

- SMART SUN VISOR
(Product Development)

● TERM PROJECT

○ DETAILS

COURSE : Product Development
For Innovation (ENGM 5800)

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MOTIVATION

”For most drivers around the world, the visor component as we know it is not enough to avoid hazardous sun glare, especially at dawn and dusk when the sun can greatly decrease driver’s vision”.

I always felt that the existing visor design functionality is limited and doesn’t really serve the need.

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The background image is a photograph taken from the passenger side of a car, looking towards the driver's seat. A very bright light source, presumably the sun, is shining directly through the windshield, creating a large, intense glare that obscures much of the view outside. The interior of the car is visible, including the rearview mirror, the dashboard, and the heads of two people in the front seats. The overall color palette is dominated by warm, yellowish-white light from the sun and the darker tones of the car's interior.

Did you know!

According to the National Highway Traffic Safety Administration, Sun glare causes approximately 9000 accidents per year and is the second environmental-related reason drivers get into crashes, with the first being slick roads.

Problem Statement

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The driver often faces visibility challenges due to sun glare, especially when the sun is low then there is a good chance that they will be dealing with blinding sunlight. Despite the usage of the visor the problem persists obstructing the driver's line of sight.



AIM:

To design new solutions for the sun visor & to prevent the driver and passengers from being blinded by the sunlight.

OBJECTIVE :

The objective of the project is to create new concepts for a sun visor in the car using product development methods.

INTRODUCTION:

Vehicle functionality is one of the leading segments in innovation and component development. One part of the car that has not been developed through the years is the sun visor. It has been looking almost the same since the 1930s when the first interior sun visor was introduced on the market. The function of the sun visor is to increase visibility by protecting the driver from the light that can disturb the driving, regardless of where the light is coming from.

Evolution Of Car Visor

Car Model

FIG 1: Ford Model T (1924)

FIG 2: Dodge Brothers DH6 (1931)

FIG 3: Typical Design of Present

FIG 4: SAAB 9-5

FIG 5: Tesla Model x



FIG 1



FIG 2



FIG 3



FIG 4



FIG 5

● Analysis Of Current Visor Design

Functional Content

The standard sun visor is positioned on the roof just above the head of the driver and passenger. The sun visor can be seen in figure 6.1. The sun visor is included with an illuminated vanity mirror which lights up when the lid is opened. The light from the lamps is useful when there is limited sunlight and the user wants to look at themselves in the mirror.

Besides, the visor can be seen as a contributing detail to interior class and comfort to the driver and passengers. Using the visor is easily done with a one-hand operation

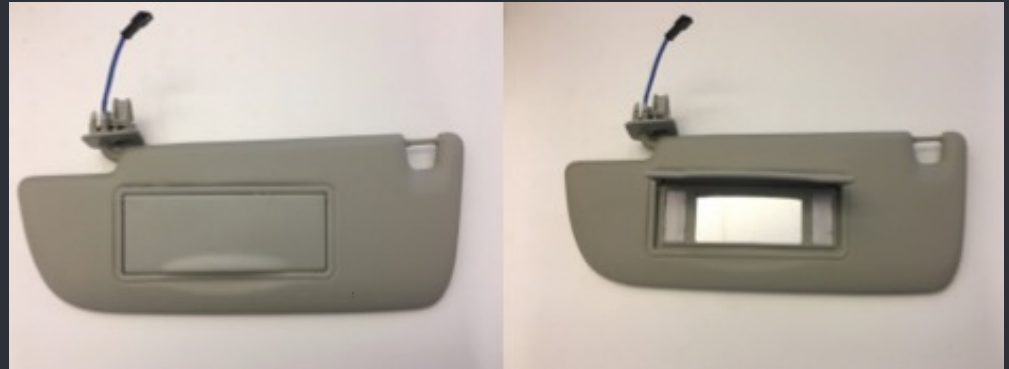


FIG 6.1: The standard sun Visor with closed and open lid.

