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Design And Development Of A Navigation System For A Bike

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Abstract: We live in an advanced world where an individual needs to travel from one place to another for one's lively hood. We are used to asking for directions from the people passing by the place. With the developments in technology, we have started to depend on them to take us from point a to point B. Our mobile phone is one of the most important tools that help us in this process. Nowadays most of us use our vehicles to travel. We use our mobile phones as our navigation system to guide us to the correct pinpointed location. These direction instructions can be used only by looking down at our phones while riding which is a hazard to the users. Even if we use an audio device to navigate it is still a hazard as we cannot listen to the upcoming traffic.

Need for a device to bridge this gap was necessary for users as we want to make their life and day-to-day activities easy and risk-free. This was a pain point that was analyzed that a user face. It was essential for a product to be designed, that prevented users from being glued to their screens thus taking their eyes off the road and assisting the users by providing directions via audio.

***Keywords*: Navigation system, Visor Display, Two-wheeler navigation.**

I. INTRODUCTION

In the field of product design, we design and develop a lot of products that help us to make our day-to-day life easier. The product design focuses on solving the problems faced by an individual to have an easy and efficient life. The product is designed after certain steps that ensure that the product is relevant and serves the purpose of manufacturing.

When we travel by car the instrumental cluster shows us the directions and instructs us when there is a change in direction. We are used to doing the same on our bikes by attaching our phones to the mobile holder placed on the handlebar. New RTO rules state that we are not supposed to have mobile holders on our handlebar. Hence, the need for this product arises. The products that do exist are not that well-known in India

II. BACKGROUND THEORY

Literature survey is important while designing any product to understand the psychology of what the users will be attracted to. While doing the literature survey it is not only about the semantics of the product, but also the features of the product that solves the issues and makes the user inclined towards the product. This is research about all the navigation system that is been used in the current time. To understand what the users are currently using and to come up with a product that serves them better than the current one This product can be applied or used on all sorts of two-wheeler road transport, especially a motorcycle. The product will be placed on the handlebar of the vehicle and will indicate the change in direction. This helps us to eliminate the risk of stopping on the side to check our phones for directions or try to check our phones while driving.

2.1 Literature Survey

In this context navigation system is a device that helps us to navigate from one location to the desired pinpoint location. Navigation system can be classified into two types:

2.1.1 Analogue Navigation System:

The world on navigation started from the concept of analogue navigation system. Components like compass, map and star gauge were used to navigate what to location. Most of the analogue navigation tools work pore a vague perspective of trying to take you to the location either with the help of magnetic pole or the landmarks made by the person on the map to direct you to the location. With difficulties in using these tools to navigate to the location was very difficult. This showed the importance of navigation. With advancement in technology, we were able to use the satellite capture images to get more accurate regularly updated information out the world. One of the major contributors for this was Christopher Columbus.

2.1.2 Digital Navigation System:

With the help of all the satellite images and certain software, we can pin a particular location and travel with GPS to assist us. The navigation system uses the network on your phone to pinpoint your location with the help of the network towers.

The software use latitude and longitude to pinpoint the selected location and start giving direction towards it. Nowadays the software is so developed that we not only get the direction but also the information about the traffic jams and the roadblocks if any. The advancement in these details addresses how important this information to the users is.

Most of the systems are connected to our phones with the help of mobile applications or Bluetooth. They use the network on the phone to navigate. Some of these gadgets have an option of either using the original product app or the default maps on the phone for direction.

2.2 Environment study and location study

Environment study is the study of the users based on the kind of surrounding or situation they will be using the product in. In both scenarios the vehicle is either outdoors or in the allotted parking space.

Location study is the process of analysing where the product has been placed on the vehicle. We can bifurcate this according to the type of vehicle.

2.2.1 Two-wheeler:

In two-wheeler the navigation system should be place in a position where the user can see the direction without any difficulty. Hence the product can be placed on two possible positions

- Mounted on the handlebar
- Next to the instrumental cluster

FIG 2.2.1 PRODUCT ON HANDLEBAR

FIG 2.2.2 PRODUCT ON HANDLEBAR

III. DATA COLLECTION AND ANALYSIS

There are a lot of the market navigation systems that exist. The need to conduct a survey and understand the pain points of the products which exist in the market. This is to ensure that the pain points of the existing products have not been repeated and to attract the users. The product that is going to be developed needs to be unique from the existing one to have a selling point

3.1 User Study

There are two types of analysis that helps us to understand end user's requirements.

