Gamification-supported Exploration of Natural User Interfaces

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ABSTRACT
In this paper, we describe a novel concept for motivating users to explore applications using natural user interfaces in the automotive domain. Based on prior findings, it can be very hard for users to detect opportunities of action in such systems. Additionally, traditional "did you know?" hints seem to be ignored by many users today. As a countermeasure, we describe an approach that shall motivate users to explore natural user interfaces by using game elements. By awarding the user with badges and experience level-ups, we hope to create a stronger motivation that is at least maintained until the user is used to the system.

Author Keywords
Gamification; natural user interface exploration; V2X.

ACM Classification Keywords
H.5.2. Information interfaces and presentation (e.g., HCI): User Interfaces

INTRODUCTION AND MOTIVATION
Today's cars have hundreds of features that can be controlled by the driver or other vehicle passengers. Some of the features can easily be accessed via the car's control elements or the in-vehicle infotainment system (IVIS), other features are hidden in deep menus. Car manufacturers try to make access to all functions more intuitive, for example by integrating interactive voice response (IVR) systems into the vehicles. Besides simplifying the access to the functions, natural user interfaces (NUIs) are also introduced for minimizing the driver distraction. However, exploring and remembering artificial gestures and predefined voice commands can be partly also very challenging [6].

In our previous work, we have developed the Android-based driver assistance and awareness system *DriveAssist* [4]. The mobile application runs on the user's personal portable device, such as a smartphone or a tablet PC, which is integrated in the vehicle [3]. The application can derive real time traffic information from vehicle-to-x (V2X) communication services [2] as well as from central traffic services. It could be extended to include other information, both from local sensors as well as nearby vehicles in the future [8]. Since the application is running on modern mobile devices that provide touch input and application programming interfaces to viable speech recognition, a NUI for interacting with the application can be realised without great effort. So far, we are only supporting touch input, but voice recognition is planned in the future as well.

Figure 1. The main screen of *DriveAssist* research prototype. The yellow sticky label-like box in the lower left corner shows random hints for the user. In a first user study, only one out of 12 participants found this way of providing hints useful.

In order to create an intuitively usable software, we have conducted several user studies with *DriveAssist*. Already in one of the first experiments, we noticed that many users were not able to find and use basic functions. Especially subjects that have not been used to modern mobile devices had large difficulties in exploring touch menus, or in performing 'pinch-to-zoom' or rotation gestures. In a second run, we added a yellow randomly chosen "did you know?"-like hint to the main screen (depicted in Fig. 1). However, out of 12 participants working with the application for more than 45 minutes, only 7 did really notice the hint and only one subject stated that s/he found the hint useful.

For that reason, we have created several concepts that could cope with the problem that many functions remain hidden when using natural user interfaces in the automotive domain. In this paper, we want to shortly introduce one concept that uses game elements, such as badges or experience levels, in order to motivate users to explore the application's natural user interface.

RELATED WORK
The use of game design elements in non-gaming context is also known as 'gamification' [1]. Rewarding people with

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badges and points for real world behavior can be used to make people try new things or to do things repeatedly. Psychological experiments in the area of educational and professional training have shown that the effect of gamification is triggered by introducing an emotional component [5]. Several examples demonstrate that gamification is working. For example, Foursquare[1] uses the gamification elements 'leaderboards' and 'badges' in order to make people check-in into locations, such as stores, restaurants or outdoor locations.

In addition, people like to share and compare the things they are doing. This is the basis of many social platforms, such as Facebook, Twitter or Google+. An example that combines gamification elements with 'share and compare' is Nike+[2]. On Nike+, users have the ability to track, share and challenge with friends and other runners across the world. Game elements, such as challenges, badges, achievements and rewards create an engaging experience that enriches the real world activity. In the automotive domain, Ford's *MyFord*[3] is a first example of using game elements for deepening the relation to cars through gamification.

Pfleging et al. have also addressed the issue that natural user interfaces can be challenging when they are used isolated in automotive environments [7]. For that reason, they have created the interactive system *SpeeT* that combines touch gestures with speech. Among other things, this system allows making opportunities for action visible to users.

GAMIFICATION FOR NUI EXPLORATION

Since humans like competing, winning, sharing and comparing, we want to bring up the usage of gamification for motivating users to explore functionality of NUIs for discussion. In the following, we have gathered some short thoughts about how such a system could be made up.

The approach could be mainly based on two different types of awards. For more common functions that can be more easily accessed (for example, such that are placed in higher menu levels), a simple one time-awarded badge should be sufficient. This can be used as motivation for exploring little common things. However, the choice of functions for which badges are awarded should not include to many trivial things so that the user has the feeling that s/he is taken seriously. For actions that may be less known to many people, the system could use experience levels that rise with every n-th activation of a function. This would ensures that the users are motivated to use a function for several times. An example could be 'changing the chassis configuration' via the IVR system.

In order to get an overview of what can be explored, the user should have an easy to access list showing all available badges and experience levels. This could, for example, be realized in *DriveAssist* by adding a little cup icon in the main menu. That way, the user can quickly identify what functions are still unexplored or could be explored more. In addition to the awards, a short instruction should be accessible from the overview screen.

An important factor for automotive applications is that the driver is not distracted by any non-driving related action. For that reason, it could be better not to directly award gathered badges or experience level-ups when the car is moving. For example, when the user activated a function while driving, the system could inform her/him about new awards when the car stops for the next time. In cases the car is standing still, the gained badge or experience level should be announced directly. In that way, the user's memory can directly link the performed action with the activated functionality.

In order to make use of the 'share and compare' motivation, the user's social network accounts could be linked to the system. This would allow sharing new badges and experience level-ups directly with the user's friends in real time.

CONCLUSION

Natural user interfaces are a great interaction approach. But in many cases, users do not see the opportunities for action. With our gamification-supported approach, we hope to provide enough motivation for the users to explore NUIs in the automotive domain.

We are currently working on a preliminary concept of this feature and are planning to integrate it into *DriveAssist* in the near future. Afterwards, we plan to conduct a user study in order to analyse the effect of the gamification elements on the users' behavior.

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