapped revenue streams. The solution will create a "digital fingerprint" for the vehicle, allowing it to securely connect to a bank's payment network, validate, and autonomously pay for a wide range of frequently used services, including fuel, tolls, parking, insurance, maintenance, and other "wallet" capabilities. BlackBerry is delivering this solution through a partnership with California-based financial technology solution provider Car IQ which leverages BlackBerry IVY's in-vehicle edge computing and direct access to vehicle sensors.

Smart Driving Lab launches Smart Driving Connected Car platformcapability to the car's infotainment system

The Smart Driving Laboratory has launched an automated system for updating and individualizing the Connected Car cartographic resources of the Smart Driving Platform. The maps will be updated on a weekly basis, primarily where customers 'vehicles are operating taking into account their wishes and tasks. An important part of updating is the processing of direct feedback such as requests for certain changes or clarifications received from private and corporate users of the Smart Driving platform. According to



the calculations of the specialists of the "Laboratory", on-demand updates allow customers to get the local changes they are interested in faster by 4-5 weeks on average. A higher frequency and more accurate targeting of updates will increase the efficiency of the Connected Car platform of the "Laboratory", improving the quality of services. In particular, this will affect the increase in the speed of updating geofences – virtual areas on the map created for automation and security purposes at the request of corporate and private clients. When crossing such borders, the owner of the vehicle receives a signal. In the Atlas fleet management system, this can be used to implement various automation, management and analytics scenarios, and private clients usually use this opportunity to create a "virtual garage" – a zone whose entry and exit is monitored around the clock.

Wallbox unveils Hypernova ultrafast public charger that will fully charge an electric vehicle in under 15 minutes

Wallbox unveiled Hypernova, the company's fastest and most sophisticated public charging station yet, at the IAA MOBILITY 2021 show in Munich. Hypernova can deliver up to 350 kiloWatts (kW) that allows it to fully charge an electric car in the time it takes to make a rest stop and is substantially faster than most other ultrafast chargers on the market. It also



employs advanced software that allows it to optimize available power and adapt to the number of EVs connected, making it ideal for public charging along highways and transcontinental road networks. Hypernova's integrated cable management system ensures easy handling and stores the cables inside the dispenser unit, maximizing durability and helping to protect and keep the installation clean. It also offers several authentication and payment options, including RFID, screen QR Code and credit card reader with worldwide acceptance. Production and deliveries of Hypernova will initiate in late 2022.

Nexteer expands high-output capabilities for all underhood electric power steering systems

Nexteer Automotive expands the output capabilities of its pinion electric power steering (EPS) systems to meet the needs of heavier electric vehicles in segments B through D. Nexteer's new high-output options for Single Pinon-Assist EPS (SPEPS) and Dual Pinion-Assist EPS (DPEPS) join Nexteer's previously announced High-Out Rack-



Assist EPS (REPS) to provide high-output options for all types of underhood EPS systems. The Company's new high-output options for DPEPS and SPEPS systems increase the steering capability by 12 to 20% – up to 14.5 kilonewtons (kN) for DPEPS and up to 12.5kN for SPEPS. These high-output solutions benefit OEM customers by enabling them to steer heavier EV loads in B through D segment vehicles without the need to move up to more premium EPS technologies that are traditionally employed for larger segment vehicles.

Beyond the Chip Shortage: Automotive industry should prepare as scarcity of minerals looms for EV batteries

To help confront this newest sourcing challenge and avoid a repeat of the impacts from the current chip shortage, Vertaeon is offering its innovative, cloud-based analytics tools to enable supply chain leaders to develop comprehensive risk assessments and mitigation processes—now. Vertaeon combines its proprietary and highly economical SaaS platform with deep experience in the automotive manufacturing industry to provide the business intelligence companies need to pivot through such tumultuous times. Concentrations of key minerals for battery elements in China, South Korea and Japan can be risk drivers in terms of geopolitical tensions, natural disasters and higher shipping costs. The already identified upstream negative environmental impact of mineral mining can also create future challenges, for example exacerbating the drain on the water supply in South America. Such risk factors combined with the shift toward the next generation in battery technology could trigger a rapid change in the regulationand ultimately in the production of EVs, favoring hydrogen vehicles instead, for instance. From a raw-material perspective, challenges include availability, cost, location concentration and profitability. Some of the key raw material issues.