- Quantitative analysis (Questioner)
- Qualitative analysis (Ethnography Study)

3.2 Market Study

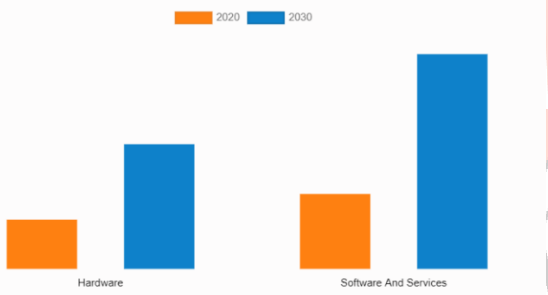

FIG 3.2 MARKET STUDY

With constant growth in technology, we have become very dependent on it. A study says that the demand and growth observed in navigation system will have constant inclined growth as the years go by in terms of both hardware and software.

3.4 Research Findings

In the user research conducted with the help of google forms and interviews the data collected were very helpful in deciding on what the end users are cooling for. It was also helpful in making the ideation sketches related to the expectation of the focus group. The main purpose of the project was to redesign the navigation system that people use while using a two-wheeler into something more futuristic and hazard free.

With the data collected from both ethnography study and google forms about 75% want a change in the navigation system which is more user friendly and futuristics when compared to the ones that we use currently.

IV. CONCEPT GENERATION

Concept Generation is one of the most important things about this project as we are supposed to create the model upon the selected concept. There are many concepts and products that exist in the market. With the help of the market study and trend study of the existing products, we are supposed to create theme board. Everyone has made their own mood board. With all the combined mood board we came up with the one mood board. The concepts will be developed with the theme board as the guidelines.

4.1 Theme Board

FIG 4.1 THEME BOARD

4.2 Ideation sketches

The concepts are divided according to the different solutions that were generated during concept ideation.

- TFT display
- Direction indicator
- AR projector
- Product placed on or in the helmet
- Visor navigation

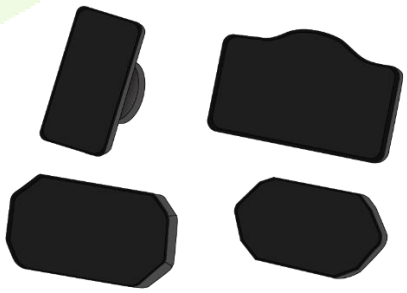

FIG 4.2.1 TFT DISPLAY CONCEPTS

This design is a regular mount on display that can be mounted either on the handlebar or on any other mounting options.

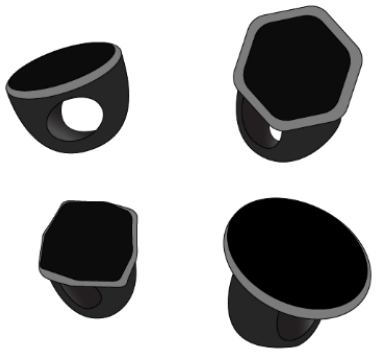

FIG 4.2.2 DIRECTION INDICATOR CONCEPTS

This is a product that provides only directions. These direction instructions are received from the different navigation system software provided by the mobile brands.

