MORRIS GARAGES

CAR AS A PLATFORM

EVOLUTION OF CONNECTED CARS

Are cars the next smartphone on wheels

JAN 2022

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FOREWORD – MG MOTOR

RAJEEV CHABA
President and Managing Director
MG Motor India

Technology and innovation are leading the connected car space in the automobile industry. Current trend focuses on digital transformation where vehicles are becoming an ecosystem of on demand, in-car services, and not just mobility solutions.

Cars of the future would not be seen just as product but as a platform. This creates an avenue for a lifetime of services and helps to provide key differentiation to the customers. Opening opportunities for entrepreneurs and developers to create new solutions and business models of ownership and experience.

At MG Motor, we are working with leading technology partners and start-ups to create this ecosystem and evolve Car As A Platform, to provide innovative services, in line with fast changing requirements of new age customers. We announced the CAAP vision in August 2021, with the launch of MG Astor, where we partnered with Jio, MapmyIndia, KoineArth, Park+ and many other partners to introduce multiple industry-first features in the car.

Our parent company SAIC has also made significant investments in connected mobility and is leading from the front to create the leading platform in the auto industry. The platform allows software developers to code and release car-based applications in an app store, which the car owners can download and install in their vehicles.

The journey of connected vehicles has only just begun and the host of services on offer would expand rapidly over time with newer applications, advent of 5G, more points of interface with cities and the fast-emerging ecosystem of innovators.

At MG, Innovation is one of the key pillars and it is our constant endeavour to engage with start-ups to drive innovation and build this ecosystem. We have an annual flagship innovation platform MG Developer Program and Grant, which is aimed at encouraging Indian innovators and developers to build futuristic mobility applications and experiences. The program has generated interest from over 500 start-ups over the last two seasons and we are actively working with around 20 of them on various projects. Going forward, we hope to partner with more to build this ecosystem together.

EXECUTIVE SUMMARY

Automotive trends have been predominantly defined by the engineering capabilities of the OEMs, be it superior driving performance, power, safety or reliability and it was the product that defined the user experience over the last century or more. However, with new age technologies and integrated solutions (Blockchain/AI/IoT) with superior and faster connectivity (access to 5G), the industry is witnessing a megatrend where confluence of connectivity, services and customer experience is going to be a new battle ground.

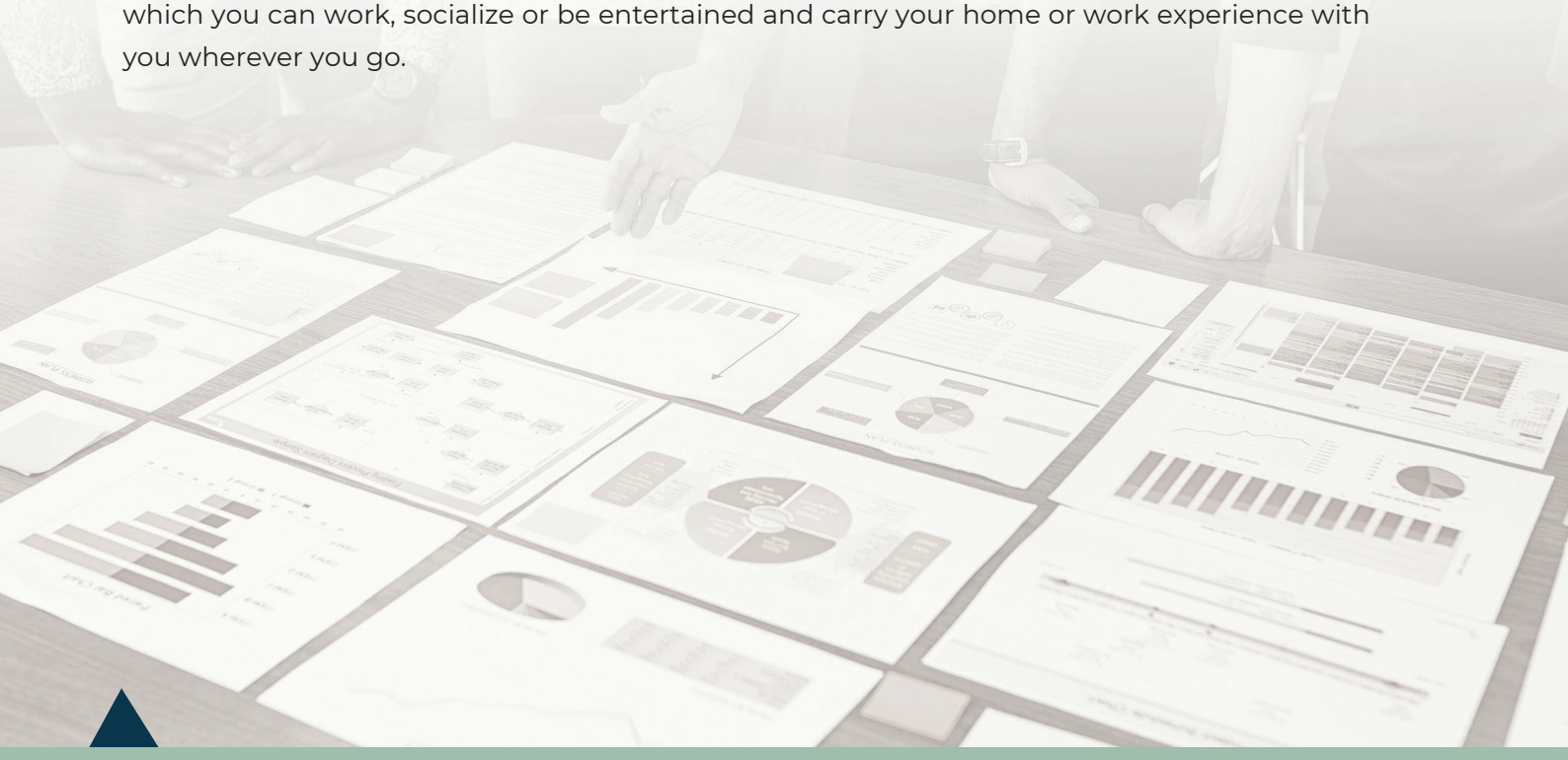
As more cars get connected to internet, more and more opportunities will be created around in-vehicle user-experience (IVX), reshaping how businesses have been driven and brands will need to commit and keep pace with new technology led, data driven customer centric innovation to remain relevant.

