

HCI/UXD Interface Design for an Innovative Smart Product

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Introduction

With the rise in self-driving technology, machine-learning and big data, technology is getting smarter and smarter each day and it is time the vehicles humans operate do the same. However with cybersecurity still being a relatively new field and news reports on personal information being hacked, the data collected through this product will only be available locally, and users will have full transparency on what can uploaded and used.

The product concept will be a smart monitor that will assist personal transportation and will provide all possible external data during the journey. Before the product can actually be built, the design strategy is to be outlined thus potential stakeholders will see what the product will look like, how it will operate, and who will be able to use it, before agreeing to invest in the product. The [Stakeholder Interview Template \(n.d.\)](#) splits up such questions into 8 different subsections, and 6 subsections will be addressed:

- Project Vision
- Value Proposition
- Customers
- Users
- Process and Workflow
- User Goals (not addressed)
- Context of Use (not addressed)
- Competition

Design Strategy

Project Vision

The project vision for this product will be a smart monitor that will assist personal transportation and will provide all possible external data during the journey. Big data is all information which can be collected ([What is Big Data?, n.d.](#)), e.g. cameras are set up all around a household and a baby is born. As the baby grows and learns to associate words with objects, an audio heatmap can be recorded over the years and show that the baby will say the word “water” more often when the baby is in the kitchen.

Such data recorded in this product can include the travelling speed, temperature and humidity inside and outside, tire pressure, tread rate, the route travelled, how long the destination took, and autonomously recording in-case of any accidents. Certainly large volumes of data will be stored, and to be safe, the data will be stored locally inside something similar to a flight recorder, impervious to accidents. This “black box” will collect only a month’s worth of data, and then the oldest data will be deleted to make space for the newest data. The black box storage size will depend on the user’s daily driving habits according to the filled out questionnaire and will adjust accordingly.

The potential pitfalls for it to be integrated into every mode of transport available - current or still to be developed - is that it will be expensive for first years it is being developed and refined. However if the business survives, costs will drop and become the new mainstream.

Value Proposition

The core value of this product is to offer as much information as possible to users. Currently users have to constantly monitor for hazards around them; this product is not to take away that ability, but to enhance it.

Customers

The target market will be for all vehicles and drivers. At the start, it will be a luxury option which users can invest in, and as time passes and cost goes down, the product will slowly become mainstream and be in every vehicle.

It will be like having a personal artificial-intelligence assistant while driving, and it can assimilate well with driverless technology. In the future, customers will have very little need to have a personal car due to being able to call one like a taxi service. If technology and social constructs allow the growth, facial recognition can be implemented and police and government forces can work together to lock down criminals by taking away their mobility.

Users and Requirements

The user requirements are the same for being able to drive - be of legal age to pass the driving test, correct license and insurance. This product is to accommodate as many people as possible, and since it will mainly be voice-activated, users will have to be able to know how to instruct it and speak in a clear, loud voice.

There will be several options to accommodate users who cannot speak or hear: buttons in the dashboard, and subtitles across the screen.

Process and Workflow

To begin the process of sales, the target market is aimed towards customers who are willing to try out new technology and have the money to spare. Slowly, the market will shift towards the middle-class bracket of having the product inside the vehicle will be a luxury option, until there is no need for sales as it will be integrated inside every vehicle.

The advertising and marketing will introduce a futuristic concept in which customers can help develop and modify the next generation of vehicles. Influential people who also currently propel futuristic technology can help the promotion of this product.

Competition

There are not many similar tools in the market today as it is still a new concept, but several companies have come up with several concepts. For cars, smart windshields can transform the view of the road, highlighting lane markers, warning about collisions, and displaying navigational arrows on the pavement ([Smart Windshields, 2017](#)). For motorcycles, the display is integrated into the visor and [Cross Helmet \(2018\)](#) uses touch gestures on the side of their helmet while [Sena \(2019\)](#) connects through bluetooth to take calls or listen to music or gps directions.

Several safety issues come up immediately - with [Cross Helmet \(2018\)](#) using touch gestures whilst driving can be unbalancing and distracting, even for a second. If a vehicle is travelling at 30 mph, 13.5m is covered each second. [Sena \(2019\)](#) allows calls through and the ability to listen to music.

Thus the product proposed will take the best features and add several restrictions to ensure safety of the user and potential passengers. One of the potential pitfalls is that there is too much information displayed that will clutter up important line-of-sight. Thus the majority of features will be hidden away, only coming up briefly in pop-up windows when voice activated and re-hiding itself; this allows the user to see the desired information and the time-limit will ensure maximum line-of-sight coverage if the user forgets to hide the window.

Since information will be taken up from the physical dashboard (like the current speed, fuel reserves), the extra space now has buttons as a backup if voice-activation does not work, or not preferred. The extra space can also allow for extra safety regulations to be put in place and increase the survivability of passengers in event of an accident.

Designs

The two alternative designs are illustrated in separate folders - "Design01 - View in Car" ([View in Car, n.d.](#)) and "Design02 - View in Motorcycle" ([View in Motorcycle, 2012](#)).

