The Pennsylvania State University
University Park Campus

Delphi Automotive Systems:
Safe - Green - Connected

EDSGN 100
Section 00#

Innovation for the Real World

Design Team 7
The Avengers
Fall 2014

Safe
Ultimate goal is to help make zero fatalities, zero injuries, and zero accidents a reality

Green
Passionate about creating a world with zero emissions

Connected
Technology to allow seamless connectivity in the vehicle – it’s what consumers want, and we can make it a reality

Submitted to:
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08 Dec 2014
ACKNOWLEDGMENTS

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SECTION 1  EXECUTIVE SUMMARY

In today’s world, the tablet has developed into an important technological device. It is used for work, entertainment, storage, and for personal needs. It helps with many everyday functions and can guide us to more and more information. Such connectivity is so vital in our world, and it keeps us all updated on every detail of our lives. Tablets are so easy to carry and use, but in some situations this is not the case. Such an example would be driving in a car. How can something so vital in our world be used in situations such as driving a vehicle?

Our team, the Avengers, have proposed a solution to this question. We believe we have created a device that can help people overcome such a huge barrier in our world. Our invention is called the SnugTab, and it has much to offer our future customers. Within this report, we have step-by-step details and sketches to better understand our ideas. We have analyzed every angle of this product, and believe that our extensive analysis will provide a clear vision of what we see to our future partners and future customers.

Within this report, one will find our basic sketches of our design. Our report will walk through the life cycle, economic cycles, etc. of this product. We have test various types of materials and have decided which to use precisely. We have also emphasized the importance of how the customers will benefit from our product, and the steps in order to successfully use it to its full potential.

The ability to safely use tablets in a vehicle will open new doors for our society. It will further connect us with the rest of the world, and keep us updates on everything of every second. We hope that our justification spelled out in this entire report satisfies Delphi’s request of creating a new device for a vehicle to benefit our society.
SECTION 2  INTRODUCTION

2.1 PROJECT OBJECTIVES. The object for this is project is to identify technologies and opportunities to make cars and trucks safer, greener, and more connected.

2.2 PROJECT BACKGROUND. There are up to 50 computers buried beneath the skin of the cars and trucks that you see every day on the road. You wouldn’t know they were there. But each of them is making that vehicle safer, greener, and more connected. Many of those computers were designed and built by Delphi.
It seems every day we’re hearing in the news about “cars of the future”, ones that will park themselves, drive themselves, talk to us, use fuel more efficiently, report data to insurance companies, avoid accidents, etc. What does this mean in terms of the technologies needed, societal acceptance, and the policies and supporting systems needed to enable these safer, greener, more connected cars and trucks?

2.3 SPONSOR BACKGROUND. Delphi Automotive is a global automotive components design and manufacturing company— it is one of the world’s largest automotive parts manufacturers and provides electrical and electronic, powertrain, safety, and thermal technology solutions to the global automotive and commercial vehicle markets. Delphi operates 126 manufacturing facilities and 15 technical centers across 32 countries, utilizing a regional service model that enables it to serve its global customers. It has approximately 161,000 employees worldwide, with around 5,000+ located in the United States. Delphi operates through four segments:
Delphi delivers innovation for the real world with technologies that make cars and trucks safer, more environmentally friendly, smarter, better connected, and more affordable than ever before.

   Electrical / Electronic Architecture - Today’s vehicles have to be about more than transportation. They have to entertain, inform, connect, and protect their passengers. The competitive landscape is all about features and functionality. Delphi’s goal is to help auto manufacturers incorporate in demand features without substantially adding to a vehicle’s mass or cost. And it’s not easy. But they have the electrical integration experience, the systems capabilities, and the technologies to deliver unique electrical/electronic architectures for unique needs.
   Major products: Wiring harnesses, electrical centers, vehicle and cell phone wireless charging, data communication cabling, hybrid vehicle charging systems
   Powertrain Systems - Delphi’s advanced engine management systems are making an important contribution to a cleaner tomorrow by minimizing the environmental footprint of vehicles. The manufacturers of motorcycles, lawn and garden equipment, recreational products, power generators, marine engines, and other small engine products also rely on their systems-level knowledge and analysis resources. They have extensive knowledge and
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Experience in fuel injection, electronic controls, sensors, air and fuel management, ignition systems, valve train, fuel handling, and evaporative emissions canisters. And they have a global network of engineering and manufacturing resources to respond quickly and efficiently with localized program support. Major products: Engine Management Systems, Fuel Injection Systems, Ignition Systems, Alternative fuel management systems