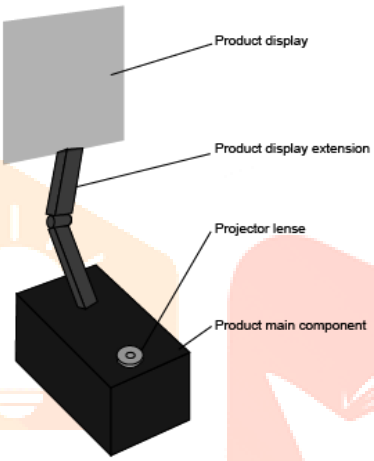

FIG 4.2.3 AR NAVIGATION CONCEPTS

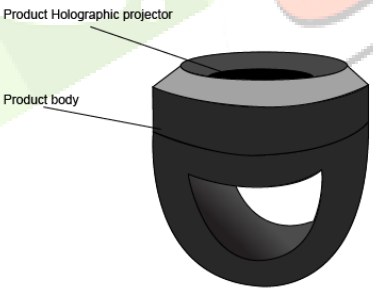

FIG 4.2.4 AR PROJECTOR CONCEPTS

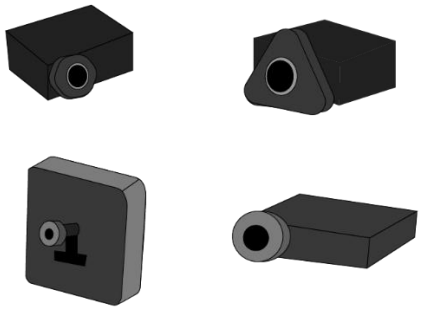

FIG 4.2.5 PROJECTOR CONCEPTS

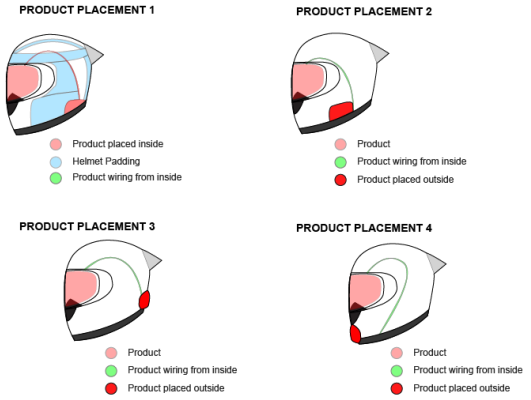

FIG 4.2.6 PRODUCT ON HELMET POSITIONS

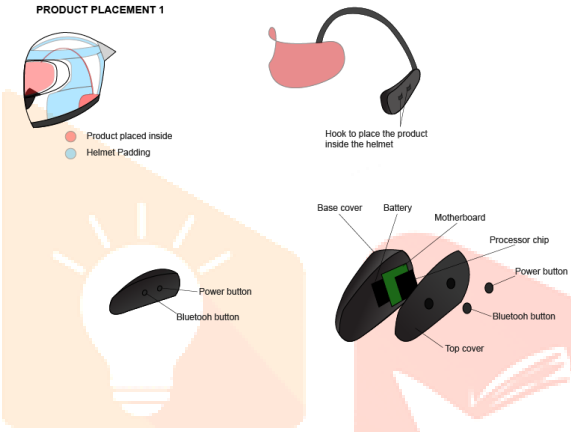

FIG 4.2.7 PRODUCT ON HELMET CONCEPTS 1

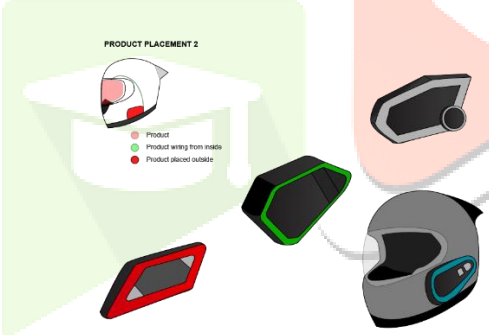

FIG 4.2.8 PRODUCT ON HELMET CONCEPTS 2

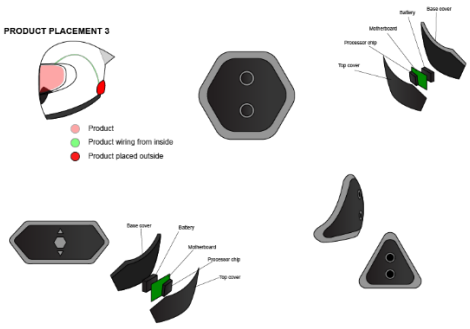

FIG 4.2.9 PRODUCT ON HELMET CONCEPTS 3

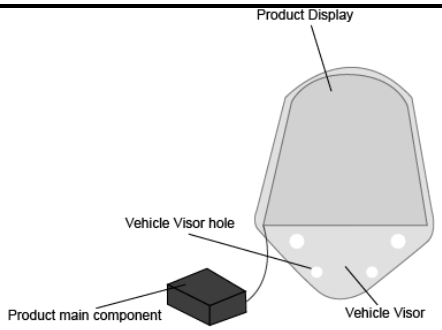

FIG 4.2.10 VISOR NAVIGATION CONCEPTS

This product shows only direction instructions which does not distract the user from the road but also shows the direction at the same time.

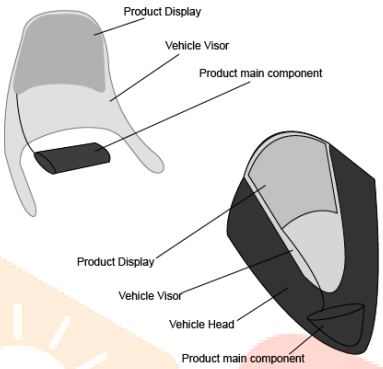

FIG 4.2.11 VISOR NAVIGATION CONCEPTS

The concepts were sketched with the mood board as the inspirations. There were five ways to approach the solution for the users. Each of these solutions were represented with 3 to 6 doodles each. These doodles were sketched to the details of their individual parts. Even to the details of the placement of the parts on the two-wheeler or the ergonomics of the product.

