**2021 Mercedes S-Class AR HUD**

What is it?

The new 2021 Mercedes S-Class comes with a never seen augmented reality heads up display presented on the windshield. The AR HUD provides a speedometer, animated arrows, lane guidance system, directions, and other assistance systems for the driver.

History of HUD and Where is it Used?

AR has been implemented in enhancing heads up displays for a long time now. The idea of having AR present a HUD has been relevant. However, Mercedes will be the first company to offer an AR HUD in an automobile. Some of the best-known applications of AR HUDs are used in the military and consumer based smart glasses. Ex: Tactical Augmented Reality (TAR), EyeRide HUD, Solos, Vuzix Blade, Snap, etc.

What are the Best Suited Applications?

The best suited applications of AR HUDs are when the user is trying to navigate through their environment such as driving your car or riding a motorcycle. Having an AR HUD makes navigation easy as its being displayed on the screen in front of your eyes.

How Does it Work?

The windshield is equipped with a digital mirror device (DMD) developed by Texas Instruments. Some of the technical aspects of the DMD is that it has a resolution of 1.3 megapixels and will project onto a 10-degree horizontal and 5-degree vertical HUD. Some of the digital images that the driver will see can appear up to 10 meters away.

The AR HUD will use the sensors around the car as input and project images on the HUD. Some of the sensors include the forward-looking radar, optical sensors, GPS, and along many others to determine the final information to be displayed. Unfortunately, Mercedes has not given us more information aside from the 1-minute video displays their AR HUD. We will receive more information at a full virtual show on September 2nd, 2020 where they will showcase the S-Class in-depth.

Why it is Unique?

This technology is unique because it will give you a real immersive feeling with AR. Many AR HUDs are used with specialized glasses or a particular helmet. However, the AR HUD on the s-class will require no such equipment. Along with that, the driver does not need to look anywhere else to look at navigation. Many AR HUDs have been implemented in cars but on a center console which requires the driver to look away. The AR HUD on the s-class will make it feel like there are actual arrows on the road for navigation, along with other features. Therefore, it will make the driver see things that are not actually there on the road, ultimately capturing the goal of AR.

Strengths

* Eyes on the Road
  + Since the HUD will be displayed on the windshield, your eyes will remain on the road and you will not have to divert them to look at navigation. This will in fact result in people being better drivers since you speedometer and other navigation tools are closer to your sight line while driving.
* Lane Assistance
  + A big part of driving, especially at night, is to stay in your own lane. It can be hard for some drivers, especially student/new drivers, to stay in their own lanes and not impede into another lane. Having a lane assistance AR HUD present in front of your eyes will give you a better sense of Where your car is in the lane. Therefore, I think this will help out student drivers and we may see many driving schools using this technology in the near future.

Weakness

* Limited Image Range
  + Since the image can only be produced up to 10 meters, we can assume that there will be moments on the road where the driver will not be able to see certain parts of the navigation route. Although this is a weakness, I do not think this is big deal because having 10 meters of data being projected is sufficient. Almost all drivers can safely decide, given 10 meters of knowledge, whether they want to not follow their navigation and go of their own knowledge or simply follow the navigational route.
* Limited Navigation Choice
  + It seems that the navigation on the s-class is coming from an internal OS, so not your phone. Therefore, this feature could limit your navigation capabilities as the driver will not be able to choose google or other companies that offer better navigational apps. Therefore, I think that Mercedes needs to explore this part of the problem a little bit more. It would be certainly better if the S-Class AR HUD offered an input for your phone. This design flaw/choice could discourage drivers from using the AR HUD since most people prefer their phone navigation over anything else.

Simulator Sickness

Rating: 0 – Normal (No Motion Sickness at all)

The AR HUD will present no simulator sickness because will not present fast-moving images or blow up the display screen with different colors. I think it will be pleasing to the eye.

Similar/Related Applications

2021 Mercedes S-Class will be the first car to present an AR HUD to the windshield. However, there are many similar applications that represent this effect.

The first one is an AR HUD in the center console of your car. The 2019 Mercedes Benz has the related AR HUD in its center screen.

There are many helmets that display an AR HUD for motorcyclists such as Exploride HUD.

There are also AR HUDs that are embedded systems that you can attach to your dashboard such as HUDWAY glass.

Lastly, there are many applications of AR HUDs that offer navigation in the Air Force. Pilots have helmets that offer AR HUDs in which the pilot is able to look at the different functionalities of the plane.

Potential Application of the Device

* Driving Schools
  + Using AR HUDs on the windshield is a big benefit in teaching student drivers and making the aware of their surroundings.
* AR HUDs can be applied on big screens now with the new hardware innovations.

Conclusion

Mercedes Benz showed us that we can put AR on big screens now without the requirement of glasses or helmets. Applying a AR HUD on the car windshield will make drivers better and give drivers better understanding of their environments.

References

<https://www.motor1.com/news/432843/2021-mercedes-s-class-interior-preview/>

<https://arstechnica.com/cars/2020/07/augmented-reality-heads-up-displays-for-cars-are-finally-a-real-thing/>

<https://www.army.mil/article/188088/heads_up_display_to_give_soldiers_improved_situational_awareness>

<https://arvrtips.com/eyeride-hud/>

<https://www.autoevolution.com/news/augmented-reality-hud-warps-2021-mercedes-benz-s-class-into-the-future-146657.html>

<https://arstechnica.com/cars/2019/07/look-where-youre-going-is-the-key-to-distracted-driving/>