Electronics and Safety - Delphi is working to build safer driving experiences that have more information, entertainment and connectivity. Their safety expertise encompasses everything from crash sensing electronics to collision mitigation. And with their radar, vision, and vehicle integration expertise, they’re enabling innovative active safety systems that help make high-performance safety features affordable in the mainstream vehicle market. These systems are designed to support their vision of a society with zero fatalities, zero injuries, and zero accidents. Major products: Engine Control Module, Advanced reception systems, Navigation, displays, adaptive cruise control, radar and camera systems, parking guidance systems

Thermal Systems - Delphi meets its customers’ heating and cooling needs across a wide range of industries, with products that provide world-class comfort. In fact, they’ve been managing air, liquids, and temperature longer than any other automotive supplier in the world. They’ve virtually perfected the science, and were first to integrate electronics, sensors, and special algorithms into climate control systems to make them smarter, faster and better than ever before. This special Delphi technology creates a precise orchestration of vehicle air temperature that can be as sensitive as one-tenth of one degree. At Delphi, they call it thermal management intelligence. Major products: Compressors, HVAC systems, powertrain cooling modules.

2.4 PROJECT CATEGORIES. This project consists of three categories- Safety, Green, and Connected.

Safety – The goal of this category is to prevent fatalities and crashes from occurring, as well as protect all passengers within the vehicles at all times. The creation of vehicles in our world has been a privilege to our everyday functions and plans. However, there can be much danger when entering any vehicle. Our goal is to keep this danger at a very minimal level, to keep our society in a safer and positive environment.

Green – The goal for this section is to limit the amount of pollution created by vehicles (such as emissions), and to ensure a cleaner environment for our customers. Enforcing Green ways can keep the planet-as well as ourselves- healthier and more sustainable.

Connected – the objective for this goal is to implement ways to use advanced technology in a vehicle – styled environment. The ability to use advanced technology helps people to connect to various sources of information. This includes news, media, navigation routes, etc. Staying connected keeps our society updated on how our world is functioning, which is vital in modern times.
2.5 **PROBLEM STATEMENT.** Our focus is to create quick accessibility to information from personal technology devices for all passengers in a vehicle. We would like to ensure that this accessibility is both simple and safe for all of the passengers in the vehicle.
3.1 PROPOSED DEVICE.
Our proposed device is the SnugTab. It is a tray that is located in the passenger’s seats. It allows the passenger to place their tablet in a position that would be convenient and comfortable to use. The second part of our product is the SnugTab Center Console (STCC), and this replaces the original center console of the vehicle. It allows the driver to manage all the features a vehicle offers.

3.2 RATIONALE FOR SELECTION.
Our team decided to produce the SnugTab because it is an easy way for passengers to stay connected. The SnugTab also keeps their personal tablet secure in case of a sudden stop or an accident. In case of an accident, advanced technology in the SnugTab decreases the damage done to the passenger at impact. Our second piece of the product, the STCC, enhances the accessibility to the center console for the driver of the vehicle.

3.3 CUSTOMER NEEDS.
Our product can be used by anyone of age 3 and above. The SnugTab is the perfect product for entertainment while in the back seat of a vehicle. While in a long trip, the SnugTab can be positioned for the passenger to watch movies, play games, and communicate. Because it is connected to the Internet, passengers can go online anytime for any purpose. This opens the doors for many ways to entertain and take advantage of the free time in a car ride. The SnugTab has an adjustable system that prevents the tablet from being dropped in the vehicle. Our product also adds longevity to the usage of the tablet. The SnugTab prohibits dust to enter the device, allowing the tablet to stay clean for a longer period of time. The second part of the product is the SnugTab Center Console (STCC). This product is designed for adults that are driving or are seated in the passenger side of the vehicle. It gives all the basic functions on a single tablet, and offers navigation to the driver.

