Driving Dilemmas

App Proposal

Driving Dilemma Icon

by Kim Brucker

"What can you do when forced to make a decision with too little information? How much of your best thinking can you do, say in three seconds?" (Northeastern University College of Engineering [NEU-COE]). Most accidents occur during repetitious driving events. Ninety-five percent of accidents are the result of indecision or poor decision making. Drivers can learn how to respond to such events and make decisions that will prevent accidents. (NEU-COE). Experience is the most common way of learning how to prevent accidents. New drivers make simple mistakes such as driving too fast for conditions, turning the wrong direction on a one-way street, misjudging traffic, or simply taking too long to decide and respond to unfamiliar events (National Safety Council [NSC]). Studies have shown that accident and citation rates are much higher in the first month of having a license than any of the 11 following months (Insurance Institute for Highway Safety-Highway Loss Data Institute [IIHS-HLDI], 2001). After seven months, the rate of accidents for new drivers is 40% less than the first month, and by two years later, the rate drops to 60% less (IIHS-HLDI, 2001).

Motivation

I close my eyes and replay the scene. "It is a nice sunny day and I am driving home from school. Perhaps, I am a little distracted by the warm weather and the colorful scenery. Traveling down a hill, I pick up speed until I enter the sharp left corner at the bottom. I slow down, but not enough. In the turn, the back of the car slides on loose gravel. I slam on the breaks and steer to the left. The car heads straight for the ditch. I quickly steer the other way and end up in the other ditch." Fortunately, for me, that is all that happen. Thirty years later I have never made the same mistake again. I have been able to correctly handle a skid. Not because I am a perfect driver, but because in that split second, my consciousness recorded my actions, mistakes and the consequences. I gained experience by making a mistake. Unfortunately, in driving, there may not be a second chance. How can we learn by mistakes and consequences and still be safe?

Another issue to consider with inexperienced drivers is automation and technology availability in vehicles. Are new drivers going to lose decision making skills because of the auto's ability to monitor details? For current drivers, who already have experience in driving and decision-making, the new technology serves as an additional level of protection against human error. Technology has been proven to improve safety. Automation in air-travel has reduced one of the most common causes of accidents, human error. However, the Air France 447 plane crash is a safety paradox of automation (Mars, 2015). In the late 80s, airplane manufacturers added additional safety measures intended to reduce human error called fly-

by-wire (Langewiesche 2014). Fly-by-wire is a computer that maneuvers the plane safely based on pilot commands not actions. In Air France's Flight 447 the fly-by-wire system turned itself off and essentially stopped flying the plane. The pilots then had complete control over a plane they were not prepared to fly (Langewiesche 2014). As automation increases, the need for manual abilities decreases. What will happen as cars get more and more automated and drivers and new drivers rely heavily on the technology? Will the ability to perform decisive driving get lost?

Purpose

Driving Dilemmas is an app concept that is intended to improve the decision-making process for unique driving situations that cannot be simulated in normal driving classes and is affordable in comparison to professional simulators. It is not intended to replace driving practice or simulators.

Samples of situations would be flooding, icy conditions, tire blowout, accident avoidance, etc. Driving dilemmas can also be used to prepare learners for new driving situations prior to practical application such as multi-lane traffic, high-traffic areas, or complex navigation.

Existing driver education apps are quizzes for written exams, or driving games focusing on speed and agility. Driving Dilemmas will provide 3D visual simulations of events that would be unsafe to practice in moving vehicles. Learners will be required to make the appropriate and timely decision for handling the simulated situation in order to succeed.

Available Research

Extensive documentation has been gathered on driving statistics. Further analysis would help establish the focus of content.

- Teen driving statistics (Published).

- Driver experience statistics (Published).
- Driver inexperience research (Published).

Research

Additional research needed would include:

- Review of department of transportation (DOT) statistics, using variables such as age, accidents, citations, vehicle information, and any trends in accidents involving artificial intelligence (AI) equipped cars. Track accident information for young drivers using AI cars.
- Interviews and surveys with subject matter experts (SME) to determine common weaknesses for new drivers. Use that information to develop a beta version using those weaknesses.
- Create a beta version to use for a controlled study of driver education students. One group will practice on Driving Dilemmas during driver education and before driving. The control group will drive without exposure to Driving Dilemmas.