Connected cars are going to evolve into an ecosystem of new applications, customised offerings, freemium services creating avenues for new business models and opportunities of data monetization.

The immense volume of data generated will also need protection under privacy laws and regulatory frameworks to safeguards customers privacy. Cyber security will be another critical factor which will determine the customer acceptance in this space.

The new ecosystem will not only be limited to the existing and established OEMs but will expand and get extended with participation from new leading tech companies, start-ups, service providers etc to claim larger share in the automotive pie.

Following the footsteps of how smartphones became PC in the pocket over the last decade, it will not be surprising to see that your next car is going to be like a smart device on wheels with which you can work, socialize or be entertained and carry your home or work experience with you wherever you go.



INTRODUCTION

YOUR NEXT CAR COULD BE MORE LIKE YOUR SMARTPHONE!

Over the past few years, Smartphones have attained an indispensable position in our daily lives, from the moment when Apple's iPhone first appeared. This success has been due to their multiple functionalities be it calling, access to internet, entertainment or networking all integrated into a single platform.

Despite arriving on the scene relatively recently, they are now the backbone of majority of our computing experiences and have made so many companies/products obsolete within years of their existence and added many new.

With connected car and integrated technologies, the automotive industry is also witnessing a paradigm shift in its core wherein the vehicles are now becoming an ecosystem of on-demand, in-car services rather than a mobility asset.

The services cover a gamut of offerings including e-wallet and payments, entertainment, utility, travel, gaming, security, insurance, parking, data, repair services, food delivery and more. Each service to be accessible from within the car and to add to further conveniences for the customer.

The eventual endpoint will allow customers to choose their specific set of services and help them personalise their purchase journey as per individual preferences. New business models are going to emerge and transform how vehicle ownership and mobility is going to be perceived.

CAR AS A PLATFORM

Car As A Platform or CAAP is going to redefine the future of mobility. We are now entering into the age where data defines user experience and software defines vehicles.

One of the many predictions about the automotive industry in 2030 states that software will account for 90 percent of innovations in the vehicle and the lines of code will be hundredfold what they are today.[1]

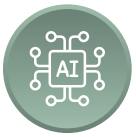
When people think of the connected car, they think of a car that is connected to the internet. However, in today's time the car itself has become a connected platform that connects to the cloud either through the driver/user's mobile network or through the SIM embedded inside the car and initiates multiple protocols which communicate with each other.[2]

A car is one of the most important places where you stay or spend a significant amount of time, after your home and office. OEMs are moving from being a hardware provider to being a hardware, software, and experience provider. This is enabled by high levels of connectivity in the car. Access to 5G will enhance communication of the vehicle with cloud-based platforms. Connected vehicles will be able to share information on a continuous basis with various interfaces in its environment (v2x) and across other business platforms who will create new markets and ecosystems for vehicle data.

KEY DRIVERS

The concept of Car As A Platform introduces software as an enabler with a host of service partners in the car. SIM connectivity and IoT solutions enable car users to access real-time connectivity, infotainment, and telematics. It creates digital ecosystems where suppliers can directly connect with end consumers and can create a lot of new revenue streams in the future.

In terms of technologies, Artificial intelligence (AI), blockchain, 5G, IoT and vehicle data are going to be the key drivers which will enable more customized services that customers value along with cybersecurity which will determine customer acceptance.[3]



Artificial intelligence (AI)

AI applications in vehicles will expand as faster connectivity, smart sensors, radars and cameras, high processing power and advanced in-car systems transform human-to-vehicle interactions and make vehicles truly smart and connected. AI-enabled driver experience and mobility services will create maximum future value. To realize AI's full potential, companies should explore and create avenues on how to monetize the resultant data.

Blockchain

Blockchain will be vital for many connected vehicles use cases because it provides decentralized storage of data, enhanced data security and reduces the risk of data manipulation.

This will make in-car payments safer, increase visibility of automotive supply chain, and reduce counterfeit automotive parts thereby building a more credible value chain.

In addition, in context of consumer experience, it will help in reshaping car resale by creating a "Digital passport" - a tamperproof record of vehicle usage and driving patterns that will add credibility and bring trust in used vehicles. Smart contracts will facilitate secure direct transactions to enhance car sharing experience or ease the transfer of ownership at time of resale.[4]

It can also be used to offer customized Usage-based Insurance (UBI) based on actual driver behaviour rather than driving history. New telematics add-on services can provide insurance companies with driver location, drive duration, acceleration and braking behaviours, vehicle speed, cornering behavior, and other information.

5G Communication

5G is of major importance to the automotive industry – and particularly to the connected vehicle segment – because of its ability to provide faster connectivity to cloud services, greater reliability and security, lower latency, and network slicing.

5G will make IoT a reality. It will transform the way OEMs design and build their vehicles, how vehicles will operate on roads and how customers will interact with them. This interconnected network of internet-enabled devices already exists. However, its potential is limited by the current speeds of 4G connectivity.[5]

The ultra-fast 5G network will allow these devices to transfer exponentially more information, with download speeds of up to 10 Gbps supporting new bandwidth-hungry applications like ultra-HD videos and support use cases like autonomous vehicles or high precision, wireless robotics. e.g., 5G offers 20 Gbps for downlink and 10 Gbps for uplink vs 1 Gbps for downlink and 500 Mbps for uplink offered by 4G.