NEWS HEADLINES

- Hyzon Motors to provide hydrogen-powered fuel cell heavy truck for commercial vehicle trial with Total Transportation Services in California
- Bosch supplies factory equipment for battery production
- Eaton develops suite of 48-Volt technologies to help vehicle manufacturers meet new global emission regulations
- Davinci Dynamics is about to launch the DC100 model, a powerful new line of electric motorcycles
- Volta Charging launches PredictEV product to power datadriven EV charging planning for the energy industry
- Electronics expertise of Vitesco Technologies is now available for fuel cell applications
- ENGIE North America builds upon electric mobility solution with new transit and K-12 fleet customers
- Guidehouse Insights names Gogoro as the leading supplier in the light electric vehicle battery swapping industry
- Resumption of services of the Toyota e-Palette vehicle and additional safety measures at the Tokyo 2020 Paralympic Athletes' Village
- Penske Truck Leasing pilots
 Stem Inc.'s Athena® Software to support EV charging
- Tritium and Electric Era collaborate on energy storage system for EV chargers
- Nissan and Waseda University in Japan testing jointly developed recycling process for electrified vehicle motors
- Juice Technology obtains international certification for portable EV charging cybersecurity
- Elio Motors announces its intent to produce an electric version of its popular vehicle
- Frost & Sullivan awards REE Automotive 2021 Global EV Platform
- Leak testing critically important for EV and fuel-cell vehicles
- Nexteer expands high-output capabilities for all underhood electric power steering systems

NEWS HEADLINES

- Foresight signs MOU for cooperation with global Chinese vehicle manufacturer Chery
- Geely Holding Group and Renault Group to sign MOU on joint cooperation in China and South Korean Markets
- Arrival co-developing its automotive open data platform with Microsoft
- Horizon Robotics to co-develop smart driving solutions with Nullmax
- Innoviz Technologies and Whale Dynamic to collaborate on next-generation L4 LiDAR-Driven Autonomous Driving platform
- Kanglim and Ridecell partner to create IoT automation and mobility platform
- Volta Charging and Place Exchange announce strategic partnership
- Voltaiq partners with Veniam to provide a global solution for transferring electrified vehicle battery data
- ParkMobile announces agreement with Vanderbilt University
- Cox Automotive Mobility and Arizona's Institute of Automated Mobility work to advance automated vehicle development and safety
- SoloGolf partners with RELiON Battery to utilize lithium batteries in the SoloCart
- Nuvve and Blue Bird announce plans to expand partnership and utilize Levo's fleetas-a-service leasing model to make electric school buses more affordable
- ChargePoint acquires ViriCiti to accelerate fleet electrification
- Continental and Varta are developing a particularly powerful battery for electric two-wheelers
- Bridgestone partners with Einride to create cleaner, safer, low-carbon fleet mobility
- Ansys and IPG Automotive accelerate autonomous vehicle path-to-market for automobile manufacturers
- Micro Bird acquires controlling interest in Ecotuned, electric vehicle drivetrain integrator
- Proterra and LG Energy Solution to partner on a long-term supply agreement for EV battery cells
- FedEx Ground operators order 120 Xos trucks for 2021 and 2022 delivery
- Combining Faurecia and Hella to create a global leader in fast-growing automotive technologies, fully aligned with industry megatrends
- Bird integration with Google Maps accelerates access to sustainable, electric transportation
- Creative Bus Sales acquires Alliance Bus Group
- Perrone Robotics and Tropos Technologies announce partnership to develop fully

Nexar partners with the Black Car Fund to protect New York rideshare drivers with thousands of cameras in cars

Nexar announced a partnership with the Black Car Fund (BCF), New York State's workers' compensation provider for independent contractor black car operators, including rideshare drivers. The partnership will place cameras in thousands of cars to protect their members in the case of an accident or assault. Nexar's AI-powered dual-camera dash cams detect collisions, immediately notify BCF, and then send a detailed reenactment of the crash within minutes, allowing BCF to begin processing their workers' comp claim. Recent high-profile assaults on drivers and the debate surrounding their employment status have underscored the challenges faced by Uber and Lyft drivers. When there is an event with competing claims, a video recording of the incident can make all the difference.

