# ADAS in the driver's seat

The domestic market for passenger vehicles with ADAS to cross $1 billion by fiscal 2028



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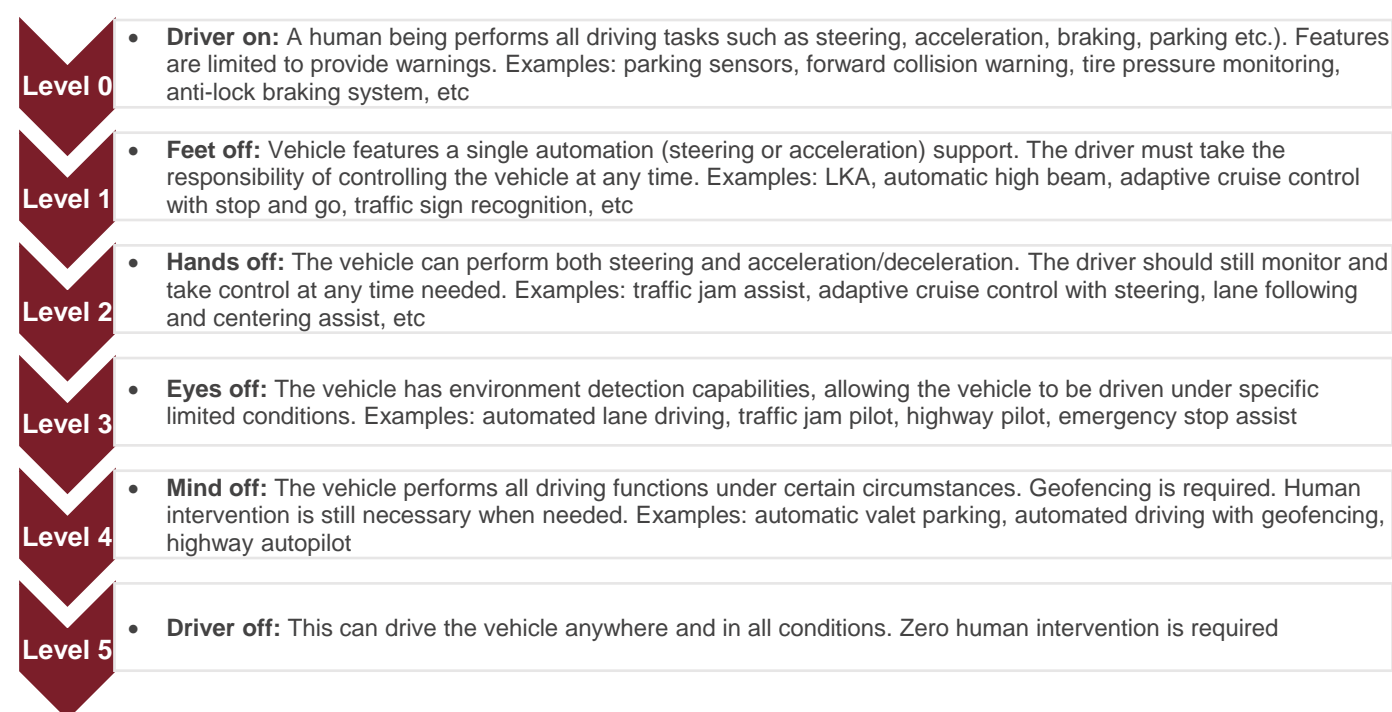Consulting

# AI makes big inroads into Motown

Artificial intelligence (AI) is fast becoming one of the most important technologies of our time. With its rapid evolution, AI has paved its way into almost every sphere of life.

The auto industry, especially, has seen AI make a mark with cutting edge technology and new innovations. advanced driver assistance systems, or ADAS, is one such example.

It is a set of technologies used in cars for safely operating the vehicle. It aids the driver in steering, braking, accelerating, parking, navigation and alerts them of any potential hazard.

ADAS employs several sensors, cameras, and methods to perform various functions such as adaptive cruise control (ACC), lane keeping assist (LKA), automatic emergency braking (AEB), blind spot detection (BSD), pedestrian detection, parking assistance, adaptive headlights, etc.