3.4 OBJECTIVES AND GOALS.
The objective for our product is to provide safety for the customer’s technology. Another main objective is to increase customer comfort and satisfaction. We would like our product to be the best in regards to efficiency. We want the SnugTab to be long lasting and to be used regularly by our customers. We also want to achieve popularity and high sales for the SnugTab. By accomplishing these goals, revenue for our product will remain positive.
3.5 CONCEPT OF OPERATION.

The SnugTab is located on the side of each passenger seat. The passenger can fold it up into place, and use it to safely keep their personal tablet or smart phone. Once the SnugTab is sitting in front of the passenger, the passenger will notice that there is a giant rectangular hole within the tray. Each side of this hole has adjustable sides, so it will be able to fit any sized tablet. The customer selects a corner, and gently places their tablet/phone into this corner. After it “snugs” into place, the other two sides can slide into place with respect to the opposite corner of the passenger’s tablet. By keeping all sides of the tablet secure, the tablet will stay in tact and in one place. It will sit in a position where it will be easy to use, and it will not be harmed or harm the passenger.

Our second device is the SnugTab Center Console (STCC). This is a tablet that replaces a car’s ordinary Center Console. Rather than having numerous buttons and switches for the controls, the driver has one tablet that has various icons to control the basic functions of the car. It also contains a GPS System. This tablet can be taken out of the car as well. The driver can use the tablet at home, and it can become a personal tablet to download other items such as music, maps, etc. The car will become a Hot Spot and will have wireless connection to the internet. This provides millions of ways for our passengers to use their personal tablets and the STCC.

3.6 SYSTEM CONTROLS.

The SnugTab is situated with the seat for each passenger in the vehicle (all except for the driver of the vehicle). It is designed to keep any personal tablet safe and secure, while offering an easy to reach and comfortable position to use it to its full potential. While keeping the tablet safe, the SnugTab prevents the tablet from breaking, getting damaged, or even harming the passengers themselves, if there is ever an accident of the sort. While keeping the tablet secure, the SnugTab prevents the tablet to cause damage to the passenger or to the tablet. The SnugTab Center Console (STCC) is a tablet we provide to our customers to replace the large space the center console of an ordinary vehicle has. It contains every personal control the car has to offer. The STCC will have various icons that each controls a different part of the car. One controls heating and air conditioning, another controls the child lock option for windows and doors, one controls the GPS system, the ability to lock/unlock the doors and windows of the vehicle another operates the radio and the list goes on. What is especially important about the STCC is that it is a tablet. It can be taken out of the car and brought to any location needed. It can hold documents, maps, personal music and pictures, and so much more. The STCC itself can become a personal tablet as well!
3.7 SYSTEM MODEL.

- **Snug Tab Tray**
  - Tablet fits into tray
  - Sides are adjustable

- **Opening to place Tablet**

- **RECTANGULAR FRAME**
  - 4 Adjustable sides
  - w/ 4 handles
3.8 **DAY-IN-THE-LIFE.**

Imagine that a family is going on a road trip miles away from home. This family consists of the father, mother, and two children. They are going to a destination they have never gone to before, and they know very well that this trip will take hours to make. They also know that they have two children that will quickly get bored and irritated for sitting in one place for a long length of time. Luckily, this family owns a vehicle that has the SnugTab and the SnugTab Center Console (STCC) already built and programmed within their car. Now, they will not have to worry about their children because they will pack their personal tablets for their kids to use on the trip. While on the car ride, the kids can listen to music, watch videos or movies, look at pictures, or play games. Because the car has Wi-Fi, the kids can connect to the Internet and explore news, use search engines, read articles, etc. This will keep them occupied, knowing that they have a secure way to hold their tablets and not have them ruined or destroyed. The parents are also fortunate because the STCC allows them to have their GPS System and it gives them easy-to-use controls, to keep everyone in the car satisfied. They can adjust the temperature, turn on the radio, lock to car windows and doors to keep their kids safe, etc. Everything for the driver is at the touch of a button. Before the trip, they can take the STCC inside their home, plug it into a home computer, and then download any personal things they may need for the trip. This may include contact information (to their destination), other maps, personal music, and so much more. The STCC can also connect to the Internet if necessary. For this family, there are hundreds of ways to use our product, and this is the same for all other families and people in our society.
3.9 LIFE CYCLE ASSESSMENT (LCA).
Our SnugTab is made of polycarbonate material, giving it a high compression and tensile strength so it is extra durable. This material is made through chemical reactions, not very electricity demanding except for when the material is shaped into the SnugTab. If one happens to break, I would need to be completely replaced. Maintenance can be done on the hinges and connectors but not on the actual body. Polycarbonate isn’t great at decomposing so disposal will have to be done carefully. Broken or old SnugTab’s can be recycled for their materials, but this takes a lot of energy to do. The SnugTab dash can be repaired or replaced; the tablets can be used for electrical scrap when being disposed of.

