

Head-up Display for Automotive

- A Landscape Study

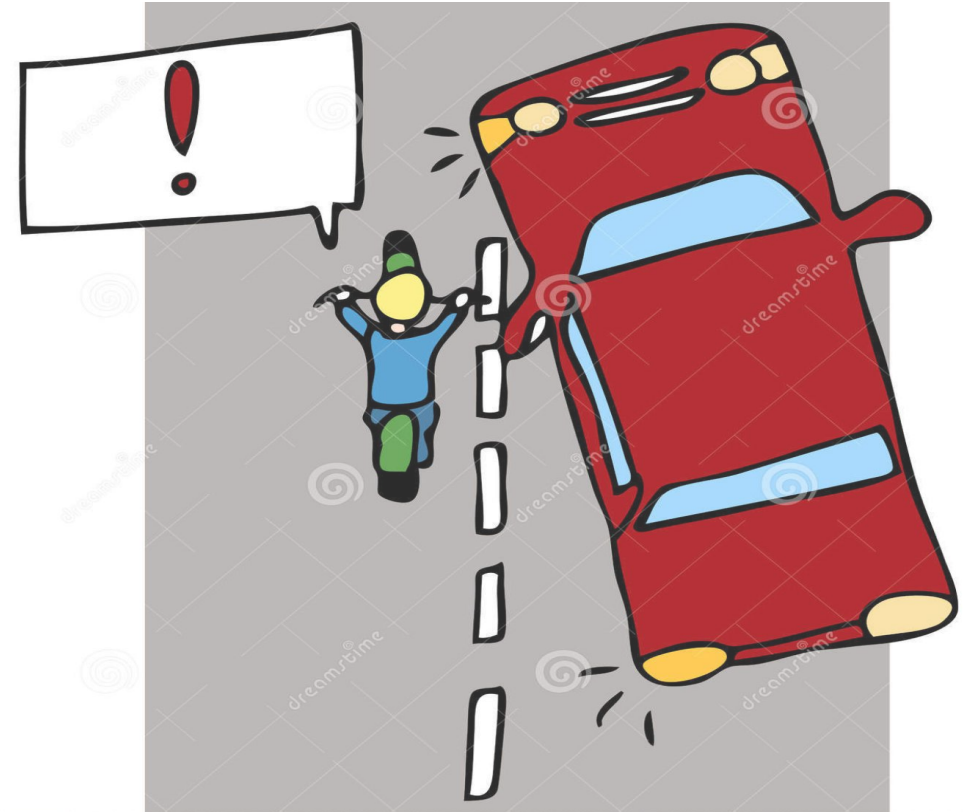


TEAM 



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Wish you had
more eyes?



Facts

- 6.75 million accidents occur every year only in USA
- 250,000 accidents occur due to lane change only in USA
- \$120,000 average cost for large-truck accidents
- Up to \$4.8 million average cost when fatalities happen
- 1.35 million fatalities occur every year globally



Head-up Display (HUD)

- Overview



Types of Head-up Display

- Combiner HUD
- Windshield HUD
- Augmented Reality HUD



Combiner HUD

- Uses semi-transparent surfaces to overlay an image
- Low cost solutions
- Basic features



WindShield HUD

Crucial information,
directly displayed on
windshield as a virtual
image



Augmented Reality HUD

Incorporates the augmented reality technology and capable to offer Advanced Driver Assistance capabilities