5G can also support a very high density of devices (up to millions devices per km^2 vis a vis 100 thousand devices/ km^2 in 4G), supporting the expansion of IoT use cases at unprecedented scale. e.g. The 5G connectivity will improve vehicle to vehicle (v2v) communication and it will help in better relay of information such as traffic/road conditions, reducing accidents on roads, checking speed limits and much more.[6]

Internet of Things (IoT)

The modern cars are fast becoming a sensor-laden mobile IoT device, with enhanced computing power and advanced communication systems devoted to key areas like vehicle location, driver behaviour, engine diagnostics and telematics; the surrounding environment (vehicle-to-everything or V2X communication); and infotainment. All of these systems will increasingly use 5G technology making automotive industry one of the largest sectors for 5G IoT use cases.

Vehicle Data

In addition to providing a unique customer experience, connected cars can simultaneously deliver cost and revenue benefits to stakeholders be it OEMs, suppliers, dealers, insurers, fleets, tech players, and beyond. Data is the next oil and seven of the ten most valuable companies in the world already generate billions in profits from data-based services. These businesses include both new players and established tech companies.

Customers see a tremendous value in connectivity. McKinsey's 2020 survey on CASE – connectivity, autonomous driving, shared mobility and electrification, indicates that about one-third (37 percent) respondents are willing to switch car brands to achieve improvements related to this area. Similarly, around 39 percent of consumers were interested in exploring additional features post purchase of vehicles – a figure that further increases to 47 percent for customers of premium OEMs.[7]

Many stakeholders are also acknowledging the importance of data and have started taking actions. Data received on vehicle health, speed, RPM and driver behavior help insurance companies to offer customized premiums. Having access to real time data about fuel consumption, idle time, CO2 emission and geolocation etc. help city administrations in better and efficient management of city infrastructure. Data on customer preferences help in expansion of the advertising reach by agencies through new touch points both inside and outside cars which are otherwise not available from other sources.

Data Security

As cars become more and more connected, data security becomes the primary challenge for OEMs and other stakeholders. The increased connectivity makes vehicles more susceptible to potentially deadly cyber- attacks on vehicle, driver, and usage information. To address this, the features and applications ensuring data security will help in building customer confidence and will play vital role in the adoption and success of connected vehicles. Blockchain can be used to store and share connected vehicle data securely, helping allay customer concerns about potential cyberattacks

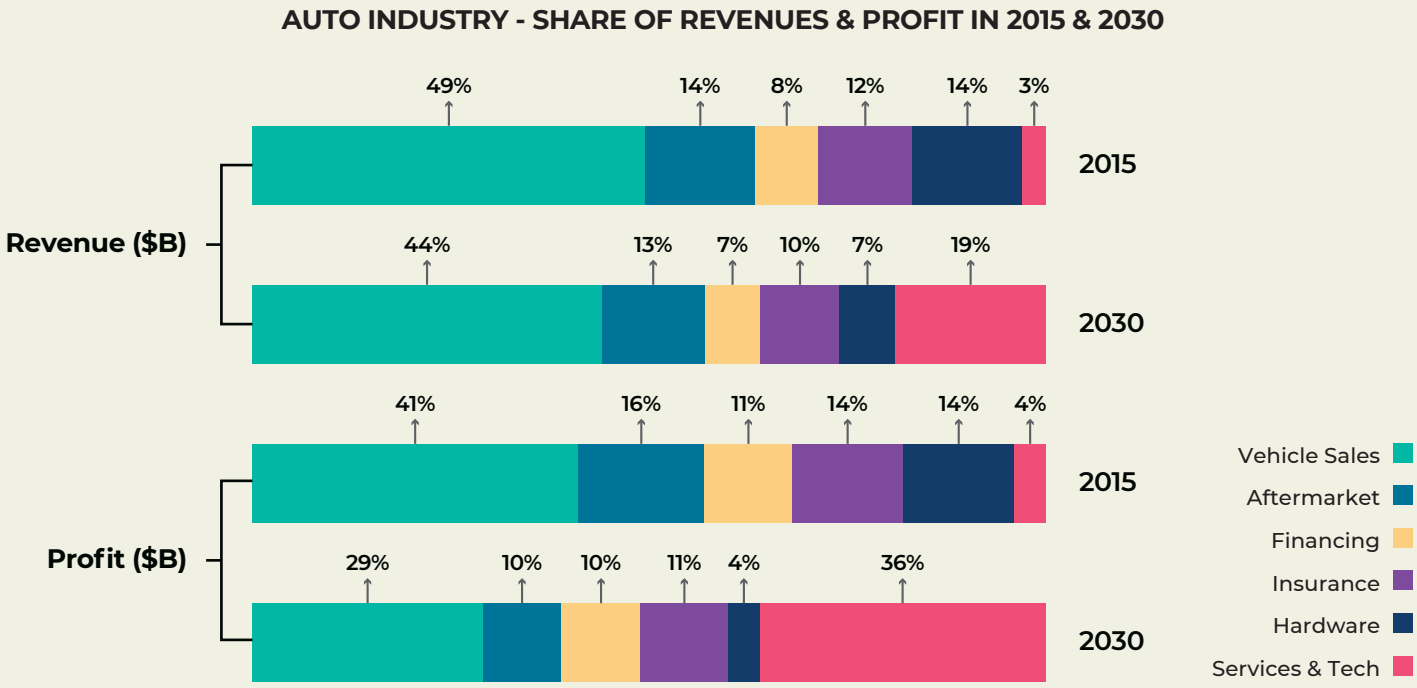
CAR AS A PLATFORM TRENDS

Car connectivity can be classified into three categories: tethered, integrated, or embedded. Tethered refers to connectivity through the smartphone. In integrated connectivity, the car's dashboard screen acts like an extension of the smartphone's screen, such as CarPlay and Android Auto. In embedded systems, a SIM card is embedded within the car's communication module.[8]