3.10 ECONOMIC ASSESSMENT.
There is a 2% level of project definition, end usage is for feasibility of product, judgment/stochastic estimate methodology, accuracy range about 15, preparation estimate: 1. The device will be successful as long as the need to stay connected through electronics is in demand. The SnugTab is complimentary to tablets, so if the demand for the tablet drops, and so will the demand for the SnugTab. There will be constraints in countries that socially don’t stay connected too much. Newer technologies can be adaptable with the SnugTab depending on the design of the new product.

3.11 PRODUCT DEVELOPMENT AND MARKETING.
Prototypes will be developed and tested in DELPHI labs. Crash tests as well as practicality/ beta tests allow people try the new device and give opinions/suggestions. Afterwards, TV and radio commercials will be made and tested with live audiences. Billboards will be designed and erected on busy travel routes. The SnugTab trays will be relatively cheap (around $40 per tray). Sales are going to be done through car companies, allowing them to integrate the device into their car to boost sales. We plan on getting a deal with an upper end automobile company for a big launch, and then afterwards, spread to all other willing car companies. At the end of one year, we expect to have over 1,000,000 SnugTab units installed into consumer cars. The Target consumers being anyone with a car and a smart device (tablet, phone, etc.)
SECTION 4 SUMMARY

There are a number of benefits to the SnugTab. This device has been engineered to keep personal technology secure and handy. Our technology provides easy access to information and other personal needs (music, videos, games, etc.). This tray is adjustable to the passenger’s comfort, and can be adapted to any sized tablets. Our product not only provides easy-to-use trays for their personal tablets, but also includes a tablet to replace the Center Console. The SnugTab Center Console (SnugTab CC) provides easy access to all system controls of the vehicle. This includes a GPS system, Heating/Cooling, Radio or personal Music, Child lock on windows and doors, and much more.

The SnugTab has a very limited amount of disadvantages. The product does not include a screen protector which does not protect the tablet from gaining scratches. It also lacks the ability to charge the tablet. By not being able to charge on the SnugTab, the user would have to remove the tablet and charge it on the car power outlet. Another disadvantage is that the SnugTab is not spill proof. Therefore, it would be crucial for the tablet to make contact if in any accidental spills that may occur in the vehicle. The product is not suited for babies and young children. They cannot be entertained because their age group does not know how to function with tablets well. The SnugTab is also not suited for passengers who develop headaches when focusing on screens for long periods of time.

We believe our product has a bright future. New applications are already being in the working process. A new addition to the SnugTab will be a built-in charger, which will allow the tablet to charge the entire time it’s in use. Our product will include a screen protector. The screen protector will make the tablet safer and allow it to have clean and fresh look. Another future application that would make the product more popular would be to have customizable colors. This way people can have the conformity to have the SnugTab in their favorite color.

Overall, the SnugTab is an excellent product for entertainment and safety. It promotes comfort and accessibility to the tablet being used. The customer will be satisfied knowing their tablet will be safe and secure while using our product. Also, the STCC adds an important dimension to our product. Not only does it allow the driver to manage all the features of the vehicle but it also gives a luxurious image to the vehicle. The SnugTab is expected to have a successful marketing campaign.