The visor navigation is the most innovative or most apt idea for the problems faced by the users. As it tries to address all the issues faced by the users. It is futuristic in many ways that the users will be depended on it. All the interviewees were an owner of an electric two-wheeler.

V. CONCEPT DETAILING

5.1 Product details

The product is designed to ensure the safety of the user. It is divided into two parts.

•Base – contains all the main components to receive the information from the base. The received information will be processed and converted into visual information and will be sent to the display to share the content

•Display – The information received from the base will be shared onto the display in such a way that it does not block the view of the road.

5.2 3D Model

FIG 5.2.5 PERCEPTIVE VIEW OF BASE

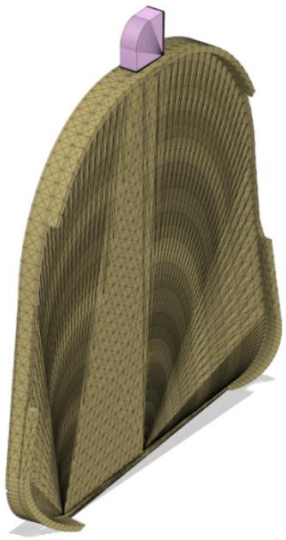

FIG 5.2.8 TOP VIEW OF DISPLAY

The display is 9 inches in width and 10 inches in height

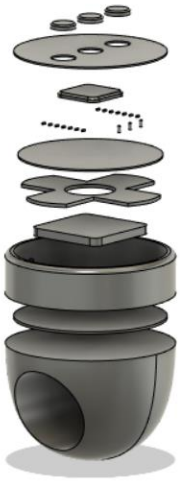

FIG 5.2.7 EXPLODED VIEW OF BASE

5.3 Mobile application

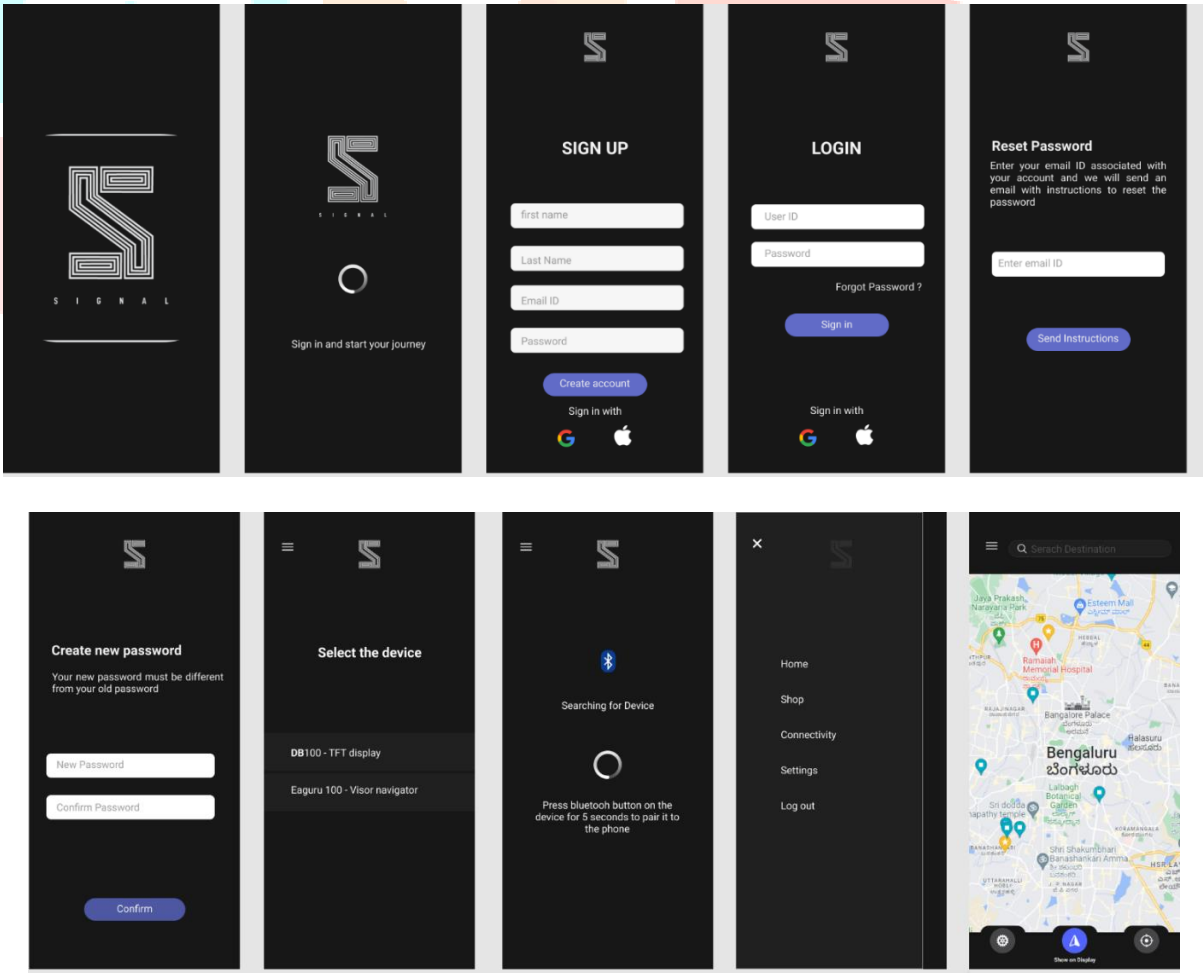

FIG 5.3.1 MOBILE APPLICATION

The mobile application can be downloaded from the play store of the app store. The design of the mobile application was made with the help of Figma. The application controls certain information that is displayed on the product. We can select them accordingly. At first, an account needs to be created. Auto-login using google or apple account for easy sign-in is available. The device needs to be paired to the mobile application

via Bluetooth. Before paring the device, the type of device needs to be selected as it is easy for the application to search the device.

5.4 Concept and context render

FIG 5.4.1 PRODUCT RENDER 1

FIG 5.4.2 PRODUCT RENDER 2

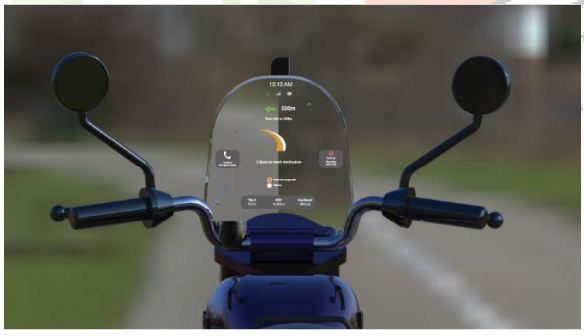

FIG 5.4.6 PRODUCT CONTEXT RENDER 1

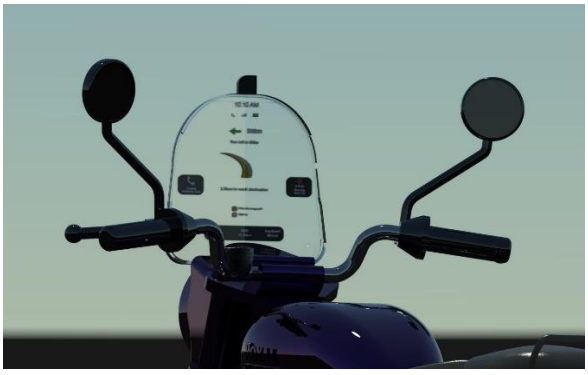

FIG 5.4.7 PRODUCT CONTEXT RENDER 2

FIG 5.4.8 PRODUCT CONTEXT RENDER 3

VI. CONCLUSION

6.1 Conclusion