ADAS has various levels depending on the degree of automation that a vehicle has been programmed to perform:

**Level 0**
- **Driver on:** A human being performs all driving tasks such as steering, acceleration, braking, parking etc.). Features are limited to provide warnings. Examples: parking sensors, forward collision warning, tire pressure monitoring, anti-lock braking system, etc

**Level 1**
- **Feet off:** Vehicle features a single automation (steering or acceleration) support. The driver must take the responsibility of controlling the vehicle at any time. Examples: LKA, automatic high beam, adaptive cruise control with stop and go, traffic sign recognition, etc

**Level 2**
- **Hands off:** The vehicle can perform both steering and acceleration/deceleration. The driver should still monitor and take control at any time needed. Examples: traffic jam assist, adaptive cruise control with steering, lane following and centering assist, etc

**Level 3**
- **Eyes off:** The vehicle has environment detection capabilities, allowing the vehicle to be driven under specific limited conditions. Examples: automated lane driving, traffic jam pilot, highway pilot, emergency stop assist

**Level 4**
- **Mind off:** The vehicle performs all driving functions under certain circumstances. Geofencing is required. Human intervention is still necessary when needed. Examples: automatic valet parking, automated driving with geofencing, highway autopilot

**Level 5**
- **Driver off:** This can drive the vehicle anywhere and in all conditions. Zero human intervention is required

One of the primary benefits of ADAS is its potential to prevent accidents. Systems such as AEB can swiftly detect an impending collision and initiate braking, reducing the risk of rear-end crashes.

Moreover, features like lane departure warning (LDW) and LKA help drivers stay within their lanes, mitigating accidents caused by unintended lane drift.

# ADAS penetration in India in the passenger vehicles segment

## Mahindra & Mahindra and Morris Gararages drive adoption

Globally, ADAS has been used rampantly for long, with the US, China and Europe leading innovations in the technology. The trend has been picking up in India as well, with passenger vehicles (PVs) with ADAS features contributing to almost 2% of total PV sales in the country as of fiscal 2023.

As per CRISIL's assessment, home-grown manufacturer Mahindra is leading the pack in terms of market share with its XUV 7OO model at 40-50%, followed by Morris Garages with its four models (Astor, Hector, ZS EV, and Gloster) at 20-30%, and Honda at the third spot with its Honda City model at 10-20%. Players such as Tata Motors, Hyundai, and Toyota have made humble beginnings, accounting for the balance share in the total ADAS-enabled PV sales for fiscal 2023.