Potential Users

User01

<u>Student James</u> James wants a cheap car to drive around when at university. At this time, the smart-windshield is still fairly new in the automobile industry and it is a luxury option.	<u>Expectations</u> <ul style="list-style-type: none">• Car is decent condition• Doesn't require many repairs• Friendly customer service to help buy the best car for his situation.
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Define	Compare	Negotiate	Select
1) Look at current money available. 2) Decide whether able to into a bit of debt or not.	3) Look at all the car available on market. 4) Research local car dealerships. 5) See if there are any student discounts. 6) Use comparison website tools.	7) With the car dealerships researched, can go around and hear their best offers. 8) See if can get the smart windshield at a lower price or not include it at all.	9) Select and buy the chosen car.

User02

<u>Mandy with a family</u> Mandy is upgrading the family car and can afford to spend a bit more than usual since she has saved up for a while. At this time, the smart-windshield is still fairly new in the automobile industry and it is a luxury option.		<u>Expectations</u> <ul style="list-style-type: none"> • Car is new • Being able to negotiate what extra features available • Family friendly • A discount because trading in old car 	
Define	Compare	Negotiate	Select
1) Look at what kind of new car is wanted 2) Researching what luxury options are available.	3) Look at different car dealerships for which one offers the best discount. 4) What kind of car has what kind of luxuries. 5) Comparing the different kinds of smart windshields	6) Securing the best discount possible. 7) Seeing what car dealerships will be able to offer what she wants.	8) Selecting a smart windshield that will only be active to her voice except for emergencies. 9) Trading in the old car and leaving with the new car.

User03

<u>Biker Adam</u> Adam recently walked away from an accident unscathed luckily, and it was not even his fault! He now needs a new helmet. At this time, smart-helmets are a more expensive option but is more common in the automobile industry.		<u>Expectations</u> <ul style="list-style-type: none"> • Clear information online to what each smart-helmet offers. • Friendly customer support. • Stores close-by to try on the helmet before purchasing. 	
Define	Compare	Negotiate	Select
1) Look at the different smart-helmets and their voice recognition. 2) Look at the price range. 3) See if the smart-helmet is or can be made compatible with his motorcycle.	4) Use comparison websites. 5) See which stores are available locally to try on the smart-helmet.	6) See and choose the different features available. 7) How customizable will the smart-helmet be.	8) Making sure the comfort and voice recognition is perfect for him.

User04

<u>Old Clark</u> Clark has had his car for a long time and now the car does not comply with the government's new rules for road and vehicle safety. Clark can get a new car for free while turning in his old car. At this time, the smart-windshield is common.		<u>Expectations</u> <ul style="list-style-type: none"> • The changing process to be as smooth as possible. • The smart-windshield will not be a hindrance to him. • Clear explanations from customer service. 	
Define	Compare	Negotiate	Select
1) Going to a local car dealership to trade in his new car. 2) Making sure the government is aware of the change.	3) Making sure the new car layout is as similar to his old car.	4) Making the use of the smart-windshield is as easy as possible. 5) Turning on the user assist program.	6) Selecting the new car. 7) Making sure the smart-windshield can be heard and hear Clark clearly.

Evaluation

A heuristic evaluation will be conducted on the smart windshield. 10 questions will be asked and answered and the questions are ([How to Conduct a Heuristic Evaluation, 2017](#)):

1. Visibility of System Status
2. Match between System and the Real World
3. User Control and Freedom
4. Consistency and Standards
5. Error Prevention
6. Recognition rather than Recall
7. Flexibility and Efficiency of Use
8. Aesthetic and Minimalist Design
9. Help Users Recognise, Diagnose, and Recover from Errors
10. Help and Documentation

1	The system will ask if the user has used the system or not. There will also be an option in the settings menu for “new user”. The tutorial can be activated and the system will explain with voice and text, how it can be used and what information is available or recorded.
2	In terms for the GPS navigation the system will use augmented reality to highlight the way, and the pop-up windows will display the information in the correct graphic - whether it would be graphs, charts, or percentage slider.
3	The main purpose of the smart-windshield is to monitor and display information. Users can command which information to display, and what information to share - while some inherent safety features are implemented, like volume control over music.
4	Standardization is the main goal of this product if the dream is to be a new standard in the future of automobiles.
5	The product will monitor any potential accidents which could happen and alert the user. The product is not to take away the ability of the user's ability to detect danger, but to enhance and serve as a backup.
6	There is more recall than recognition due to the voice commands, but there are physical buttons with the appropriate icons.
7	Since the smart-windshield will be voice-activated, it will be very easy to use.
8	The augmented reality screen will take up as little space as possible to avoid cluttering the view of the road, while the relevant important information will be displayed in a clear concise manner.
9	Any potential accidents will be alerted, and users can easily send feedback to diagnose any peculiar problem.
10	The manual will be explained through the through the tutorial and accessible at any time.

Conclusion

The best design I feel is the smart-helmet. Motorcyclists are generally very aware and the product will help increase the awareness without the distraction since it will be voice activated. Motorcyclists also usually have cameras on their vehicles/helmets to help their insurance claim, and to have one built-in while being able to choose what data is uploaded will help out a lot of drivers.

The visor will also have the information centered around the driver's eyesight, whereas in the smart-windshield, the information is centered around the driver's side and cuts the screen right down in the middle.

The GPS feature will reduce users having to fiddle around with their phones for directions, and if there are paired drivers, communication between the helmets will sound nice and clear instead of having to rely on light flashes and hand signals.

For a good user experience, the user must speak in a loud clear voice and not use the buttons provided to reduce distractions while driving. The physical buttons are there as a contingency feature. Users are to be technically aware due to the cameras recording visual and audio data and understand what is to be uploaded/discarded in an event of an accident.

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Appendix

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