Call-based public transport services for visually impaired

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Abstract
The AKTA project seeks in simple terms to assist visually impaired in finding the right bus and getting of the bus at the right destination. The project is jointly financed by the Research Council of Norway, the Norwegian Association of the Blind and Partially Sighted, The Norwegian Public Roads Administration, Møre and Romsdal County and Trafikanten Møre & Romsdal. Through two demonstrators we aim to extend the functionality of the public transport information system already established to facilitate the needs of visually impaired. Web interface and mobile phone will the information canal for real-time information along the trip.

Keywords
Transport
Transport Information
Universal Design
1. Introduction

A public transport system might represent immense challenges for several groups of potential travellers. It is common knowledge that people with physical or mental disabilities, whether originating from illness or high age, find it difficult to orient themselves within such systems. They will frequently end up on alternative ways of travelling, or even as non-users.

Public transport ITS ("Intelligent Transport System") functions regularly serve the purpose of providing travelling customers with information in terminals or on-board, or with means of payment. More seldom ITS-solutions are offered for interactive communication and two-way messaging, such as calling or ordering for special transport services. Furthermore, the majority of such systems are designed for the majority of passengers, i.e. those with their senses intact. For visually impaired, finding the right bus and getting of the bus at the right destination, can be quite a challenge.

The AKTA project seeks to solve these problems, assuming that the design thus make the public transport system and information accessible for all. The AKTA project is jointly financed by the Research Council of Norway, the Norwegian Association of the Blind and Partially Sighted, The Norwegian Public Roads Administration, Møre and Romsdal County and Trafikanten Møre & Romsdal.

Two demonstrators are planned within the project. This paper will give a description of the demonstrator goals and the work that will be carried out in the following two years.
2. The planned demonstrators

2.1 The AKTA demonstrator goals

AKTA seeks to combine two major goals:
1. To extend the functionality of the public transport information system already established on Timekspressen in Møre & Romsdal in a manner that facilitates interactive calls or ordering for the public, by means of positioning technology, extended mobile phone functions and other applicable wireless communication.
2. To apply the principles of “Universal design” to this system, thus enabling for example visually impaired to make simple use of the functionality.

2.2 Demonstrator 1 – Real-time information on public transport

The first demonstrator will develop the existing real time information system on Timekspressen in Møre & Romsdal to be a system accessible for all. Timekspressen provides public transport between Kristiansund – Molde – Ålesund – Ørsta – Volda, with a 200 km distance covered. Travelling the whole distance will take nearly 5 hours.

Figure 1 : Map giving an overview of the distance Kristiansund – Molde – Ålesund – Ørsta – Volda

Today’s system is delivered by the Swedish company, AB Thoreb. 20 buses, 7 bus stops and 4 hospitals are equipped with monitors for real time information. The position of the buses is given by GPS and odometer, and the communication between the buses and the central system is by IT-
radio. IT-radio is a design with a network of communication nodes, connected to each other and Internet, and communicates by means of short and quick radio messages. IT-radio can easily be combined with other types of data communication, such as GPRS. The design makes it possible to get access to real time information everywhere via Internet.

As described in the introduction, the main problem for visually impaired people is to get on the right bus and to get off the bus at the right place. These are the main problem to be solved in the first demonstrator.

So, how can we help the passengers to get on the right bus and of at the right bus stop? The main idea is that the user can give a message to the system via Internet, mobile phone or PDA. The message contains data about when, from and to where he/she wants to travel. They will get a confirmation from the system. 15 minutes (or another preset number of minutes) from the bus is expected at the bus stop, the passenger receive a message that the bus will arrive within the requested period.

Then again, when the bus is expected at the bus stop within 3 minutes the passenger receives a new message from the system. The passenger can now prepare upon the bus arrival. The interface for this message is the passenger’s mobile phone. If the passenger has special need, like being visually impaired or physically impaired, they can in advance tell the system to give the bus driver a special
message telling the driver to take pay attention. The monitors in the buses showing real time information has loud speakers which make it possible to also give real time information orally. Because a great share of the passengers travels quite a long distance, it would be too annoying to listen to a voice reading all the bus stop. A possibility is to give the passenger a message on his/her mobile phone telling that the bus is about to arrive at the selected bus stop.

Figure 2 – Interface used by AB Thoreb in current installation.

The visually impaired passengers should use Symbian software on their mobile phones to get the information orally. Thereby they can get real-time information about the progress without being dependent on the driver. In our demonstrator site the drivers normally assist visually impaired and other unknown passengers. It is however our purpose to build a system that can be operated in a busy city environment with multiple users.

2.3 Demonstrator 2 – Extended information solution for passengers
In demonstrator 1 we aim to assist passengers doing a simple trip from one destination to another by one bus. In these circumstances the visually impaired passenger normally will be comfortable with public transport.

A more challenging trip may consist of several buses with interchange or multiple transport means. In these circumstances the need for real-time information about the progress is more essential. In demonstrator 2 we aim at improving the information with regards to changes. The passenger may request information about a trip that requires an interchange.

The passenger may thereby experience a situation like this:

Passengers request information about a trip from his or her home. The interface is Web or mobile phone. He or she gets information about the start-up of the trip. After receiving information about the first bus arrival he or she enters the bus. Before the appropriate bus stop the passenger gets information thru the mobile phone to be prepared for the interchange. The information includes where to get off as well as when the next transport mean are available. If it is a bus the information sequence may be repeated.

In special areas and for special user groups it may be appropriate to use taxi as a supplement to the ordinary bus routes. This may be required due to environmental needs. Of possible this transport mode will be included in demonstrator 2.

3. Conclusion

The demonstrators will give a solid foundation for an evaluation of extensions in Public transport IST solutions. Is this kind of assistance for visually impaired users essential for their comfort and readiness for using public transport? Can information technology provide sufficient assistance for large groups of visually impaired so that the public authority may use this approach as a more cost efficient solution compared to use of individual solutions? Also the efficiency gains for all passengers
will be evaluated. Unknown travelers may benefit from this sort of ITS systems in the same manner as the car industry focus on route guidance.

The conclusions will be supported by technical evaluations of the ITS solution provided for the passengers as well as questionnaires especially intended for visually impaired.

The results from the AKTA project will be available early 2007.

4. References

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