- The traditional "Transportation as an Asset" model-in which a person buys, owns, and drives her own car-is shifting to "Transportation as a Service" (TaaS) integrating new ownership models; be it rental transportation (which can help to lease out your own vehicles) or flexible subscription services (to let you swap vehicles as per your choice and requirement)

- We also foresee merging of public and private transportation and a pathway to free transportation in the TaaS pool model (e.g., sharing rides with non-familiar passengers). Corporations might sponsor vehicles to offer free transport to market goods or services to commuters (e.g. Starbucks coffee on wheels).[9] [10]

- Customers will now have more options in hand to choose from, rather than owning a car at higher costs (avg. USD9000 an year to own and maintain, all-in). As the chart below illustrates, Price Waterhouse Coopers projects nearly 20% of industry revenues and 36% of profit will shift from auto sales to services by 2030.[11]



https://www.cbinsights.com/research/transportation-tech-auto-service-trends/

- A seamless digital ecosystem will emerge where customers will expect a smooth digital interface that integrates all services – connectivity, mobility, entertainment, social and business etc

- Apps and applications will become the key differentiators that influence purchase decision rather than the car itself, but the competitive advantages will have shorter cycles and constant innovation will be required to stay relevant as seen in the mobile phone industry in last 15 years.[13]

- For luxury cars, embedded connectivity can create strong brand differentiation by providing a higher level of in-car services and applications. For popular cars, customers will still have the option of tethered or integrated.

- By 2025, the mobility services market is expected to exceed $230 billion dollars worldwide, making it an important growth driver for the connected car market. High capability modems in the car will enable passengers to utilize the car's embedded connectivity with their own data subscription for entertainment, while the car uses the OEM's negotiated subscription for its own services using the same 5G modem.[14]

- Biometrics and 'context relevant' computing will play a key factor in super personalization e.g., if the driver has paid a bill at a bar by his credit card at night, the car will adjust the driver-assist mode based on the time, what the driver has had, road conditions, weather and aspects like eye-movement and motor skills of the driver.[15]

CAR AS A PLATFORM MARKET & ECOSYSTEM

Connected vehicles is one of the fastest growing mega trends across various business and segments.
It is estimated that the number of connected cars is set to increase to 352 million by 2023, compared with 119.4 million connected vehicles in 2018 and this growth is expected to be associated with a rapid proliferation of data, from 33 zettabytes in 2018 to 175 zettabytes in 2025 – data that can be monetized by OEMs. However, this data growth depends on customer take-up of connected services.[16]

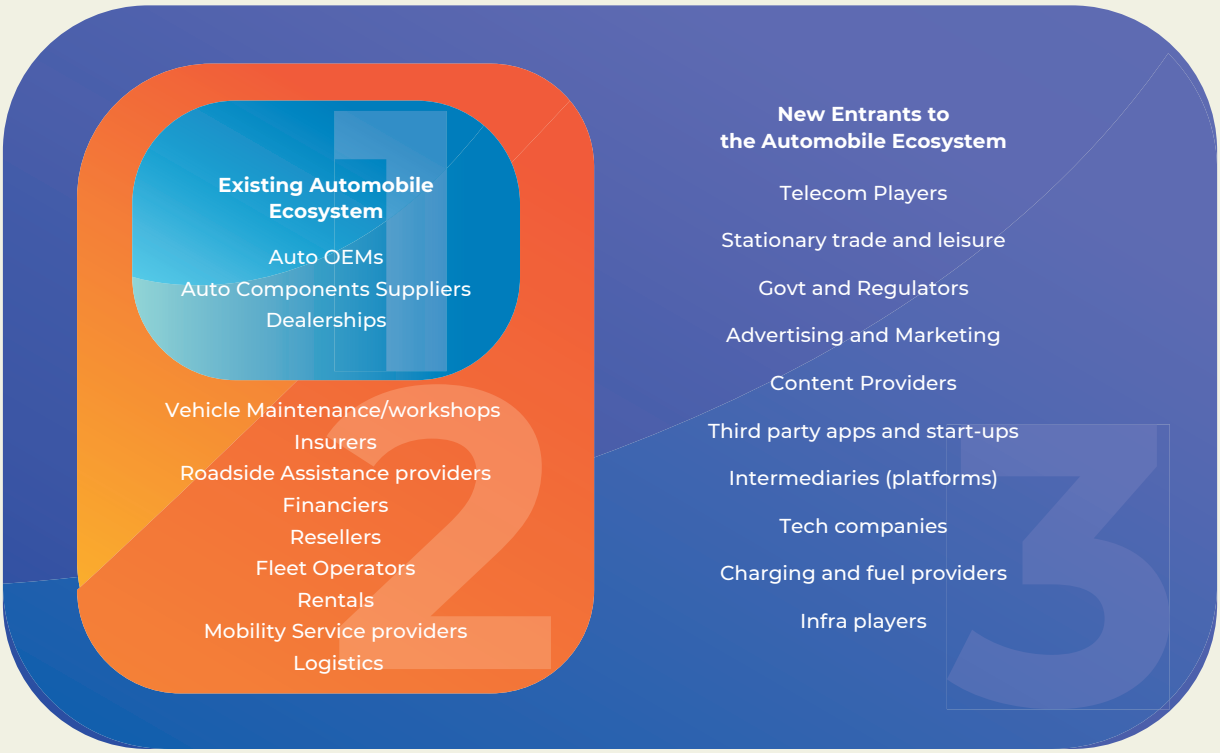
By 2025, the connected car market is predicted to reach $166bn globally. 2020 Juniper Research study predicts that in-vehicle payments will exceed $86 billion by 2025. (Up from just $543million in 2020).[17] The Indian connected car market is expected to reach $32.5 bn by 2027 at a CAGR of 22.5%.[18] Customers are willing to switch to another car brand for better connected services, and most of them would do this even if the new brand cost more.

Also, as vast amount of data will create several use-cases, new business models are going to emerge for OEMs. There is more than one way to do this.