**ADAS penetration in India in the PV segment, fiscal 2023**
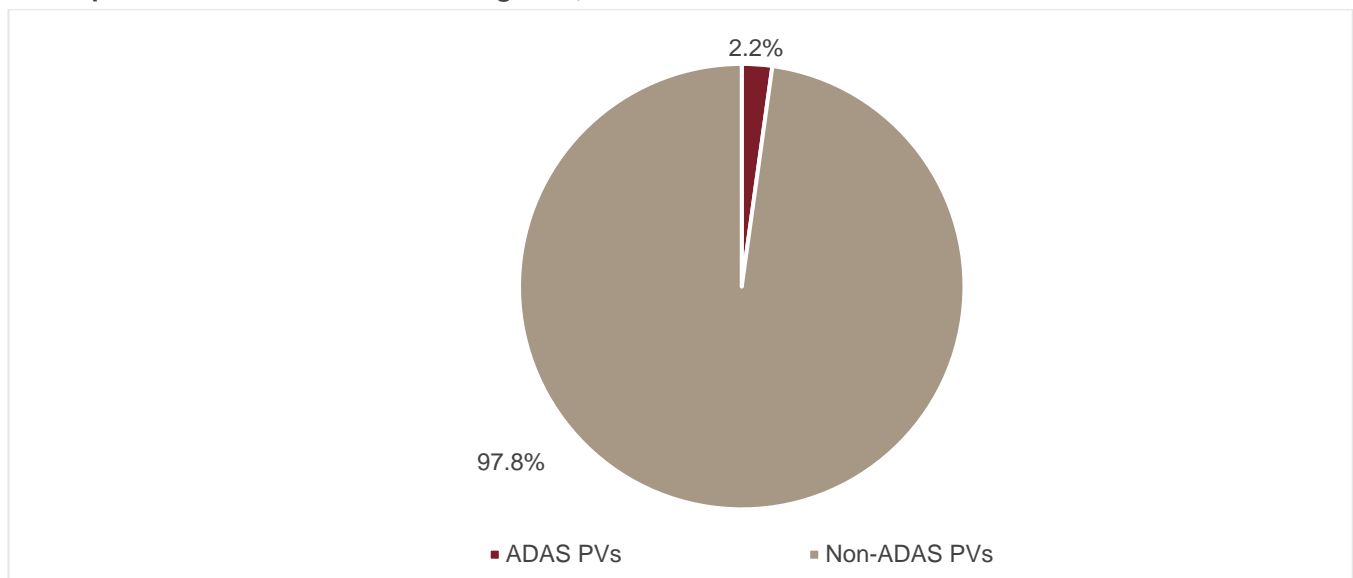


*Source: CRISIL MI&A Consulting, industry*

| OEMs | Player-wise market share (FY23) |
|---|---|
| Mahindra | 40-50% |
| Morris Garages | 20-30% |
| Honda | 10-15% |
| Tata Motors | 5-10% |
| Hyundai | <5% |
| Toyota | <5% |

*Source: CRISIL MI&A Consulting, industry*

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# Levels of automation/ADAS systems in India

The Indian automobile industry is at a nascent stage in terms of penetration of PVs with ADAS features, with home-grown players like Mahindra and Tata making a dash, along with international players such as MG, Honda and Toyota.

The current level of automation in India suggests that the automation technology levels L1 and L2 are making inroads, mainly in the premium SUV and sedan segments, which account for almost one-fourth of PV sales in the country. On the other hand, adoption in the hatchback segment is minimal , with the adaption level still at L0.