Currently, Judy Weber-Jones, the president elect of the Illinois High School and College Driver Education Association has tentatively agreed to serve as SME for this project. In addition, many of her colleagues, experienced driver education (DE) teachers, may also be available as SMEs. Ms. Weber-Jones teaches at Urbana High School and has 35 years of experience in driver education. She is in charge of the 2-day State DE Conference in Effingham (May 2020) and suggested possibly introducing Driving Dilemmas at the conference if the beta version is available.

Evaluation

Is there any notable difference between the participants using Driving Dilemmas and the control group? This can be measured by improved driving scores for the driving portion of driver's education and interviews with instructors and participants.

Beta Version Financing

- Subject matter expert (SME) for content and editorial purposes: $2000
- Additional research surveys with several driving instructors: $500
- Design (including art and interface design: $5000
- Development of front-end and back-end programming: $7500.
- Testing and modifications: $2000

Total request $17,000.

Funding Sources

Insurance companies could be a source of funding. If drivers are trained to improve their spontaneous decision making, there may be a reduction in claims. This is especially important as automobiles get more and more complex.

Government grants might also be an option. Improvement of safety on roads is important for reducing accidents.

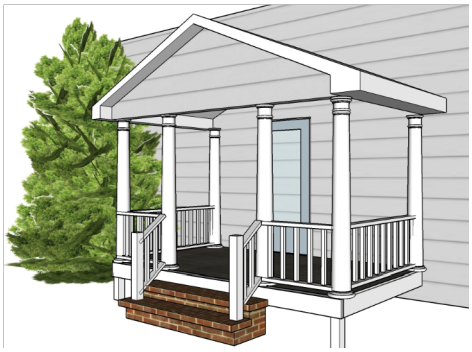
Driving schools may be interest in using this app to improve their success rate.

Learning objectives

- Introduce drivers to situations that might arise outside of normal driving training.
- Train drivers to make good and timely decisions in unfamiliar circumstances.
- Practice making decisions based on visual cues.
- Practice procedural steps in driving situations.
- Prepare drivers for the consequences resulting from poor decision-making.

