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

Passionate about creating a world with zero emissions

Technology to allow seamless connectivity in the vehicle – it’s what consumers want, and we can make it a reality
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SECTION 1  EXECUTIVE SUMMARY

Our design team worked on the safety aspect of this project. We decided that safety on the road, for the driver and others, is one of the most important things that can always be improved. We were especially concerned with work zone safety. We designed a device that is designed to control speeds in work zones and prevent fatalities. Our design will not only protect drivers, but it will also protect the workers. This design will be quickly adapted by the consumer and companies because they will see the increase in safety and the money they can save.
SECTION 2 INTRODUCTION

2.1 PROJECT OBJECTIVES. The objective of the project is to design and identify technology that could make cars safer, greener or more connected.

2.2 PROJECT BACKGROUND. There are up to 50 computers already hidden in the cars and trucks that we drive every day. You might not notice they’re there, but you would definitely notice if they were gone. Cars of the future are often talked about but what is it going to take in terms of technology, societal acceptance and policies and supporting systems?

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 has four segments: Electrical systems, powertrain systems, electronics and safety, and thermal systems. Delphi’s goal in all of these segments is to create safe, green and connected technology.

2.4 PROJECT CATEGORIES. The three categories the project should be focused on are safe, green and connected. Delphi is interested in technologies that can prevent accidents and injuries, they want to promote a better environment and they want everything in your car to have seamless connectivity.

2.5 PROBLEM STATEMENT. Our device is designed to stop speeding in work zones. Speeding in work zones is a huge issue that caused 609 fatalities in 2012, according to workzonesafety.org. Our design focuses heavily on the safety category of the project and our ultimate goal is to reduce work zone accidents to zero.
SECTION 3 METHODOLOGY

3.1 PROPOSED DEVICE. The device we are proposing is a sensor controlled speed governor in cars. It will be wirelessly activated upon entering a work zone and will limit acceleration if the vehicle travels over the permitted speed. The wireless system that turns on the governors will be used just as any other construction equipment, the workers will turn it on when they arrive at the job site and then they will turn it off when they go home for the day. The system will also be able to be remotely controlled by emergency personnel.

3.2 RATIONALE FOR SELECTION. We have designed this device because it will improve the safety of the workers and of the drivers. It will certainly limit the high number of work zone accidents.

3.3 CUSTOMER NEEDS. The customers of this device will be car companies and construction companies. This will satisfy several needs of both companies. The construction companies will need to purchase the wireless system to turn on the governors and the car companies will need to put the sensor-controlled governors in their cars. The car companies will want to do this to show that they are the safest car on the market and the one that people want to buy. The construction companies will want to do this to prevent fatalities and accidents on the job. This device will help construction workers keep their employees safe from harm. According to work zone safety, there were 609 work zone fatalities in 2012. This device will save consumers and construction companies money. According to the Rocky Mountain Insurance Information Association the average liability claim for property damage was $3,073, the average claim for bodily injury was $14,653, the average collision claim was $2,950 and the average comprehensive claim was $1,585. The costs of getting into an accident are very expensive and it affects all parties involved. The costs of an accident are pain 50% by private insurers, 27% by the victims and third parties like other motorists and charities, health care facilities pick up 14% of the cost and the remaining 9% is paid by local, state and federal governments. This devices stands to save all of those entities money, and they will all support that. Speeding is costly and it accounts for 21% of economic loss from accidents. The cost of preventing accidents greatly outweighs the cost of the accidents themselves. This device will save money and time, and will prevent reckless driving from causing accidents in work zones.

3.4 OBJECTIVES AND GOALS. The objective of this device is to improve safety of motorists and workers in work zones. The ideal goal is to reduce work zone fatalities due to speeding and other reckless driving to 0.