**Current level of automation/ADAS systems across segments in India**
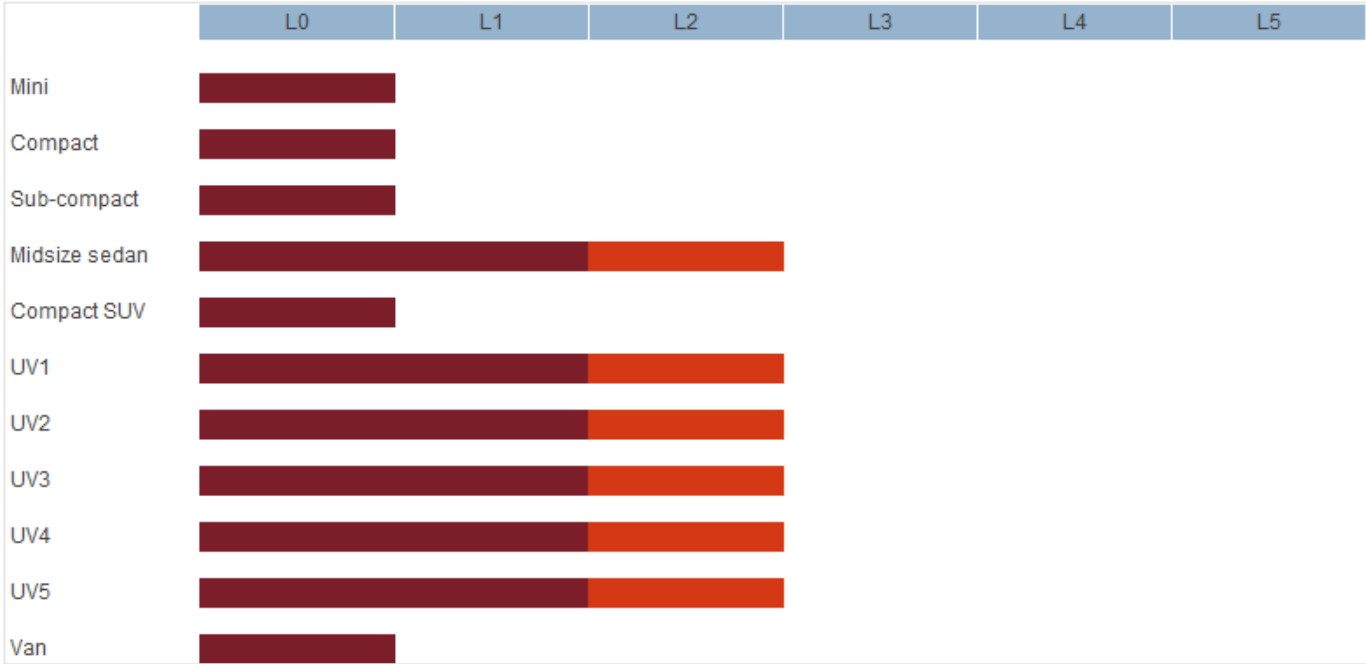


*Source: CRISIL MI&A Consulting, industry*

The premium SUV segment (UV2) (models – Mahindra XUV700, MG Hector, Tata Harrier, Tata Safari) account for two-thirds of total ADAS PV sales, followed by the entry level SUV segment (UV1) (models - MG Astor) and midsize segment (models – Honda City and Hyundai Verna).
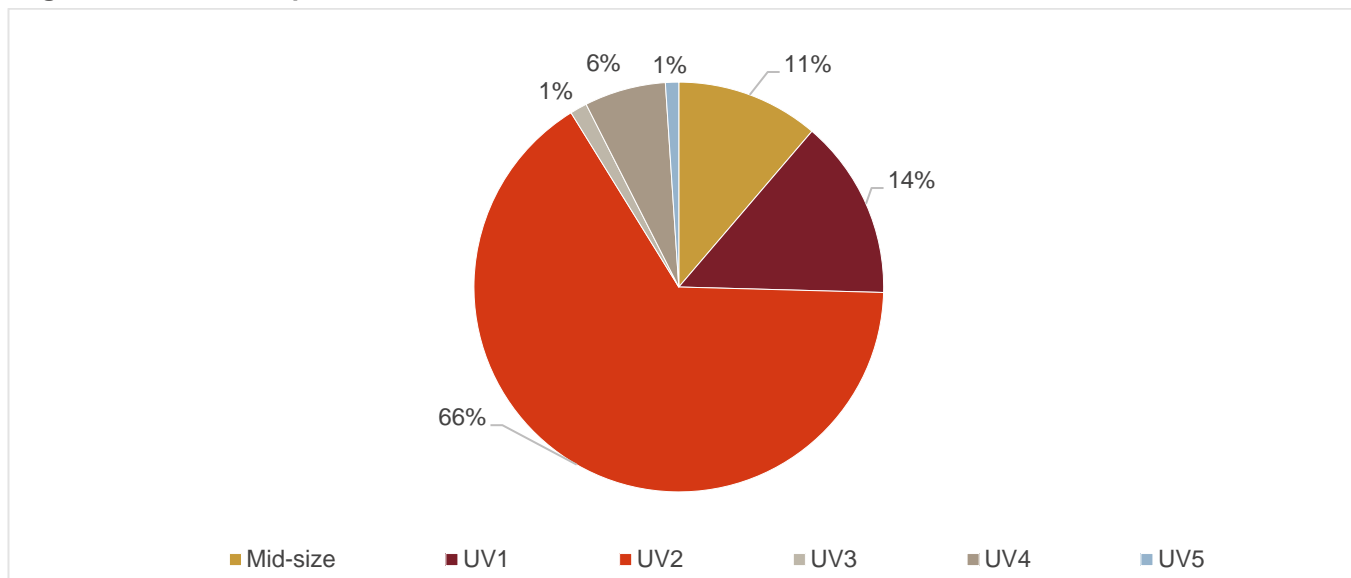
These three segments form over 90% of ADAS PV sales, indicating minimal adoption in hatchback and other premium SUV segments.