Components within the visor

1. **Body:** The part that blocks the incoming light & covers the inner components of the visor
2. **Fixing Points:** It controls the position of the sun visor. The components that are attached to the roof are linked to the fixing point so it is important that the fixing points are in the right position for optimal function for the sun visor.
3. **Hinge:** It enables the visor to be folded down and moving it up again to the original position.
4. **Frame:** It is integrated with all other components & carries the structure of the visor.
5. **Sub Frame:** Controls the stability of the mirror.
6. **Vanity Pack:** Consists of a mirror & two lights which are located on the sides of the mirror

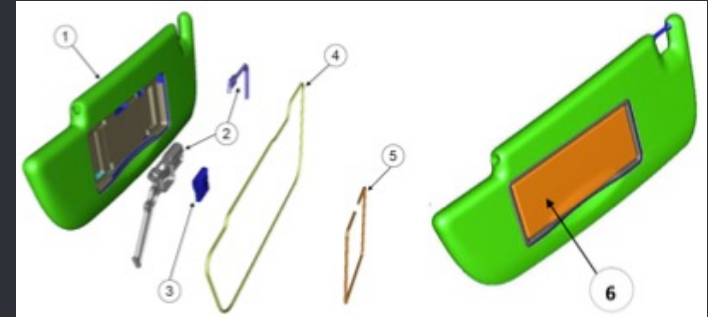


FIG 6.2 Exploded view of the different parts of the sun Visor

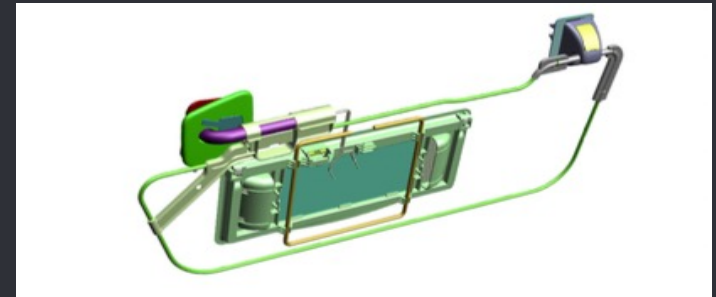


FIG 6.3 Integration and connections of parts that are hidden inside the body.

Problem Identification

Point P1 is a set point where the average height and position of the eyes are located. It is determined by measuring the position of the eyes of various test persons which are all of different lengths and sizes. The sun visor is then regulated by this set point.

The current height and position of the sun visor cause complications for the driver and passengers. A variation in height of the driver and passengers which deviates from point P1 implies that the sun visor will not fulfill its purpose. The sunlight will not be blocked by the sun visor at all if a person is shorter than point P1.

The sun visor is currently protecting the driver from the major part of the sunlight. If the sun is setting at a certain angle in perspective to the driver, the light will reach the driver from the outer sides of the sun visor even though the sun visor is folded down.

If the sun sets low, the sun visor won't protect the driver at all due to the limited height of the sun visor even if the height of the driver is according to point P1.

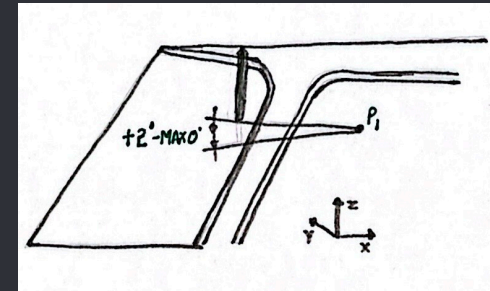
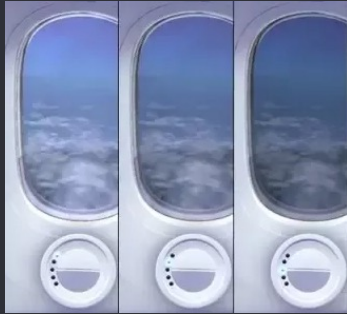


FIG 6.1: View of front windshield and side window of Car.

- Achievable Visor solutions Using TRIZ 40 inventive Principles

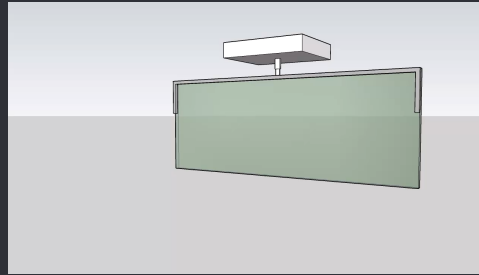
3 Principles were considered in the design of the proposed Visor: a) Taking Out b) Thin & Flexible c) Color Change.