Augmented Reality HUD

- The HOW

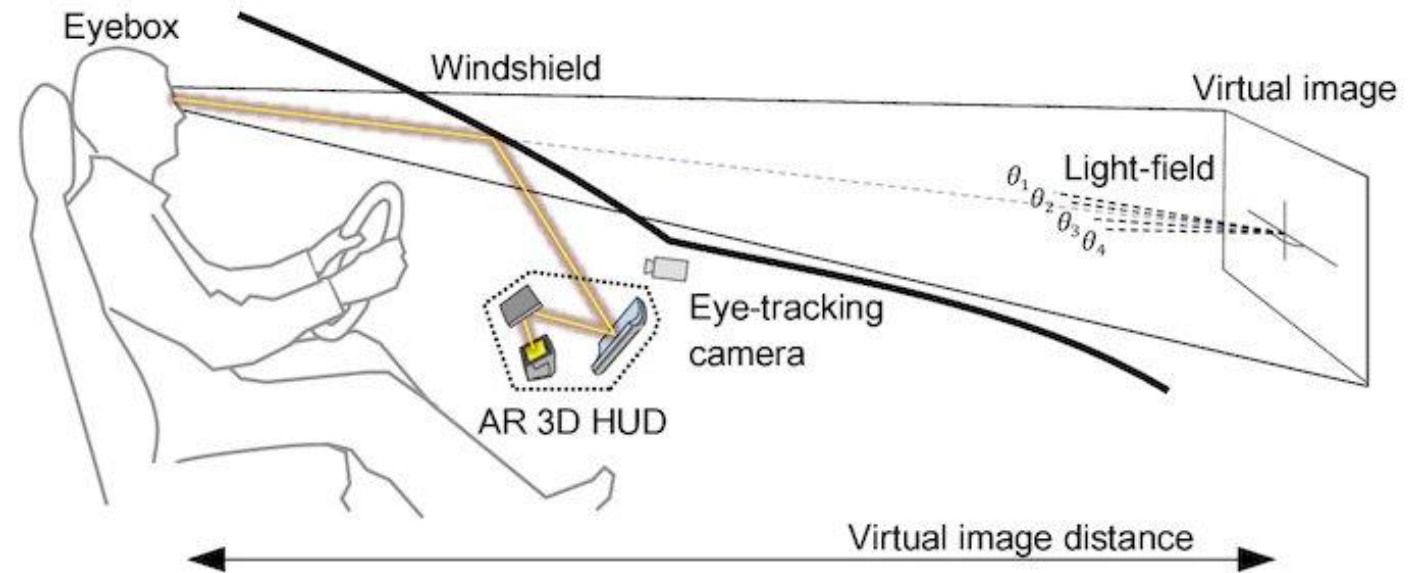


Image courtesy: [Lee et al](#)