**Segment-wise sales penetration of ADAS models (FY23)**

| Segment | Penetration |
|---------|-------------|
| UV5 | 1.6% |
| UV4 | 25.7% |
| UV3 | 2.4% |
| UV2 | 16.0% |
| UV1 | 1.7% |
| Mid-size | 8.6% |
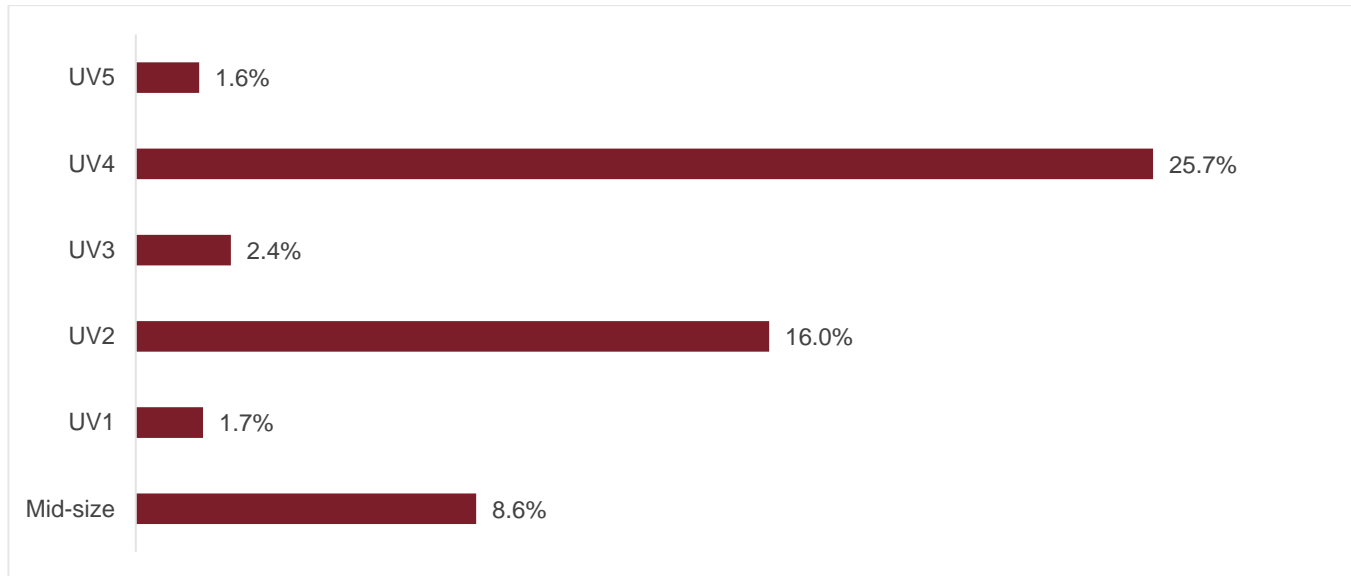
*Source: CRISIL MI&A Consulting, industry*

**Segment-wise break-up of ADAS PVs**

Mid-size 11%, UV1 14%, UV2 66%, UV3 1%, UV4 6%, UV5 1%

Legend: Mid-size, UV1, UV2, UV3, UV4, UV5

*Source: CRISIL MI&A Consulting, industry*

## Typical cost mix in ADAS components

ADAS components fit broadly in three groups — mechanical, optical and sensors. Mechanical components are the ones which enable ABS, ESP, TCS and cluster warning, while optical components mainly involve the camera systems. The sensor modules provide the most advanced safety features in the ADAS ecosystem.

Over the past few years, there has been a huge leap in the innovation of radar sensor modules. There is a wide array of choices, including long, medium, short, and ultra-short-range sensing capabilities, as well as various radar frequencies and LIDAR technology. The cost of sensor components is the most at ~45%, followed by mechanical at ~30%, and the balance ~25% is contributed by the optical components group.