Iteris and Wejo partner to deliver enhanced applications of connected vehicle data

Iteris, Inc. and Wejo have entered into an agreement to deliver enhanced connected vehicle data content to Iteris' public-sector and commercial customers throughout North America. Under the terms of the agreement, Iteris will join Wejo's partner program to provide new and existing customers with real-time movement data from more than 11 million connected vehicles in North America. In addition, Wejo will join Iteris' ecosystem of mobility intelligence providers, empowering public-sector and commercial enterprise customers in the transportation space nationwide with Wejo's connected vehicle data. Connected vehicle data characteristics will combine with additional layers of real-time traffic and weather information, incremental predictive inputs and artificial-intelligence capabilities from Iteris' ClearMobility[™] Cloud. The combination, traffic mitigation, road network management and studying road utilization.

Green Steel for Mercedes-Benz: Partnership with SSAB

Mercedes-Benz is taking another important step on the way to a green steel supply chain. To this end, the company has launched a partnership with the Swedish steel manufacturer SSAB for CO2 free steel. Together, the partners are already setting the course to introduce green steel into the vehicles as quickly as possible: The first prototype parts for body shells made of CO2 free steel are already being planned for next year. A pilot plant for fossil-free steel is already operating. From 2026, SSAB aims to supply the market with fossil-free steel on an industrial scale. By 2039 at the latest, the Mercedes-Benz new passenger car fleet will become CO2 neutral along the entire value chain, including the supplier network. Together with all of its steel suppliers, the company pursues the goal of a green steel supply chain. In doing so, Mercedes-Benz is deliberately focusing on avoiding and reducing CO2 emissions instead of compensation.

Xiaomi acquires autonomous driving firm Deepmotion

Xiaomi had acquired Deepmotion for around \$77.37 million to "enhance the technological competitiveness" of its electric vehicle business. In March, Xiaomi announced plans to launch an electric vehicle business and invest \$10 billion over the next 10 years. The acquisition could help bring autonomous driving features to the cars Xiaomi eventually produces, a feature being developed by many automakers for nextgeneration electric vehicles. The company announced the Deepmotion acquisition after reporting financial results for the second quarter which saw revenue surge 64% year-on-year to 87.8 billion yuan (\$13.5 billion). Xiaomi said total revenue and adjusted net profit hit record highs in the quarter.

Toyota debuts mobile Collision Assistance service

Toyota worked with CCC Intelligent Solutions Inc. (CCC) to develop Collision Assistance. The CCC mobile technology combines guided accident documentation and access to claims and management services to assist drivers following a collision. Toyota transmits accident and vehicle telematics data to CCC to initiate the program. Collision Assistance is designed to let the customer choose how they'd like to handle the claim and repair processes, providing convenience and safety while also ensuring owners are informed about the process through completion. Collision Assistance is an extension of the Safety Connect suite of features available to Toyota and Lexus owners who have an active subscription or are within the trial period of select 2018 model year or newer Toyota and Lexus



vehicles The Collision Assistance Feature is made available to Toyota and Lexus owners through the Owners App. Toyota and Lexus Owners App downloads are available for iPhone® or Android™ smartphones.

Veoneer products enable level 3 hands-off self-driving tech



Veoneer, Inc. is equipped to offer level 3 hands-off self-driving tech. During the fall, Mercedes-Benz's DRIVE PILOT system is being introduced with a greater performance from Veoneer's Stereo Vision and Radar products to support level 3 selfdriving. Veoneer's 4th generation stereo vision camera system is comprised of fully integrated hardware and perception software to master the challenges of highly automated driving. The stereo vision camera system uses Convolutional Neural

Network (CNN) technology in combination with 3D stereo for accurate classification and positioning of objects in front of the vehicle. Functions enabled by the stereo camera are lane detection, free space, small obstacle detection, and 3D objects classification. Additionally, the stereo camera is contributing to the detection of emergency vehicles and construction warning trailers to support level 3 driving. Veoneer's 77GHz radar, generation 1.2 including corner radars, offer high range resolution and angular accuracy. The radar has been adapted since launch to additionally support the HAF-Level 3 solution. Veoneer Radars are an important component contributing to the vehicles spatial awareness, which is increasingly important for the HAF-Level 3 use cases. Built upon novel algorithms, the resulting performance provides superior angular resolution allowing the Drive Pilot system to discern pedestrians, and vehicles. Mercedes-Benz DRIVE PILOT system is a prime example of collaborative driving; as a level 3 system, the car can take control under certain conditions, but the driver needs to be ready to retake the wheel when needed within 10 seconds.