1. Digital service providers - OEMs can start to earn money from software services as well as hardware.
2. Revenue sharing can be done between the automotive companies providing the platform and the tech companies that create consumer–centric solutions.
3. Another approach is for OEMs to develop operating systems and license them to other OEMs, perhaps on an as-a-service basis.
4. Data collectors - There will also be opportunities for exploiting the wealth of data generated by connected services. OEMs can derive insights that help them (and their ecosystem members) to offer the individualized services that customers really value.

As it evolves, the monetization models are also going to evolve, from the pride of ownership to the pride of membership.

Faster adoption of CAAP will need agility from OEMs to create an ecosystem that encourages third-party apps and support faster integration. OEMs to combine diverse and valuable functionality into a single platform in the way that has been achieved with smartphones and create a deeper collaborative ecosystem.



Automobile Industry : A deeper collaborative ecosystem

In the new mobility paradigm, adding services over a vehicle's life span will grow revenue. Examples of new sources of revenues and new business models for monetization.[19]

On Demand Services	a) Free b) Freemium (In app Buys)
Subscription Based	a) Trial – Limited Features b) Full paid – Added Features
Sales/Financing	Direct to customer sales, rental and leasing
Over the Air (Updates)	a) Software updates b) Temporary Power or charging c) Activation of various driving modes
Insurance	Customer specific packages
Digital Services	AI Assistant
Convenience Services	a) Parking Assistance b) Concierge services c) Vehicle Swapping d) High Speed charging e) Charging station booking f) Emergency Services

Aftermarket	a) Predictive Maintenance b) Convenient servicing c) Car Diagnostics d) Protection, Security, Threat e) RSA
Vehicle and Customer data	a) Tailoring new vehicle according to customer data b) Passenger health c) Vehicle Usage d) Personalized messages
Entertainment	a) Music and Video streaming b) Karaoke c) Gamification d) Social networking
V-commerce	a) Retail b) In-vehicle shopping
Content	a) Content b) Advertising

CAR AS A PLATFORM: USE CASES AND EXAMPLES[20] [21]

In-car payments and e-wallets

One important use case in the connected vehicle context is the e-Wallet, a digital payment assistant within the vehicle that can automatically make transactions without driver intervention. These could be payments for parking, battery charging, or tolls, for example. The associated contractual relations can be handled via smart contracts.

Entertainment

Development of next level of digital services such as high-quality streaming of music and video, in car gamification, in-car karaoke which will significantly expand the opportunities for in-car experiences. Premium subscription models will become incremental source of revenue offering specialised and customised packages as per customer needs

Easy and faster Refuelling at the fuel stations (Pay-at-the-pump/charging stations)

Fuel stations (petrol pumps or charging stations) can partner with OEMs to offer better and faster auto payment experience at the fuel pumps. And as more stations are getting upgraded with connectivity, the pay-at-the-pump experience can change even more drastically and can be integrated with other convenience services available at the station.

For example, drivers will receive a notification when fuel is running low. Geofencing will then notify them of connected pumps in proximity. The person can then compare prices and make a selection. When the fuel is filled, the car automatically transfers money to the fuel station via the internet, RFID or BT connection without physical insertion or handover of the credit card (which may be security issue for many) and the driver can be on his way.

Hassle-free and integrated long route travel planning

Service provides can partner with navigation and map partners to offer access to verified hotels enroute, nearest medical aids, restaurants / food options as per choice etc with advanced booking options available in car itself. Drivers can place an order in advance and payment can be made through car itself.

Drive-thru can be made simpler and smarter

We use drive-thru convenience for food, dry cleaning, pharmacy and more. Drive-thru businesses are also embracing AI and other technologies to offer personalized services to the customers. If a smart car orders in advance, makes payment before the arrival. OEMs can also set up partnership deals with different drive-thru businesses and have an additional revenue stream for referring customers to them.

V-Commerce

Customers are already using voice-based car assistants. Customers can make use of these assistants to make purchases, either through the dashboard, or in phone apps. Integration of such apps can open opportunities for voice commerce. However, it is important to keep a check that such features should not lead to any distraction while driving.

Smart and easy Parking

Parking is a challenge in most urban areas due to limited space. It further becomes difficult to navigate, specially in public places like office complexes, hospitals, markets or malls. Most areas have fee-based parking lots but securing a place in time is always an issue. Connected cars and payment features can ease these issues for drivers. IoT-powered parking lots can “broadcast” open spaces as well as pricing via over-the-air transmission. Drivers can easily navigate to the nearest open spot and pay automatically – no waiting lines, no tickets, no manual payment through cash or cards, and no parking lot attendants.

Faster navigation through Toll Roads

Paying for toll roads has always been a hassle. This process has become simpler in India with the introduction of FASTag which employs RFID technology for making toll payments directly through the payment accounts linked to it. This process can further be improved using in-car apps. Authentication documents and payment methods can be embedded in a vehicle’s license plate and/or a windshield label. When entering the paid road, those can be automatically read through, and toll will be automatically deducted from the account a driver has connected to the car.

Car Rental Experience

Connected car solutions can enrich car rental and subscription experiences. OEMs can partner with rental companies to allow customers to reserve their rentals and pay for parking and fuel online, as well as track and submit their expense claims.

Automated Car Repair notifications and suggestions [22]

Smart notifications help to inform the drivers when any service is due, or a repair is impending. Taking a step further, smart cars can analyse a specific issue and allow drivers to check prices of repair costs before selecting a service location. Through geofencing they can also suggest nearby service stations and compare service charges and cost. Add to that, automated payments, and the driver has an even more streamlined experience.

LIKELY CHALLENGES & REGULATORY FRAMEWORK IN INDIA

Connected cars run on immense volume of personal data and individual preferences that need protection under the privacy laws which currently may not be adequate given the nuances with the technology. Governments will play an important part in the transition and acceptance of connected car services. Data regulation to be closely monitored to provide clear framework to OEMs and data customers.[23]

We can see this happening in Europe with eCall. In North America, NHTSA is already leading a number of safety innovations around vehicle-to-vehicle connectivity and autonomous vehicle features. Compared with the United States, the European Union has more thorough guidance on the use of private data, including who may handle it, which gives players greater legal security when working with personal information.

