Übung 8 – Mensch-Maschine-Interaktion 2

Exercise 8: Context Awareness for Mobile Devices

(Per-group homework)

Submission

- Pick two of the three scenarios and complete the given tasks for each one. Write no more than two pages per scenario.
- Submission is by email to mmi2.2005@hcilab.org.
- Please use a PDF attachment named `uebung8-gruppeN.pdf` (`N` is the number of your group). The report must be written in English.
- Deadline for submission: **Friday, July 8th 2005, 8 a.m.**

This assignment has been created by Jonna Häkkilä and is part of her PhD research on usability for context-aware applications.

Introduction

To guide the designer towards a good result in the user interface design tasks, there exist general usability guidelines. There exist a large number of design guidelines, and often they refer to same or very similar principles, sometimes articulating or emphasizing them differently. Maybe the most famous ones are the usability principles proposed by Molich and Nielsen, containing the following[1]:

- Simple and natural dialogue
- Speak the users' language
- Minimize the users' memory load
- Consistency
- Feedback
- Clearly marked exits
- Shortcuts
- Good error messages
- Prevent errors
- Help and documentation

When focusing to a certain platform or application type, refined sets of guidelines have been developed in order to better meet the specific needs of the area in focus. For instance, Weiss has proposed the following design guidelines for handheld devices[2]:

- Design for Users on the Go
- 'Select' vs. 'Type' [in the means of input, e.g. writing]
- Be Consistent
- Consistency between Platforms
- Imply User Control
- Design Stability
- Provide Feedback

[1] Nielsen, J: Usability Engineering. Academic Press, 1993. Chapter 5.
[2] Weiss, S: Handheld Usability. John Wiley & Sons Ltd., 2002. Chapter 3.

- Forgiveness
- Use Metaphors
- Clickable Graphics should Look Clickable
- Use Icons to Clarify Concepts

In this assignment, you will consider a specific platform, a context-aware mobile handheld device. Context-awareness means that the device is, to some extend, aware of its environment and the usage situation, such as e.g. the location, environment temperature, noise level, surrounding devices, etc. By knowing these factors, the device can then adapt its behaviour according to the specific situation for instance by automatically executing appropriate actions or acting proactively. An example of context-aware behaviour could be that when the user enters to the lecture room, the phone recognizes the place and turns the ringing tones to silent.

In the following, you are given design guidelines, which have been created in order to take into account the special characteristics of the platform.

Design Guidelines used in the Assignment

Here are the **design guidelines for context-aware mobile applications**. The guidelines (GLs) are not presented in priority order.

1. **Consider the uncertainty in decision-making situations.** Context-aware devices may employ different kind of uncertainties when inferring the usage situation resulting for instance from sensor resolutions and detection accuracy. This guideline should lead the application designer e.g. to consider, if the device should ask the user a confirmation before executing actions, and to think if e.g. illustrations of the uncertainty level would be useful.
2. **Prevention from interruptions.** For example, the user should not receive 'spamming' or other unnecessary information. This condition could be avoided e.g. by applying filtering. Also, the designer can consider if the user's interruptability in certain situations can be taken into account.
3. **Personalization.** Consider using personalization according to the user's individual needs or preferences. For instance, implement filtering according to the user's personal preferences, and take into account that the preferences may change over the time. Also, use meaningful and intuitive categorization if you need to present menus and lists of possible selections.
4. **Avoid information overflow.** For example, do not present too much information at once. Arrange the information in a meaningful and understandable manner.
5. **Secure the user's privacy.** Here, special care should be taken with applications employing information sharing. If necessary, provide a possibility to anonymity. Also, try to protect the user from 'spamming', which can be perceived as a violation of personal privacy. In addition, consider possible effects of social context in relation to your application – in some social context, certain device/user behaviour may be more acceptable than another, e.g. with volume alerts.
6. **Remember mobility.** For instance, favour simple and fast interaction, as the user may interact with the device while moving or doing something else. Consider how mobility affects on the availability and use of the context information – for instance to the available data connections or location detection accuracy.
7. **Secure the user control.** For example, if using adaptive user interfaces, consider of providing also an alternative, non-adaptive option. An example of this could be a possibility to change between a filtered and unfiltered view. As with personalization, consider if the user's changing needs or preferences over time should affect your design. In addition, think the possibility of asking a confirmation from the user in relation to automating the execution of actions.
8. **Access to context.** This principle can have effect for instance on features related to subjective understanding of context attributes – for example, the meaning of the words 'cold' or 'bright'

