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# Reducing Congestion through Persuasive Gaming

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*From the Car as an Arena for Gaming Workshop at  
MobileHCI 2012, San Francisco.*

**Abstract**

In this paper we provide an overview of the I-GEAR (incentives and gaming environments for automobile routing) project that is intended to reduce traffic congestion in Luxembourg through the use of persuasive gaming. In order to illustrate some of the issues involved we also present an outline concept of a live game in which we propose to encourage the workshop participants to take part. If a sufficient number of workshop participants take part, this real life game could even be used as a small scale study within the project.

**Author Keywords**

Persuasive gaming; traffic congestion; real life game; driver behavior

**ACM Classification Keywords**

H.5.2 [Information Interfaces and Presentation]: User Interfaces; H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems; K.4.2 [Computers and Society]: Social Issues.

**Introduction**

In the following paper we will expand on our basic idea that driving may be considered part of a game and that approaches from location-aware pervasive and persuasive gaming can be relevant. Furthermore, we specifically address the problem of how such games

could be played by proposing that during the workshop the participants engage in a simplified driving game. We plan to use this “mock” game as not only a mean to explore the range of potential behaviors within such gaming scenarios but also as a basic study of the effects of different incentives.

### **Background**

Our research is motivated by an immediate and pressing problem that the City of Luxembourg (population c.90,000) is the 10th most congested city in Europe [1] with around 120,000 commuters coming in daily [2]; with the result that the congestion increases journey times by around 21% [3]. These problems are further compounded by the general reduction in capital spending by governments; with the result that there is unlikely to be much increase in road capacity or in the provision of more advanced traffic management systems. Therefore there is need to move the cost of managing the problem onto the motorist, predominantly through encouraging them to use their smartphones to aid in traffic management.

### **Social gaming as behavior changer**

Given these problems we are currently working on solutions that use social gaming coupled with incentives as a method of persuading traffic participants to undertake new behaviors. In order to support this idea we take the view that moving in traffic can be viewed as a pervasive game [4], in the sense that people complete a series of goals or sub-goals within a gaming environment where the precise boundary between game and non-game is not clear. Furthermore, there exists a set of social norms (e.g. the project leader can park nearer the office) and laws (e.g. right lane driving,

speed limits etc.) that encourage traffic participants to behave in certain ways.

In the I-GEAR project we will develop and test a persuasive game that will encourage traffic participants to undertake certain courses of action that will result in the reduction of congestion. We will draw on the idea of gamification [5] by introducing elements from computer games such as leaderboards, challenges, competitions and collaboration. We will also introduce social and other incentives within a game-like context. For example in common with [6] people could receive points for leaving home early every day. In return whoever tops the leaderboard that particular week could receive a financial incentive. Such an approach would encourage players to compare their success with others and in doing so hopefully motivate them to change their own behavior. One major challenge is to encourage drivers to use alternative modes of transportation, while including them in the pervasive game. Therefore the building of a community of traffic participants (including motorists, bicyclists, PT users etc.) via the use of a website is a key aspect. The website could be both, a content community and a social networking site according to categories of social media [7]. A content community is defined as one whose main objective is to share information (e.g. traffic situation, alternative routes, alternative activities) between users without obliging users to create a personal profile page. A social networking site encourages users to create personal profile sites and to invite friends and/or colleagues to join their page. As a combination of both, the application could be used for sharing a high amount of personalized information between users, which allows the joint co-construction of traffic avoidance behavior but also fosters social exchange and community building by suggesting for

example good music, audio books or language learning CDs for driving, real time sharing of interesting radio stations, gas prices and so on. Our application will allow forming communities whose members interact in real and digital life, build relationships between participants, create interdependence during exchanges and accumulate shared experience as grounds for membership.

There are also human-factors issues related to creating games for drivers and their passengers and these will also be addressed within the project.

### **Workshop Game Concepts**

During the workshop participants will be invited to take part in a game that will take place in the room or conference venue. The game will also draw on standard rules of the road while introducing some variables that we want to test (e.g. formation of mobility groups, exchange of incentives etc.). During the game participants will be able to act out how they may behave under such conditions. This embodied game will allow us to observe the emergence of problematic traffic situations. The game elements will therefore include role-playing of traffic participants within a small-scale environment and enable the understanding of social interaction between players. The game will be video- recorded (if permission is granted by the workshop participants) and a questionnaire will be provided. Therefore being able to contact other participants in advance of the workshop would be useful.

According to time and space restrictions we will compare collaborative and competitive play, try the use of different kinds of incentives ("social recognition" vs.

material) and discuss the strategies that players/ participants develop. Within two or more gaming rounds, we try to simulate the socialization effect ("getting-to-know the other") of the website that is going to emerge within the I-GEAR project and that will support the application. This effect is expected to change the local and the global traffic related behavior of the participants.

The workshop game will allow all participants to experience and gain a better understanding of key aspects such as: individual and group behavior, interaction, incentives and their own personal behavior. As a result it should encourage lively discussion and further analysis of the results will be of use to the researchers in the I-GEAR project.

### **Conclusion**

In this paper we provided an outline of the I-GEAR project that will specifically explore the use of persuasive gaming as a method of reducing traffic congestion. As part of this work we have also proposed the use of a live game as a method of gaining information about traffic participants both on an individual and social level in traffic behavior. In conclusion therefore we have illustrated both the potential and use of gaming approaches with the context of traffic congestion and an approach to studying such behavior under restricted conditions.

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## References

- [1] TomTom (2008). Traffic Survey published in the Daily Mail. In R. Massey, *Three British cities are among most congested in Europe*. Retrieved September 27, 2012, from <http://www.dailymail.co.uk/news/article-1268330/Three-British-cities-congested-Europe.html>.
- [2] PWC (undated) <http://www.pwc.com/lu/en/public-sector/docs/pwc-cities-lu-extract.pdf>
- [3] Inrix (2010). *Traffic Congestion in Europe: INRIX National Traffic Scorecard Provides Revealing Look at Traffic Congestion in Cities Across Belgium*. Retrieved September 27, 2012, from <http://www.inrix.com/pressrelease.asp?ID=111>
- [4] Montola, M. Exploring the edge of the magic circle: Defining pervasive games. In Proceedings of DAC 2005 Conference.
- [5] Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification. using game-design elements in non-gaming contexts. Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems, CHI EA '11 (p. 2425–2428).
- [6] Bliemer, M.C.J. and van Amelsfort, D.H. (2008) Rewarding instead of charging road users: a model case study investigating effects on traffic conditions. Proceedings of the third Kuhmo-Nectar Conference.
- [7] Kaplan, M and M. Heanlein. Users of the world, unite! The Challenges and Opportunites of Social Media. Business Horizons, Vol 53, No. 1. Jan-Feb 2010, Elsevier.