Currently, In India, all the operations for transports are governed by the Motor Vehicles Act, 1988, which did not even allow testing of self-driving vehicles on Indian roads. An amendment was proposed in the Motor vehicles Act bill of 2017 which provides regulations for testing. However, the framework on data regulation is still required. Notably, NITI Aayog in 2018 released a policy paper National Strategy for Artificial Intelligence (NSAI), which discusses how AI can be introduced in sectors like healthcare, agriculture and automobile. It has also released two approach documents on Responsible AI highlighting principles for responsible AI framework in India.[24]

Beyond regulations, organizations are issuing new concepts that create a secure legal environment for data monetization. One such example is the Neutral Extended Vehicle for Advanced Data Access (NEVADA) Share and Secure concept, issued by the German Association of the Automotive Industry several years ago.

Beyond data security and access, cybersecurity is increasingly important for connected vehicles as well. Greater protections could thus actively advance vehicle connectivity, and many organizations are attempting to set guidelines in this area.

NEWS AND TRENDS

1. **Service Oriented Architecture by SAIC Motor Corp**[25]
   SAIC Motor Corp, has launched a digital platform that intends to function like Google's Android system for smart mobile phone makers and users. The platform, the first of its kind in the auto industry, allows software developers to code and release car-based applications in an app store, and car owners can download and install them in their vehicles.

   The platform, developed by SAIC's subsidiary Z-One, is called Service-oriented Architecture. It has attracted over 500 companies including big names Tencent, Alibaba, Baidu and Huawei as well as such startups as Momenta. Those companies develop and offer applications based on authorized access to over 1,900 vehicle components and sensors in such aspects as vehicle control, smart driving, infotainment and connectivity.

2. **Microsoft Connected car platform (MCPV)**[26]
   The Microsoft Connected Vehicle Platform (MCVP) is the digital chassis upon which OEMs can deliver value-add services to their customers. It unifies the cars and their data with the Azure platform, enabling a range of in-vehicle services as well as offering commercial operators powerful efficiency insights. A recent deal saw TomTom pledge to integrate with MCVP and few OEMs have also signed up with Microsoft for the platform.

3. **Tesla has enabled in-car purchase and subscriptions**[27][28]
   Recently, Tesla has enabled the in-car purchases and subscriptions with their latest software update. The new premium connectivity subscription offers navigation, live traffic visualization, satellite-view maps, video streaming, caraoke, music streaming and an internet browser.

4. **Honda has partnered with Visa to facilitate in-car payments**[29][30]
   Honda unveiled a fully integrated in-car experience, called Honda Dream Drive through a partnership with Visa, that allows drivers and passengers to use voice-control and mobile technology to buy gasoline, parking or order food and enjoy entertainment features integrated into the dashboard. It has also expanded its collaboration to include Mastercard and Paypal

5. **Connected Car solutions by Bosch**[31]
   The company is at the forefront of connected car research and had filed more than 150 patents in a year few years ago. Its first connected car system has been tested with Mercedes. The two companies have partnered to launch the first connected autonomous car in 2021, and develop some of the components of vehicle-to-vehicle (V2V) communication and car-to-infrastructure (V2X) modules. Bosch is also testing the self-drive module on a Tesla (as a test subject), in Boxberg, Germany. The MySpin solution, an app created by Bosch that takes all apps from the smartphone and mirrors them on the car’s infotainment system, has been built in Bengaluru.

6. **Xmart OS by Xpeng Motors**[32]
   Xpeng Motors has worked with AliOS to implement the Alibaba In-Car Mini APP into the Xpeng P7, opening the door of a vast in-car service ecosystem tailored for smart vehicles.
   The platform is open to third-party developers and focuses on numerous driver-centric functions related to location, navigation, traffic status, travel assistance and driver condition monitoring and will gradually expand to a host of other mobility, lifestyle and infotainment functions.

It will be open to third party developers to launch more value-added services tailored for driver's needs and the in-car environment.

7. **Increased participation of leading tech companies to get greater share in automotive pie.**
   Connected cars share much of its DNA with Smartphones. The level of seamlessness that these large companies could provide to consumers is quite substantial. This is one of the major reasons why almost all big tech companies have announced their plans to go electric or autonomous in coming years. Most of the companies are already sharing components with leading OEMs.

   Some tech companies are also positioning themselves to become industry's new default option for infotainment by integrating directly into the vehicles.

8. **Autonomous and EV announcement by all major smartphone brands**[33][34][35][36]
   a) Apple – Apple started its Project Titan back in 2014, with more than 1,000 car experts and engineers developing an electric vehicle. The collaboration with manufacturing partners is aimed at shortening the car development time.
   b) Sony – Sony has expressed interest in making electric cars and is exploring commercial launch of Sony EV. The company has showcased its second electric vehicle prototype Sony Vision S 02 at the Consumer Electronics show (CES) 2022 and has also announced its plan to launch a new company Sony Mobility, during the first half of 2022 to explore entry into the electric vehicle market.
   c) Samsung – Samsung joined hands with OEMs to develop cars. With Samsung's expertise in sensors and radar technology, the company is ambitious about grabbing a chunk of the global electric self-driving car market.
   d) Huawei – Huawei has developed a hybrid car named as the SF5. Developed in association with SERES, the Huawei car was showcased at the Auto Shanghai. It has also partnered with carmaker Changan and battery supplier CATL to form the Avatr – a premium luxury brands of EV. It has also announced the launch of another hybrid car Aito M5 using its proprietary HarmonyOS operating system.[37][38]
   e) Xiaomi – Xiaomi plans to launch its first electric car in the market in 2024 and is planning to put more resources into the research and development unit of EV project. As per new resources, Xiaomi is putting more resources into the research and development unit of EV project and plans to launch its first electric car in the market in 2024.[39]
   f) Oppo – Oppo is already a major player when it comes to self-driving technology. The company has several patents on self-driving technology such as distance measuring devices, cameras, and electronic equipment for car positioning. It has announced plans to manufacture electric vehicles in India by 2024.