Current HUD Market

Market is expected to REGISTER a CAGR of

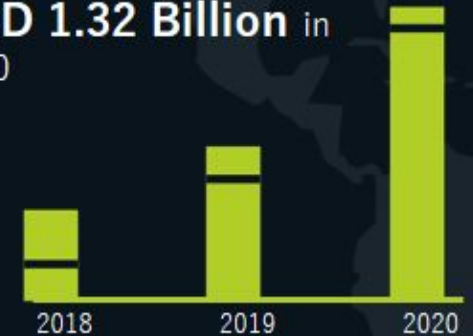
28.4%



35.6%

of market revenue was accounted for by North America in 2020

The market was valued at **USD 1.32 Billion** in 2020



\$9.72B

Projected Market Size in 2028

By application, the automotive segment is expected to register a

steady **28.6%** CAGR over the forecast period



One of the **KEY DRIVERS** for market growth is advancement in technology



Market Dynamics

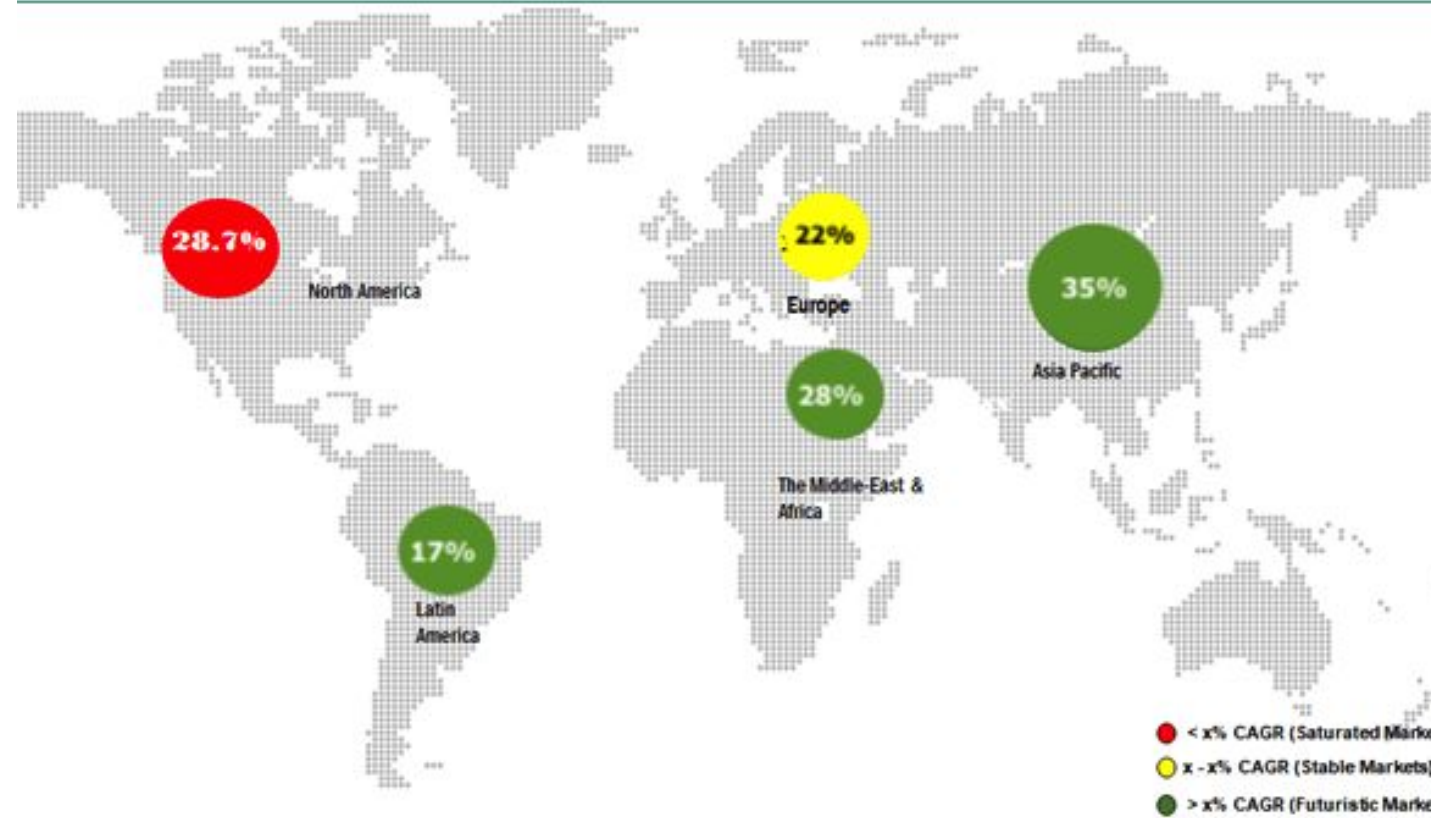
- Driver: Increase in awareness about passenger and vehicle safety
- Technology: Continuous advancement and new hardware boosted solutions
- Opportunity: Introduction of portable HUDs at lower prices in low and middle car segments
- Challenge: High cost of advanced head-up display systems



Regional Share

- Asia Pacific to hold the largest share
- US and Europe to follow

HEAD-UP DISPLAY MARKET: REGIONAL SHARE



Current Players

DENSO

Denso

Continental

Continental
AG

NS
NIPPON SEIKI

NIPPON
SEIKI CO.,
LTD.

Visteon

Visteon

BOSCH
Invented for life

Robert Bosch

BAE SYSTEMS

BAE Systems

THALES

Thales Group



Technical Challenges

- Building an AI Model
 - An expensive process (time, volume and variation of data and cost)
- Automated Action Such as blow horn, flash light .
 - Could become annoying experience
- Technical Limitation
 - Requirement of greater space in the cockpit for the installation of HUD



Market challenges

- Incentive for Auto Manufacturers to adopt technology
- Deceleration in market due to COVID
- Competition: Too many Big and Small Players



Evolution

Past



Narrow FOV $<4^{\circ}$

Present



Medium FOV $7-8^{\circ}$

Future AR HUDs



Wide FOV $>10^{\circ}$

FOV = Field of View



The Road ahead

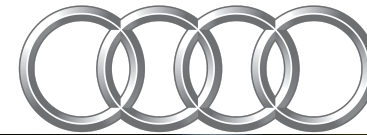
- Augmented Reality HUD will become a default option in the Cars.
 - OEM & Electric Cars are preferred (due to space & early opportunity)
 - Integrated eye-tracking technology to follow driver's eyes
- Become integral part of the Self Driving cars
- Integrated into commercial vehicles to reduce the operating cost
- Split view for media entertainment in Park mode
- Integrated night vision using digital image enhancement



HYUNDAI



SUZUKI



Audi



Mercedes-Benz

And...



Image courtesy: <https://driving.ca/auto-news/news/hyundais-windshield-of-the-future-looks-like-a-giant-tv-screen>

QUESTIONS?



Thank you





Appendix



References

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