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**Typical cost mix in ADAS components in India (FY23)**
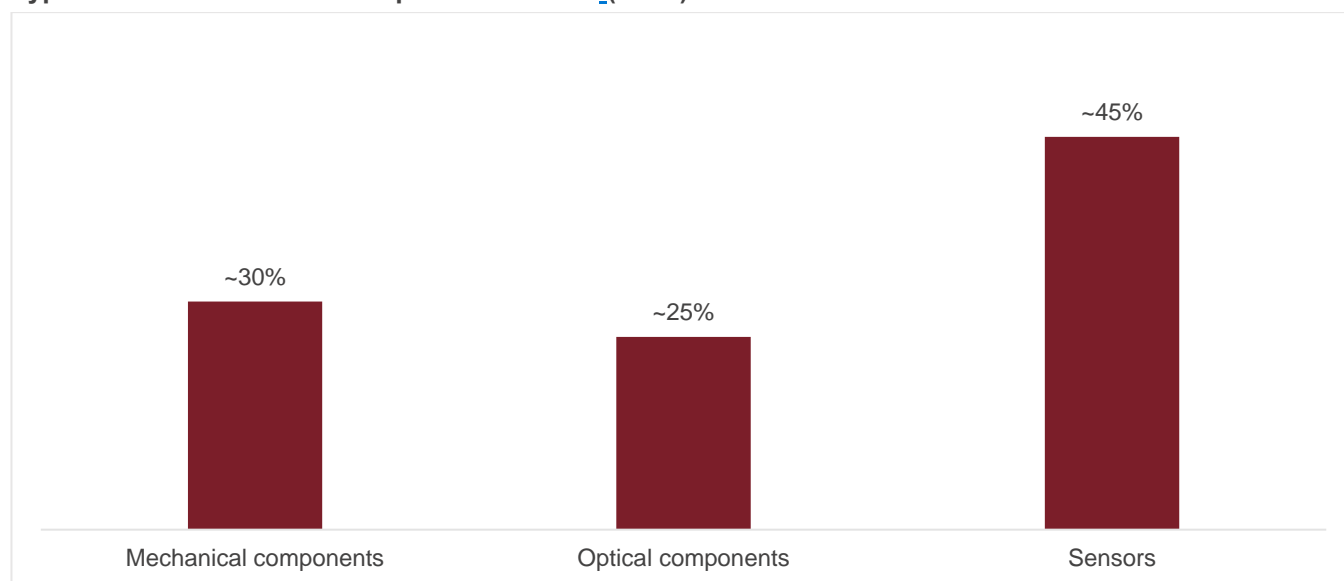


*Source: CRISIL MI&A Consulting, industry*

## Market size of ADAS components to grow over six times by fiscal 2028

Based on primary interactions with industry players across OEMs, and after an extensive analysis of the model-wise cost of the ADAS components, CRISIL MI&A pegs the market size for ADAS components at ~$169 million for fiscal 2023, which is projected to grow to ~$1 billion by fiscal 2028, up six times over the fiscal 2023 market size.