CASE IN POINT – LAUNCH OF MG ASTOR (AUG'21)

Laying down its vision for the future, and betting big on mobility solutions in the Indian automotive industry, MG Motor India introduced the concept of Car As A Platform (CAAP) with MG Astor in India in Aug 2021.

With software at the heart of vehicle development, it is building an ecosystem of various in-car services and subscriptions in the areas of utility, entertainment, security, consumer payment and more.

Each service will be accessible to the car users and will further add to their convenience.
It will create various possibilities which will evolve with time, creating safer and smarter driving experiences. The eventual endpoint is allowing customers to choose their specific set of services and help them personalise their purchase journey as per their individual preferences.

To build this platform, MG Motor India has partnered with:

a) **Jio** – for seamless internet connectivity with 5G embedded SIM

b) **KoineArth** – for creating a blockchain enabled digital passport which can earn lower insurance premium or higher resale value basis safer driving behaviour and vehicle usage. MG is further partnering with insurance provider like ICICI and Reliance and CarTrade, an online marketplace for resale of used cars. KoineArth is a Singapore and India based Blockchain startup and is also winner of MG Developer Program and Grant 2021.

c) **Park+** – for parking discoverability, booking and payment from within the car, even before reaching the destination. Automatic FASTag recharge.

d) **MapmyIndia** – for superior navigation experience with AI-powered maps engine and intelligent voice interaction system

e) **Wikipedia** – for providing voice based online search on various topics.

f) **Shortpedia News app** – with english and hindi voice readouts.

g) **JioSaavn** – for on-demand music streaming service and podcasts..

h) **Microsoft** – Microsoft Azure service for cloud servers for data storage

i) **Bosch** – Autonomous Level 2 systems are built and powered by Bosch.

j) **L&T Technology Services** – Data service audit partners to ensure data privacy.

k) **Star Design USA** – Design of the first-of-its-kind Personal AI Assistant.

THE ROAD AHEAD

CAAP is an exciting area of innovation and an amazing opportunity for OEMs to reinvent through digital technology and create a brand experience that transcends beyond the purchase of vehicle and lasts over the entire customer journey with the brand.

To make CAAP vision a true reality, collaboration is going to be one of the key enablers of success, as is the ability to integrate multiple products and services over a single platform and simultaneously demonstrate their value to consumers. Revenue from recurring services could boost the revenue from car sales and OEMs need to work closely with partners both new and old to earn it.

Innovators and developer have an opportunity as CAAP can provide a fast and frictionless entry point to quickly add value and seize the expansion potential within that ecosystem.

In the end, everyone stands to benefit—OEMs, adjunct industries, suppliers, and customers—as the convergence of connected, autonomous, shared and electric technologies (CASE) inexorably transform the automotive ecosystem.

ABOUT MG

A 97-year-old start-up.

The iconic MG brand, founded in the UK in 1924, MG (Morris Garages) is world famous for its sports cars, roadsters, and cabriolet series. MG vehicles were much sought after by many celebrities including British Prime Ministers and the British royal family for their styling, elegance and spirited performance. MG has made its way to India under the leadership of SAIC Motor Corporation Limited, the world's 7th largest automobile company and ranked 36th in the Fortune 500 list.

MG cars are designed at the MG design center in UK and engineered at centers around the Globe. Globally SAIC and MG are driving innovation and technology in the automobile industry to make cars safer, comfortable and better to use in every possible way.

SAIC has made significant investments in Connected Vehicles and Artificial Intelligence. They have forged multiple partnerships with leading technology players around the world including Alibaba, Microsoft, Cisco, TomTom and many more.

MG has launched the 1st internet car in the world. The latest Marvel X launch from the SAIC/ MG stable is the most intelligent car with last mile self-drive characteristics, Over the Air Updates (OTA) and a host of connected mobility features, supported with voice command and mobile app control.

MG cars offer several pioneering features and services. Some of these innovations include travel related services with real-time navigation. Applications for entertainment and recreation. Convenience and safety with real time tracking and mobile app interface. Enhanced vehicle service features with smart

diagnostics. Enabling commerce and transaction on the fly. Voice command and control for simpler interface between owner and vehicle to enhance comfort and safety.

MG brand had an iconic presence as an innovative sports car for decades. It is now making waves with its high technology features and stylish design. All this has made MG the fastest growing brand in markets around the world.

MG India is focused on community, diversity, innovation, and experiences. MG is poised to build the next generation automotive company & bring the best of automotive experience to its customers; experiences that will reflect its heritage, future readiness, and cultural diversity.
MG has evolved into a modern, futuristic, and innovative brand over the last 97 years. Its state-of-the-art manufacturing facility in Halol, Gujarat, has an annual production capacity of 80,000 vehicles and employs nearly 2,500 work force. Driven by its vision of CASE (Connected, Autonomous, Shared, and Electric) mobility, the cutting-edge automaker has augmented the across-the-board 'experiences' within the automobile segment today.

It has introduced several 'firsts' in India including India's first Internet SUV – MG Hector, India's first Pure Electric Internet SUV – MG ZS EV, India's first Autonomous (Level 1) Premium SUV – MG Gloster and India's first SUV with AI inside – MG Astor.