Baidu unveils the first robocar at Baidu World 2021

Baidu unveiled its first robocar at Baidu World 2021, its annual flagship technology conference. The robocar has no steering wheel as the tech giant envisions that future vehicles will be more like robots. The robocar is equipped with L5 autonomous driving capabilities, which is claimed to be safer than human drivers. With multi-mode interaction, such as voice and face recognition ability, the vehicle can analyze customers' potential needs to offer relevant services. Besides, the robocar can also self-learn many things and continue to upgrade, making it capable to serve various scenarios. The vehicle looks futuristic with a falcon-wing door, glass roof and exterior sensors integrated together. Inside the vehicle, there is no steering wheel, pedals, but it is mounted with such intelligent devices as a large screen, intelligent console. By the end of



June, Baidu Apollo L4 autonomous driving vehicles have run 7.5 million test miles, up 152% year over year. Apollo has received 278 autonomous driving permits and has over 2900 patents.

NEWS HEADLINES

- Global Connected Truck Telematics outlook report 2021: Video Telematics, lastmile delivery, and convergence will be the key aspects that will nurture growth
- Global Automotive Connectors Markets 2021-2025
- Advanced Driver Assistance System (ADAS) Sensors market size to surpass value of USD 25,000 million by 2026: Facts & Factors
- Autonomous Truck Market Size Worth \$2.14 Billion By 2027 | CAGR: 12.8%
- Global Autonomous Vehicle Vision and Navigation System Market (2020 to 2030) – Featuring Aptiv, Autoliv and Garmin Among Others
- North American Medium and Heavy Duty commercial vehicles replacement filters aftermarket: Electric vehicles, connected solutions and customer-focused service solutions are key growth opportunities
- EV Charging Infrastructure in Europe and North America: Total installed base of charging pointers in Europe forecast to reach 9.7 million by 2025 – ResearchAndMarkets. com
- Guidehouse Insights report underscores the need for increased safety and reliability with the uptake in global EV adoption

Cybellum and the Automotive Security Research Group (ASRG) survey finds that the automotive industry isn't ready for upcoming cybersecurity regulations

Cybellum and The Automotive Security Research Group (ASRG) released a report outlining the results of a joint survey conducted amongst top global OEMs and Tier-1-2 suppliers, to assess how the automotive industry currently handles vulnerability management. According to the report, automotive players are not ready for the upcoming regulation and are lagging behind IT security practices in their organization. Some of the key findings include:

- 63% of respondents haven't automated any aspect of their vulnerability management process
- 65% consider timely assessment of new vulnerabilities to be a growing challenge
- 43% note manual processes

security assessments while 42% cite lack of coordination along the supply chain as a hurdle for timely assessments

as the reason behind lengthy

- 74% prioritize vulnerability management solutions that automate post-production continuous monitoring
- Only 6% are fully ready for the upcoming UNECE WP.29 R155 regulation

The Cybellum/ASRG report covers a wide range of issues relevant to automotive cybersecurity and vulnerability management ranging from current levels of preparedness for the regulations to the average time to fix vulnerabilities all the way to vulnerability management use cases.

CCC releases research on driver sentiment on ADAS features included in newer vehicles

CCC Intelligent Solutions Inc. announces the release of its 2021 Crash Course Midyear Report. This edition of Crash Course examines how permanent changes to consumer expectations and the desire for personalized experiences continue to accelerate the deployment of AI, IoT, and mobile technology in the auto claim and repair process. The report also explores changing driving behavior and features research on consumer attitudes towards Advanced Driver Assistance Systems (ADAS) technology in newer vehicles. Original research from CCC on ADAS technology is also included in the report and reveals consumers have a positive if the complicated relationship with the technology. The research found more than 84 percent of drivers believe ADAS features promote safe driving. Despite this belief, more than 54 percent of those who own a vehicle with ADAS believe that certain features can increase the chance of an accident and 70 percent have actually turned ADAS features off.