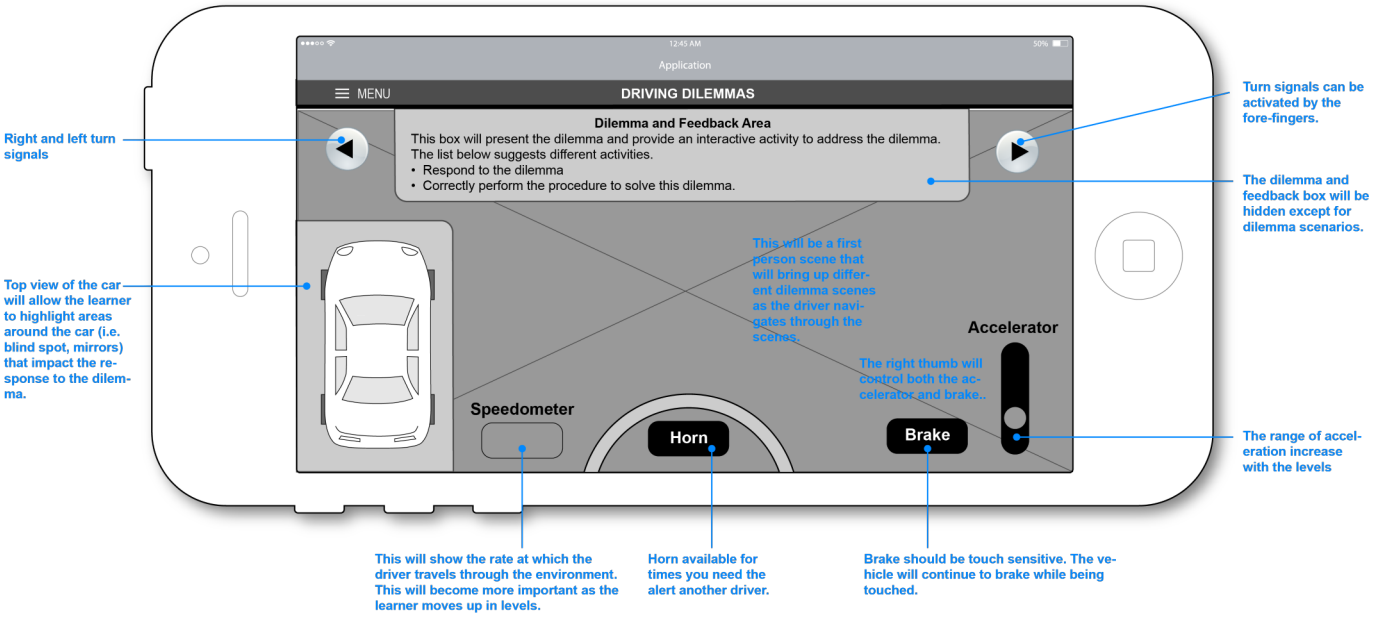
User Experience

The layout of the App shares a similar concept with driving simulators. However, there should be less detail in the background to keep the focus on decision making. I believe a simply animated but not juvenile environment would be appropriate.



User Interface

Driving Dilemmas uses a dynamic interface for a smart phone or tablet. The phone and tablet will act as a steering wheel. Additional controls include an accelerator, brake, speedometer, and turn signals. The top view of the car will appear when the learner needs to make decisions pertaining to locations on the car.



Level 1

LEARNING STAGE

The objective for level one is to introduce learners to unique situations that they may come across while driving that are new to them.

Drivers will be directed through a 3D environment. At various dilemma points the scene will freeze and the driver will be presented with a question on how to respond to the situation. These questions will be multiple choice, ordering procedures or true/false.

Answering correctly will result in earning credit, positive feedback and continuation of the level.

When mistakes are made, the learner will be provided with the correct actions to take. Drivers will be educated on the consequences of the mistake. Consequences may include exchanging insurance cards, contacting police, or calling a tow-truck.

This is intended to help learners understand the seriousness of mistakes. Typically, in driving apps when you wreck you are given a new car and get to start over. There are no start-overs in motor vehicle accidents and learners have to be prepared to handle everything appropriately.

- Feedback will be presented in a written format and verbally.
- The dilemmas will repeat until all situations are correctly addressed.
- The learner then moves onto the next level.

Level 2

RESPONSIVE STAGE

The objective of this level is to respond to dilemmas by using the dynamic car interface to perform correct procedures to avoid accidents.

- In level two, progression through the 3D environment will not stop at dilemma points. The learner will have to correctly respond to visual cues and verbal directions.
- As in level one, the driver continues through the scene, collecting credits until a mistake is made.
- When a mistake is made at this level, learners will be stopped and given a link directing them to review the correct response in level 1. Another link will be provided to return to their current level.
- When they return to level two, they will be placed in a location prior to where the mistake occurred. This will give them a chance to address the dilemma dynamically.
- This level will focus on correcting mistakes after reviewing the proper response.
- As in level one, they graduate to the next level when successfully passing all the dilemmas.

Level 3

APPLICATION STAGE

The objective of level three is to allow the learner to proceed with increased dynamic driver control of speed and handling.

- This level will not limit speed and steering.
- By permitting this, the learner will be exposed to operator error as a variable in dilemmas. Speeding, oversteering and aggressive braking are common errors made by new drivers.
- Introducing the variable of operator error may create new dilemmas as well as eliminate previous dilemmas by defensive driving.
- Minor mistakes will be addressed with verbal feedback and suggestions for improvement.
- For severe mistakes, resulting in an accident, the learner will experience serious consequences, and the driver will be sent back to level one to review proper procedures for the mistake and then return to this level.

- In order to pass on to level 4, the learner will need to perform level 3 by handling dilemmas with no severe mistakes.

Level 5

PRACTICE STAGE

The objective of level five is to successfully maneuver throughout the environment without making mistakes.

- Level five is a free play where drivers can test their driving skills. The focus will be on fast responses to dilemmas.
- The driver will have total control over speed and handling.
- This level will measure time. The intention is not to encourage speeding but nurture quick decision making.
- In this level, dilemmas will be scored based on the learner's proficiency in addressing the dilemma. A driver can continue to practice and work to improve their score.

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