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Acknowledgements

The author would like to thank the following for their support that made this report possible

Rajeev Chaba
President and Managing Director
MG Motor India

Gaurav Gupta
Sr. Vice President (Customer Experience and Marketing)/
Chief Commercial Officer
MG Motor India

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Founding Partner The Growth Labs and Member – Prasar Bharti Board

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"The future of the car and innovative mobility solutions is a greater shift than the mobility industry has ever witnessed so far. This shift shall be primarily powered by bringing together diverse cloud apps, ecosystems connected via broadband wireless technologies like the 5G. Information is streamed from the connected vehicle to the OEM or across ecosystem partners, creating new forms of markets and business models for vehicle data. With the emergence of Digital Cockpits as a standard feature in most cars of tomorrow, we can look at a whole new world of in-car experience powered by personalised content apps while we travel with the highest standards of comfort and safety. This whitepaper by team MG very insightfully outlines this vision and the emergence of CAAP. A cool read for everyone in mobility and tech."

Mohan Raju
VP and Vertical Head IoT,
RIL Jio

"Car is a fascinating convergence of various technologies and the new age car is going to take this convergence to an exciting level. Highly sensorized, intelligent, intuitive making critical decisions in real time. Always connected and communicating with various networks internally and externally, generating huge amount of data related to vehicle as well as passenger experience and all the while software working seamlessly with mechatronics to provide a safe and pleasurable driving experience. The possibilities are exciting and challenging. The theme Car As A Platform aptly captures the nature of the technological convergence and the wide variety of possibilities it provides. Many are working in this area but to work with a leading OEM wanting to innovate for this vision is a very valuable and exciting opportunity."

Ashish Khushu
Chief Technology Officer,
L&TTS Ltd.

"New embedded connectivity in vehicles will enable the delivery of enhanced customer experience and will seamlessly bridge physical and digital divide.

In-car services offered through CAAP will transform a vehicle from just a means of transport to a lifetime of services accessed various digital touchpoints.

Appreciate the initiatives from MG Motor to take the lead with developers and innovators to create this platform together. The paper provides rich insights on various opportunities CAAP can offer to all stakeholders. An interesting read to build understanding on fundamentals of CAAP."

Dr B K Panigrahi
FNAE Institute Chair Professor
Professor,
Department of Electrical Engineering
Head, Centre for Automotive
Research and Tribology (CART)
IIT Delhi

“We are in an era of transformation in the automobile industry. Unlike the past few decades where hardware and mechanical innovations dominated the industry, it is software and technology leading the charge now. Park+ is a super app for car owners, offering a suite of services like FASTag, parking, insurance, access control systems, e-challans, to solve daily problems for car owners. Our partnership with MG to provide real-time connected car solutions is another step towards our aim of making car ownership delightful. It takes a leader to bring in change and MG is performing the role of a leader perfectly by bringing in developers and partners, to build Car As A Platform. This white paper is a fount of knowledge for developers and innovators, providing them with insights which will help them develop better and more relevant solutions.”

Amit Lakhotia
Founder & CEO, Park+

“Automobiles are rapidly transforming. They are no longer mere mobility products but a third space for travellers. Software and digital adoption would play a key role in leading the transformation of the car as we know it. Car As A Platform offers a great opportunity to innovators, developers, service providers and entrepreneurs to build new offerings and business models for consumers.

MG Motor India has taken in the lead in bringing CAAP to India with its futuristic products.

This paper from MG Motor covers all the aspects that explain what is the vision for CAAP and how developers and innovators can make the most of this platform. A highly informative and inspiring document.”

Alok Agrawal
Founding Partner
The Growth Labs and Member
Prasar Bharti Board

"MG is an incredibly innovative brand and truly committed to India. The success of the MGDP in terms of reaching out, engaging, encouraging and giving business and investment opportunities to hundreds of start-ups and innovators, shows how MG is a Car As A Platform as well as a market leader that is enabling a thousand flowers to bloom. We at MapmyIndia share the same ethos - helping bring the benefits of maps, geospatial and automotive N-CASE technologies - enabling advanced navigation, connected, autonomous safety, shared and electric mobility - through our suite of maps, software, IoT, APIs and analytics - and are so proud to be a part of MG’s vehicles and technology stack, as well as this illustrious jury and mentor group. We wish for the incredible success of MG and the startup ecosystem in India and beyond.”

Rohan Verma
CEO and Executive Director,
MapmyIndia

"Imagine setting out for a shopping trip, where the onboard computer or an app on your car offer you discount vouchers, help you identify and parking spot near your preferred store to make your shopping experience seamless. Cars of the future might offer many such services, and significantly transform the way we experience mobility today.

I must compliment MG Motor for putting together this initiative which is designed towards bringing some pathbreaking innovation from our Developers and Startup community to consumers in India and across the world."

Prateek Mathur
Sr. Director Marketing,
Innovation and Strategy, SAP

"Car is surely becoming 3rd living space with fascinating technologies converging in it and bringing high value proposition to various types of consumers throughout the lifetime. We are witnessing the shift from erstwhile mechanical car to current mechatronic system towards intelligent platform of the future with trends of Personalisation, Automated, Connected & Electrified playing significant role in shaping-up the future. High compute platforms which are getting embedded in the cars are clearly moving them to be more & more software defined & driven by AI. The theme Car As A Platform aptly conveys the possibilities in front of us and I am happy to see MG motor integrating Startups as well into the Eco-system to be able to speed-up this transformation."

R K Shenoy
Member - Executive Leadership team,
SVP Mobility Solutions (MS/BE2)
Bosch Global Software Technologies
Private Limited

"Technology has played a crucial role in making cars smarter. The innovative concept of CAAP (Car As a Platform) is taking this further creating a digital ecosystem & level playing field for defining the next generation In-Vehicle Experiences (IVX). The confluence of creativity, technology, content & data facilitated by CAAP present exciting possibilities to personalize the In-Vehicle Experiences (IVX) by integrating not only automotive but Fintech, Insurance, Retail and many other industries.Trust develops when Competency Reliability, Transparency & Authenticity come together. In my opinion, MG's vision of CAAP embodies these elements to transform your car from being a "smart utility" to "a trusted companion."

Soumitra Dhankar
Solution Consulting
Lead, Adobe – Technology

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