Nauto releases new white paper titled, "Measure & Reduce Risk in Fleets"

Nauto® released a new white paper, "Measure & Reduce Risk in Fleets," detailing the data-backed analyses that connect the reduction in risky driving behaviors to fewer collisions and loss reductions. The paper details how its advanced AI fleet safety platform uses real-time data to help improve driver performance and help reduce collisions by as much as 80%, transforming the way organizations approach to risk, safety, and operations.

The in-depth white paper profiles two customer stories; the first features a major global package shipping fleet that experienced an 82% improvement in collision reduction and an 84% improvement in loss reduction; the second features a large last mile delivery fleet that experienced a 92% reduction in distractions without any direct management involvement.

Risky behavior can be mitigated in real-time, to help prevent collisions. Nauto tracks analyze and detect risk both inside and outside the vehicle in real-time, providing preventative warnings that give drivers critical extra time in which to respond. These warnings take advantage of more than 1.3 billion AI-processed driving miles to make them highly accurate, helping to eliminate issues around alert fatigue from false alerts.

Luokung announces eMapgo to lead the development of standards for technical

Luokuna Technology Corp. announced that the Technical Requirements of Automated Valet Parking Map and Localization, standard project sponsored а by Luokung's operating affiliate eMapgo Technology Co., Ltd. has passed the review of the China Society of Automotive Engineers and entered the development phase.

Automated Valet Parking is known as the L4 autonomous driving technology that enables vehicles to park themselves. The development of the AVP Requirements will further improve and refine the AVP standards and establish a uniform set of safety and technical requirements in China, providing a clear foundation for future AVP products. Development of the AVP Requirements will be led by EMG, together with representatives of nearly 60 industries including relevant map vendors, positioning service providers, software and hardware vendors in the field autonomous of drivina. car manufacturers. communication operators, and parking lot operators.

Lytx launches the Lytx Integration Network



Video telematics company Lytx® Inc. unveiled its Lytx Integration Network, an ecosystem of partners that provides clients with access to fleet operations solutions and shared data. Lytx said those partners can leverage their hardware and telematics data solutions to offer customers a customizable platform. The Lytx Integration Network offers a coordinated, smooth, and coherent integration of services so that clients can get more out of their fleet investments. Specifically, data, video, and insights from Lytx can provide a more complete picture, which powers more comprehensive fleet management. The Lytx Integration Network aggregates

tools and data from more than 20 partners that offer:

- Tracking;
- Dispatching and routing;
- Maintenance and repairs;
- Transportation management;
- Insurance automation & mitigation;
- Safety and risk management;
- Human resources & compliance.

Layered together, these turnkey integrations across these critical areas give fleets everything they need to quickly take action, improve operational efficiency and safety.

Uhnder leverages proteanTecs' Universal Chip Telemetry for deep-data monitoring



ProteanTecs announced that Uhnder has selected the company's Universal Chip Telemetry (UCT) monitoring solution to provide actionable insights and predictive data about the performance, quality, and reliability of its radar-on-chip, through all product development and usage cycles. proteanTecs provides deep data based on Universal Chip Telemetry (UCT), introducing visibility from within. Their cloud-based analytics platform applies machine learning algorithms to measurements extracted from on-chip monitors, strategically placed during design to provide a high coverage, high resolution picture of the system's health and performance throughout its lifecycle. Chip manufacturers and Tier1s can reduce DPPM (defect parts per million), optimize system performance, and manage reliability margins. Once deployed in the field, OEMs can perform data-driven OTA updates, ECU fault diagnostics, and predictive maintenance, with alerts on faults before failures.

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 Ram lineup with new features, content and capability for truck and fleet owners
- Luokung announces eMapGo to provide autonomous driving data services for Zenseact

JBL® ignites the car aftermarket audio experience with the launch of CLUB 605 CSQ and Celebrity 100 in India

HARMAN has expanded its aftermarket car offering with the launch of JBL CLUB 605 CSQ – car speaker system and JBL Celebrity 100 – Bluetooth enabled Car Multimedia player for the optimum quality sound and convenient audio experience for customer journeys. The JBL Club 605 CSQ is a 160mm 2- way SQ Component speaker system engineered to provide a superior audio experience for car journeys.