Idea 1



By using the same glass systems used in the airplane window, which is dimmable with the push of a button, utilizes electrochromic technology which is the science of darkening a material using electricity.

Play Video



The model is built using Google Sketchup



Proposed Visor

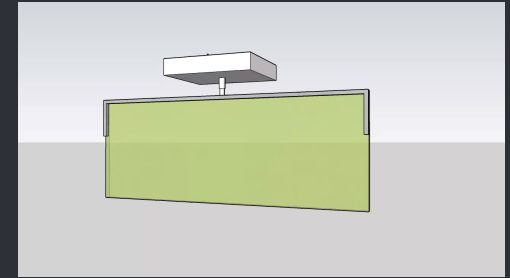
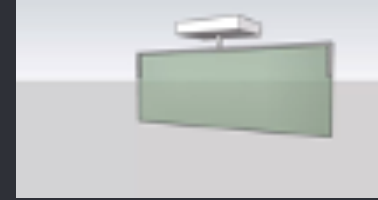


FIG 7: Automated Dimmable Sun Visor That adjusts according to the sun brightness.

● Visor Operating Process

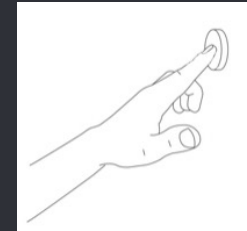
● First

Unfold the Visor vertically down.



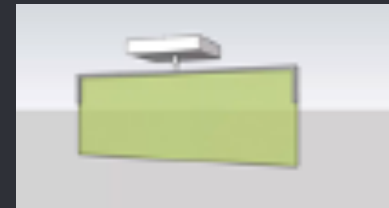
● Second

Push the button for Auto/Manual setting.



● Last

Press multiple times to adjust the dim as required/ put it in auto mode.



- Challenges Of Proposed Design



A picture representing the nearest output.

- Though the Visor size can be made broader, no variation in the height is possible.
- The alternative that can be provided is making the whole windshield a dimmable component, but cannot be done as the front glass is more prone to damage by accidents.

● SWOT ANALYSIS

STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Auto-adjusting opacity in line with the sun's brightness	Expensive Over traditional Visor	Smart Sun Visor can be the first of its kind in the automotive marketplace	Potential legal requirements that could affect a new concept for sun visor
Provides better visibility due to the transparent construction	The new visor function has still limited blinding from the sun, especially for people of short heights.	Even with the upcoming driverless cars, the dimmable concept can be used in the overall windshield and windows.	
Smart cars with smart interior components			

- Qualitative & Quantitative Benefits

Qualitative	Quantitative
Enhanced Visibility: The proposed visor provides a clear line of sight due to the glass screen.	Ease of Use: The degree of the opacity of the Visor can be adjusted as required in manual mode
Safety for Driver's Eyes: The proposed visor would act as a protection to the driver/passenger eye's from harmful sun rays.	Fewer Components: The Proposed Visor comes with the benefit of assembling minimal components during manufacturing.
Enhanced Appearance: The proposed smart visor looks aesthetically appealing compared to the traditional visor.	Safety: The Proposed Visor with better coverage could decrease the rate of accidents caused by blinding the driver due to sun glare.

Commercialization Strategy



Alliances

By alliancing with the leading Car manufacturing companies Like Volvo, Ford and others that believe in smart solutions.



Expo's

Display of the proposed product in every auto show conducted worldwide.



Advertisements

The proposed product can be promoted through advertisements and social media platforms.

Thanks!

ANY QUESTIONS?

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- SOURCE OF INFORMATION

- <https://www.explainthatstuff.com/electrochromic-windows.html>

- <https://en.wikipedia.org/wiki/Sunvisor>

- <https://www.nhtsa.gov>

- <https://www.mdpi.com/2076-3417/10/9/3032/htm>