can vary greatly among the people. Think, if it would be appropriate to employ editability to the context attributes and their measures. Also, does the user want to access to remote (i.e. not the current) context? Maybe the user would benefit from the possibility to browse context history, or to access to location-specific service over a long distance. Also, the application may need to take into account the social context, when the designer should consider possibilities to define e.g. different social groups, anonymity, and privacy level. This guideline can also be considered in relation to User control (GL 7) and Information overload (GL 4).

9. **Visibility of system status.** In addition to general issues, such as showing feedback of executed actions, the visibility of system status should be thought also with contextual information. For instance, consider of using logs and history data. Show the user the data related to information sharing. Also, consider if it is appropriate to make the user aware of the level of uncertainties (e.g. in context recognition), as in GL 1.
10. **Usefulness.** Consider the usefulness of the provided information. Is the function or information necessary in the first place? Also, consider the usefulness of a function in respect to the user's interruptability – does the application really help the user, or is it just annoying? If the application is aimed to be entertaining or a 'fun-feature', does it meet the expectations in that sense? Also, consider if it would be necessary to capture or store information for future occasions. In addition, think whether proactive or reactive device behaviour would more useful.

Assignment Tasks

In this assignment, you have a context-aware mobile phone, which has the following features:

- Location recognition (in 20 m accuracy)
- Recognition of nearby devices (e.g. nearby mobile phones)
- Social context and user groups: family, friends, work
- Time, temperature, environment noise and environment lightness recognition
- Data connection
- 3D accelerometers
- Camera
- Supported features: mp3, video streaming, web browsing
- Speech input

In this assignment, you will consider three applications: Contacts, Image manager, and Calendar.

In the following, you are given three scenarios, which each relate to a given application. You are given two types of tasks, starting with words *describe* and *design.* With *describe* task, you should give a written answer to the given problem. With *design* task, you should sketch the user interface: appearance, menus, and interaction steps required to complete the task. Include also explaining texts into your design.

Pick two of the three scenarios, and complete the given tasks for each of the selected ones.

The screen shots of current applications are given in Figures 1-3 – you may use them as inspiration, but you don't have to restrict your design by them. However, consider that the screen area and resolution are about the same as in the figures' screenshots, so be careful not put too much text, graphics and user interface elements in the application.

In your tasks, use the guidelines for Context-aware mobile applications. **Clearly show, which one(s) you use and where (you can refer to the guideline numbers).**

Scenario 1. Context-aware Calendar application

It is Monday morning and Mike goes to work to his office. Because it is his son's birthday, he gets an idea to take his family to an ice-hockey game in the evening, and ***checks his family members' time schedules*** *to make sure everybody has time for the game. After this, he* ***sets a reminder*** *to go and buy the tickets on the way when he leaves work, as the ticket office is located right on his way home.*

Describe, what features would the context-aware calendar application have.
Design the steps how Mike 1) checks his family members' time schedules, and 2) sets a reminder so that it will remind him in the right moment about the tickets.