Technical specifications of JBL Club 605 CSQ



- Description: 6 1/2" (160mm) Two
 Way SQ Coaxial Speaker
- Power Handling: 285W Peak, 95W RMS
- Sensitivity (@2.83V): 93dB
- Frequency Response: 48Hz to 21kHz
- Nominal Impedance: 3 Ohms.
- Grills Included

JBL Celebrity 100 Head unit is Single-Din, Mechless Car MP3 player with Detachable face, perfect to fit JBL speaker products as a bundled audio system. Multiple playback options like Bluetooth, USB input, Auxiliary input, SD Card, and FM Radio allows customers to choose freely for their favourite listening source.

Technical specifications of JBL Celebrity 100



- 1 Din Mechless Car MP3 player with Detachable face and Without Screen
- Multiple Playback Sources: Bluetooth, USB, AUX in, SD Card, FM Radio
- Wireless Bluetooth Streaming
- 18 Preset FM Stations
- 4 x 50 Watts Maximum Power Output
- ISO Connector (wiring harness included)

Ashok Leyland and CCBSS launch electric bus service in Chandigarh

Ashok Leyland and Chandigarh City Bus Services Society CCBSS launched the first electric bus service in the city. The flag-off was done by the Governor of Chandigarh Union Territory, VP Singh Badnore. The company has bagged an order for 40 electric buses under the FAME-II scheme. They will provide service within the route plans set by the Chandigarh Transport Undertaking (CTU). On average, this fleet of 40 buses will save approximately 6.5 lakh litres of



fuel while reducing carbon emissions to the tune of 1700 tonnes, annually. Ashok Leyland will operate and maintain the fleet end to end and the charging infrastructure will be developed across four locations in the Tri-city. These charging stations will be developed by Ashok Leyland's electric vehicle arm, Switch Mobility, in partnership with Siemens.

Tata Motors delivers Nexon EV to the Municipal Corporation of Greater Mumbai (MCGM)

Tata Motors has proudly presented India's highest-selling electric vehicle, the Nexon EV, to the Municipal Corporation of Greater Mumbai or MCGM, as part of the company's tender agreement with EESL. In an event held, the Nexon EV was handed over to MCGM by the Honorary Cabinet Minister of Tourism and Environment for the Government of Maharashtra – Mr. Aditya Thackeray, in the presence of Mr. Iqbal Singh Chahal – Commissioner, MCGM, Mr. Sanjay Bansode – Cabinet Minister, Government of Maharashtra and other government dignitaries in Mumbai.

With the initiation of the Maharashtra EV Policy, the state is all set to begin a green revolution and Tata Motors is excited to be a part of this journey. The Nexon EV is an aspirational SUV equipped with a powerful and high-efficiency AC motor with a 30.2 kWh lithiumion battery. It promises an easy and effortless drive on a single charge with zero emissions, making it an excellent addition to your daily commute. The Nexon EV combines remarkable design, practicality, technology, and a host of advanced features like class-leading safety features and the convenience of charging with its home-installed charging equipment.

Since its launch in January 2020, Nexon EV has received widespread praise and is currently the largestselling electric SUV in India.

Spireon expands to India, appoints technology veteran to Head Business Operations

Spireon announced the launch of its subsidiary, Spireon Telematics India Pvt. Ltd. Located in India's Silicon Valley, Bengaluru, Spireon Telematics India will be led by technology veteran, Pranab Das, who will oversee a growing team that currently comprises 40 engineers. The launch of Spireon Telematics India follows the company's five-year partnership with a managed service provider in the country to tap into world-class engineering resources. Largely focused on software development, the team grew from seven to more than 40 engineers. announcement signals the transition of all those engineers to Spireon employees. Vice President and Head of India Engineering, Das is a seasoned leader with over two decades of experience in Industrial IoT, Enterprise & Mobile Applications, Embedded Systems, Wearables and Test Automation. He has worked with leading vehicle telematics organizations where he was instrumental in successfully setting up large offshore engineering centers in India and building high performance teams.



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