3.5 CONCEPT OF OPERATION. This device will be implemented into the engine of your car. The consumer will not even know that the device is there if they are not in a work zone. Upon
entering a work zone, the governor will turn on and the user will not be able to give the car gas if they are above the allowable speed. If the user was speeding before, they will gradually be slowed to the permitted speed and then will be prevented from accelerating past it. Upon leaving the work zone, the governor will be deactivated and the user will no longer be able to detect a change.

3.6 SYSTEM CONTROLS. The device will be installed to the engine of a car and will be activated by a wireless system placed in work zones. When activated the governor will work by restricting air and fuel going into the engine, which limits the maximum speed the car can accelerate to.

3.7 SYSTEM MODEL.

This image shows how the governor will be incorporated into the car. 
<www.429mustangcougarinfo.50megs.com>
This is a model of the device. As you can see the device is very small, only .18 cm across. It will be built into the engine just like any other part would be. The other device necessary for this to work is the wireless activating system. The wireless activating system will be placed near the entrance to a work zone, early enough that drivers will be completely slowed down when the enter the working area. In the case of an emergency, the workers will always be able to remotely turn off the device so that someone can get through quickly. There will be warning at one and two miles before the activation point so that the driver will know that they are going to be slowed down. In the case of an emergency there will be a phone code that the user can call if there is an emergency and they can get the activator turned off. This is good in two ways: 1. The driver will not be slowed down and can take care of the emergency in a timely manner and 2. The workers will know that someone is going to speed through and can get out of the way if they are in danger. This system will take some time for workers to get used to at first, but after time it will be just like any other piece of construction equipment.

3.8 DAY-IN-THE-LIFE. As a car dries down the highway, the speed limit is 70 mph. The car is driving at this speed until a work zone approaches. During the hours work is occurring in this work zone, the speed limit is 45 mph. Before the car enters the work zone, it will start to slow down. By the time it enters the work zone, the speed of the car is 45 mph. The car cannot travel at any speed higher than this due to the speed limiter installed in the car. It will travel at this speed until it exits the work zone, at which point it can accelerate back to the previous speed limit.
3.9 LIFE CYCLE ASSESSMENT (LCA). There is a low environmental impact caused by this product. Due to its design, it will last for as long as the car is usable. They are low maintenance devices with a simple design so no wires will be damaged or cause damage to any part of the car. They can be recycled like any other electronic product such as phones or laptops. They are collected in bins and taken to a factory where they are broken down and used to create new parts for that same product or for a new device.

3.10 ECONOMIC ASSESSMENT. A class S estimate of cost using AACE methodology, the cost of the average speed governor is about $60 - $100. According to the US DOT there were 253,108,389 cars registered by highway driving. These governors will need to have sensors that turn them on upon entering the work zone. Outfitting existing cars could prove to be expensive, but putting the governors on during the manufacturing process would be much cheaper. Construction companies will pay for the power systems because of concerns for safety of the workers.

3.11 PRODUCT DEVELOPMENT AND MARKETING. The product will be developed by first being attached to the engine of the car. This device will have a sensor in order to sense when the car enters the work zones. The speed of the car will then decrease to meet safe speed limits. In order to test this device using beta testing, a car will be driven on a road with these sensors. The car will be observed to see if the sensors and governor cause the car to slow down. The next step is market testing, so the car will be tested with the sensors through a work zone on the highway. The target selling price of the device is $100, this is to help pay for the installation of the device within the car. All new car will have this governor preinstalled and all existing cars will have 6 months to buy and install the speed limiter. Therefore, the product will be launched for everyone who has a car, and will be regulated by the government in order to ensure the devices are installed in all cars.
The benefits of implementing this device are the increased safety of both the workers and drivers. This device has a simple design and can be installed fairly quickly within cars. However, there may be a problem if there is an emergency that occurs within the work zone radius. Another possible use for this device and control system could be used for police during high speed chases. This would reduce the danger and damage caused when criminals try to run from police. We believe this is a feasible idea because it is simple and easy to use. The price for each governor and installation may even come down because such a large quantity of devices are being used and installed. Some people may see this as bad but it only affects cars when driving through work zones.