**ADAS components market size in India – current situation and outlook**
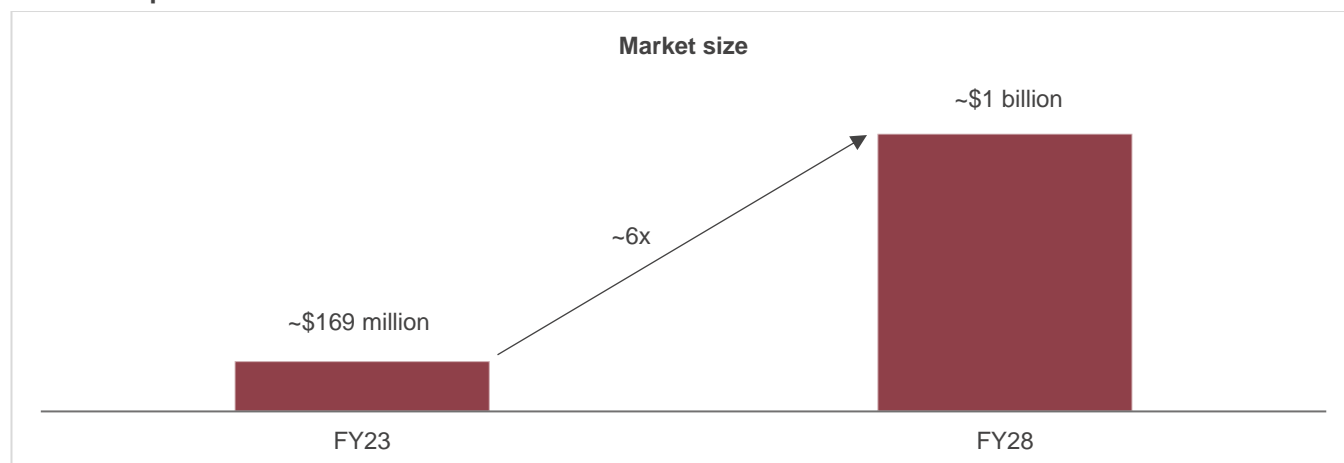


**Note:** *Sizing is based on the Society of Indian Automobile Manufacturers' sales of domestic passenger vehicles and not luxury brands like Mercedes, BMW, Audi, JLR, Volvo, etc.*

*Source: CRISIL MI&A Consulting, industry*

Based on CRISIL's assessment and interactions, mid-size and UV segments are expected to register the highest ADAS penetration at 15-20% and 10-15%, respectively, by fiscal 2028, growing from 5-10% and 4-8% as of fiscal 2023. Compact UV and hatchback/small cars segment will also see an increase of 6-10% and 4-6%, respectively, in ADAS penetration by fiscal 2028 from 0% and 1%, respectively, as of fiscal 2023.

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As per CRISIL's assessment, by fiscal 2028, of the total PV sales with ADAS features, about 55-60% are expected to be utility vehicles, followed by compact utility vehicles at 20-25%, midsize at 10-15% and balance 3-7% by hatchbacks/small cars.

The growth in India's road infrastructure greatly benefits the implementation of ADAS. With increasing efforts by the Government of India to convert existing highways to expressways, roads are destined to become well equipped with the necessities for ADAS to flourish.

Expressways typically have their standard markings, signages, lane markings, and consistent roads. Standardisation often leads to uniformity and predictability, which can contribute to smoother processes, which bodes well for ADAS.

Expressways can be equipped with the necessary sensors and communication protocols that will allow advanced technologies, such as adaptive cruise control, LKA, and automated braking in ADAS-equipped vehicles to operate more effectively. This technology would eventually transition to vehicle-to-vehicle and vehicle-to-infrastructure connectivity, thereby expanding the market and enhancing the driver's experience.

## Few chinks in the armour

While the outlook for the industry looks bright with penetration increasing as more and more customers demand autonomous and safety-rich features, some challenges remain, which need to be addressed, for the industry to realise its full potential.

**Challenges in ADAS penetration**

| | | |
|---|---|---|
| **Extensive road infrastructure with proper lane markings are needed.**<br>**Most local roads in India have no lane markings** | **Signboards are not positioned properly, not well maintained for the cameras to read them clearly** | **Standardisation and regulations need of the hour to boost confidence among players in the whole ADAS ecosystem** |

Addressing one of these challenges, the Ministry of Road, Transport and Highways recently introduced fresh directives pertaining to signages on national highways and expressways, with the aim of improving road safety standards, ensuring better visibility, and providing intuitive directions to drivers. The guidelines will be implemented in a phased manner on all upcoming highways, expressways and greenfield projects.

Additionally, as electric vehicles (EVs) become more common, the overall vehicle fleet will become more modern and safety conscious. ADAS features are a good fit for the emphasis on safety in EVs, and they could become standard or desirable options.

In addition, regulations and incentives may encourage the adoption of ADAS in EVs; consumer demand for advanced technology could also drive sales. Finally, the development of autonomous driving is supported by ADAS technologies, which could further increase demand for these features.

Just as AI is poised to shape the future of the world, ADAS stands to revolutionise the automotive landscape in ways that are nothing short of transformative. It is both the forerunner and enabler of a safe and autonomous future. The path to self-driving cars may indeed be challenging with technical intricacies and regulatory frontiers, but with each passing year, the autonomous mobility envisioned is only getting closer.

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