There is a constant development in a product over the years as there is an improvement in the technology. Similarly, the need for development in the navigation system was very much required. The issue of using the navigation system while riding a two-wheeler was very hazardous for the user and other civilians around. This was the main pinpoint that prompted the path to the thought of creating a new navigation system.

After going through the entire design cycle, a concept was selected and the 3D model and prototype for it were created. This product is a visor navigation system that is divided into two halves: a base that receives the information from our mobile phones and a display in the form of a visor that shows the navigation instructions without obstructing the view of the road ahead. There are two modes in the visor display: a high contrasting visual instruction for the daytime and a highly translucent background for night-time.

The display positioning differs from vehicle to vehicle according to the correct ergonomics. The base product is mounted onto the handlebar which has three buttons on it: power button, Bluetooth pairing, and display contrast. The whole device is paired to our mobile phones via Bluetooth from which the navigation instructions are transferred to the base.

The navigation device is controlled via a mobile application which can be downloaded from the app store or play store. The navigation system comes with a dash cam which is placed above the visor display and records the journey of the user and comes in handy in case of emergencies. A small notification of the time, dashcam video recording, caller notification, and odometer are certain sets of information available on the display.

6.2 Future Work

The best option for advancing this device is by making it more compact and user-friendly for all sorts of vehicles that run on two wheels. This can be incorporated into the protective gear we wear including helmets and glasses which help in making a product compact and futuristic.

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