Enhancing Traveler's Awareness in Smart Traffic

1 Workshop Theme and Goals

In our daily life we can hardly avoid being part of the world's biggest machine - traffic. When we travel with public transportation, drive our own car, or walk on the sideways, we are part of a system that will influence to our lives. Travel is time-consuming with traffic jams and incompatible schedules of public transportation. Fuel consumption, tickets, tolls and other fees cost you hundreds of Euros per year and there is always a risk of injuries in traffic. However, traffic is not an unknown monster that lives among us, but lots of data is collected from traffic and there are new technologies available which can help in making traffic more safety, environmentally friendly and less time-consuming. This is called smart traffic.

One of the key issues in smart traffic is that we need to enhance the awareness of the travelers' about the current traffic situation. It will be beneficial for drivers or passengers to know what the current traffic flow is and how the traffic will change in the near future. This will allow the travelers' to anticipate and re-evaluate traffic flow and how it will influence to their going.

Having a smart environment where traffic information is readily available for drivers and passengers requires us to re-innovate our existing methods of illustrating this information. Visual and auditory senses have been traditionally used for delivering this information, but we need to be able to employ multimodal approach in communicating, and haptic technology can be the way forward. The challenge in driver related information is the as the amount of information increases, cognitive load of accessing and understanding this information also increases. This means that we either have to prioritize information or hide some information altogether. By using haptics as a communication channel, we do not need to make this choice. We can communicate information and meta-information without increasing driver's cognitive load.

Haptics has been embraced by car manufacturers and passengers a like, as the channel to deliver critical information safely and effectively. Haptics has been successfully taken a front seat in in-car entertainment and information systems. Many key manufactures in car industry have realized the untapped potential of haptic technology. One of the well-known systems is Audi's Multimedia Interface (MMI), which can be used to control variety of devices and functions of the car. Similar systems are also provided by Cadillac (CUE) and Mercedes (COMAND Online). Haptic technologies have also been incorporated into these systems such as Ford's MyFordTouch, Hyundai's Haptic Dash, and Lexus' Touch Haptic to assist drivers in interacting In Vehicle Infotainment Systems (IVIS) with minimal visual distraction.

However, conformational haptics is just a beginning. Research is being done to improve haptics as a communication channels by employing guiding haptics and remote haptics in the car environment. In this way, complicated data elements can be

communicated to the driver with limited or no visual attention as well as providing personal control over complicated car functions.

Tactile feedback does not have to be limited to communicate information which comes from the accessories attached to the car or in-car functions, but it can be used to deliver information about surrounding environment and traffic as well. There is lots of relevant information such as road conditions, points of interest along the route or traffic jams which can be haptically encoded and communicated to the travelers.

The objective of the workshop is to discuss and seek out new possibilities of taking advantage of haptic research in smart traffic. The specifically interesting question is how tactile feedback could be used to enhance the awareness of the person in traffic flow by delivering important information to the traveler or notifying the traveler about the changing context. Another topic for the workshop is explore how multimodal interaction approach can be employed in communicating this information to the traveler in a useful and the least distracting method and how tactile feedback can be used in delivering relevant data in smart traffic. During this workshop we will try to identify and rectify the challenges being faced currently as well as discuss possible new technologies that can be used to overcome them.

2 The Content of the Workshop

The workshop will start with the introduction section in which the workshop organizers will tell a summary of smart traffic test area in Tampere and what kinds of opportunities it offers. Then the participants will hear an introduction to haptic research in smart traffic domain, its challenges and implications to travelers.

In the second section participants will present their own topic to other participants. The presentations will focus on

a) Current challenges that need to be solved,

b) Possible technologies that have been developed and could be applied in smart traffic domain, or

c) Possible research questions that are related to the domain.

In the third section the participants are divided into small groups and each group start discussing issues that was raised in the previous section, possible concepts and prototypes that could be studied in the smart traffic test area and identify collaboration partners. Finally the groups will present their summary to others.

The duration of the workshop is a half-day workshop.

3 Outcomes of the workshop

The intended outcome of the workshop is collaboration projects which will study new solutions and possibilities of haptic in smart traffic domain. Ideally the projects could start in the beginning of 2013 and field experiments are conducted in Tampere test area.

One of the challenges of the research in this domain is to find a plausible environment for testing ideas and concepts for smart traffic. Usually you need to have other

travelers nearby and traffic data cannot be collected unless there is traffic which can be measured. Therefore, an innovation and testing area for smart traffic solutions will be established in Tampere region during the first half of 2012. The test site provides multiple data sources which contain real time data from vehicle traffic, public transportation and cyclist and pedestrians in Tampere city region. There are also data sources that provide information about road network, public transport timetables and parking. In addition, several companies and research units conduct their own product development and research tasks which will enable fertile collaboration and peer group support.

4   Intended audience

The intended audiences of the workshop are both researchers and other participants who are interested in smart traffic. We are especially interested in academic researchers who have done haptic research and would like to explore possibilities for applying their research results in smart traffic domain. The industrial and public sector participants could bring their challenges related to smart traffic on the table which could be studied together with researchers to find solutions for them. The industrial participants could come e.g. from car industry and logistics. Public sector participants could represent organizations that have a responsibility of developing smart traffic solutions from their perspective e.g. traffic engineers of the city.

The expected number of participants is 10-20. Interested participants should send a brief position paper describing their interest in smart traffic and a topic they want to present in the workshop. The workshop organizers will review the position papers and invite participants who will form an interesting mix of people from academic and industrial for discussions.

The deadline for position paper submissions is May 7, 2012 and the acceptance of the participants is announced May 14, 2012. Position papers should be submitted to Hannu.juhani.korhonen@uta.fi and Ahmed.Farooq@uta.fi with a subject line ″Eurohaptics 2012 workshop″.

5   Organizer's names and backgrounds

Hannu Korhonen has more than 15 years of experience in developing mobile applications and services. He was a user experience and usability researcher at Nokia Research Center in Tampere. His research interests are related to user centered design of mobile devices and their applications and services. He has been especially interested in studying user experience and how context affects to the experience of product use. Currently he is a user experience manager at the University of Tampere in a unit which develops new business and solutions for smart traffic.

Ahmed Farooq has 8 years of software development and testing experience, with more than 4 years of designing and developing haptic devices. He has done his MS in Haptic UIs and now is working on his PhD designing new techniques in implementing Haptic UIs. His current research involves developing multimodal systems to en-

hance haptic feedback in IVI systems. His interests involve studying hapticons in pneumatic haptic devices with respect to ambient noise and deploying these devices in a multitude of environments. At the moment he is working as a researcher at TAUCHI, focusing on the HapticAuto project.

6   Facilities

The workshop can be organized in a classroom type of room which enables small groups of people (3-5 persons) to discuss and do small group works. The room should be equipped with a projector, chairs and tables and preferably flip charts.