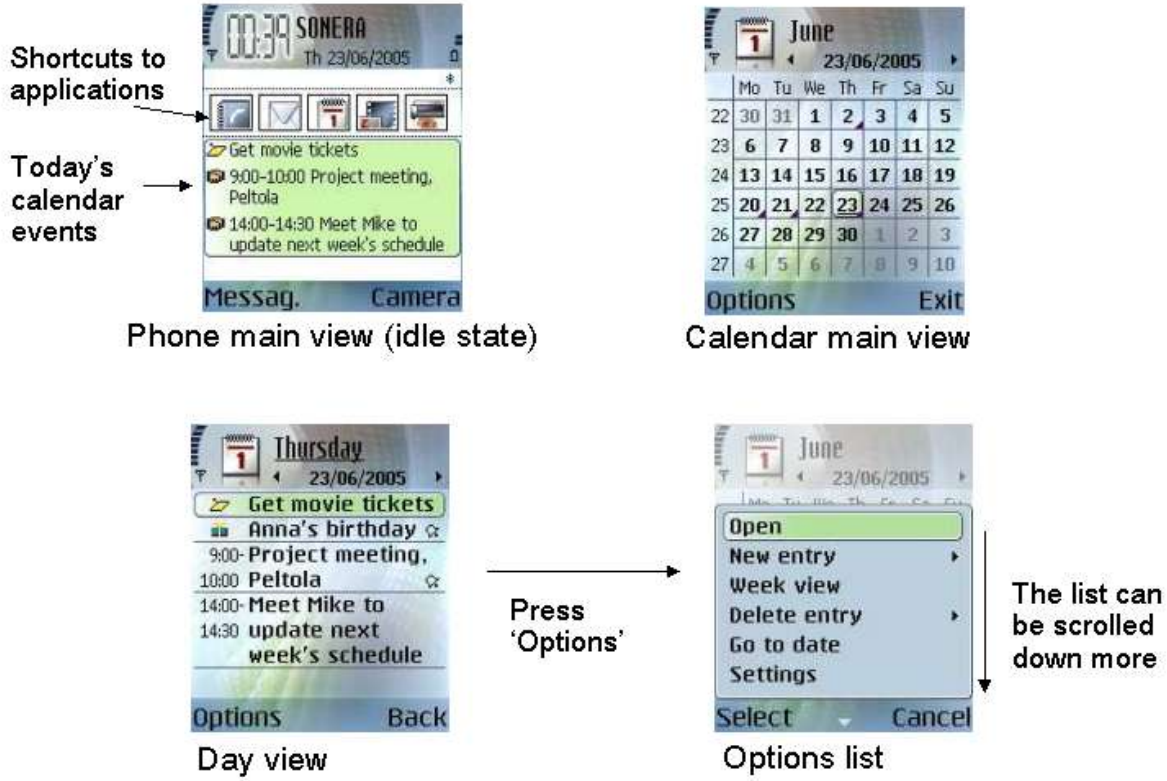

Figure 1. Screen shots from Calendar application.

Scenario 2. Context-aware Contacts application

In his phone Mike has an advanced Contacts application, which stores different kind of data of the contact person, and is also able to update it dynamically. On Friday, Mike has a day off from work, and he decides to go fishing. He thinks it would be fun to have his friend Jason with him. Before calling Jason, Mike can first check Jason's availability with his Contact application to decide, if it is a good moment to call him.

Describe, what kind of information is stored for the people appearing in the Contacts? Also, describe, what kind of data gets updated and in which conditions?
Describe, how the person's availability status changes and what are the different status options.
Design the steps, how Mike finds out Jason's current availability status.

Figure 2. Screen shots from Contacts application.

Scenario 3. Context-aware Image manager application

Mike and his wife Anna have been in Paris for a holiday, and he took lots of photos with his cameraphone. In his phone Mike has a smart Image manager application, which stores several kind of context information to the image when it has been taken, and is also capable of automatically organize the photos to different folders. Now Mike wants to show pictures of him and Anna visiting the sightseeing places of Paris to Anna's parents. He quickly does a search in Image manager to find the photos that were taken in Paris, outdoors, when Anna was with him.

Describe, what kind of context information is stored together with an image, when the photo is captured? Describe along which factors the photos could be automatically arranged in different folders in the Image manager?
Design the steps how Mike does the search of the photos mentioned in the scenario.

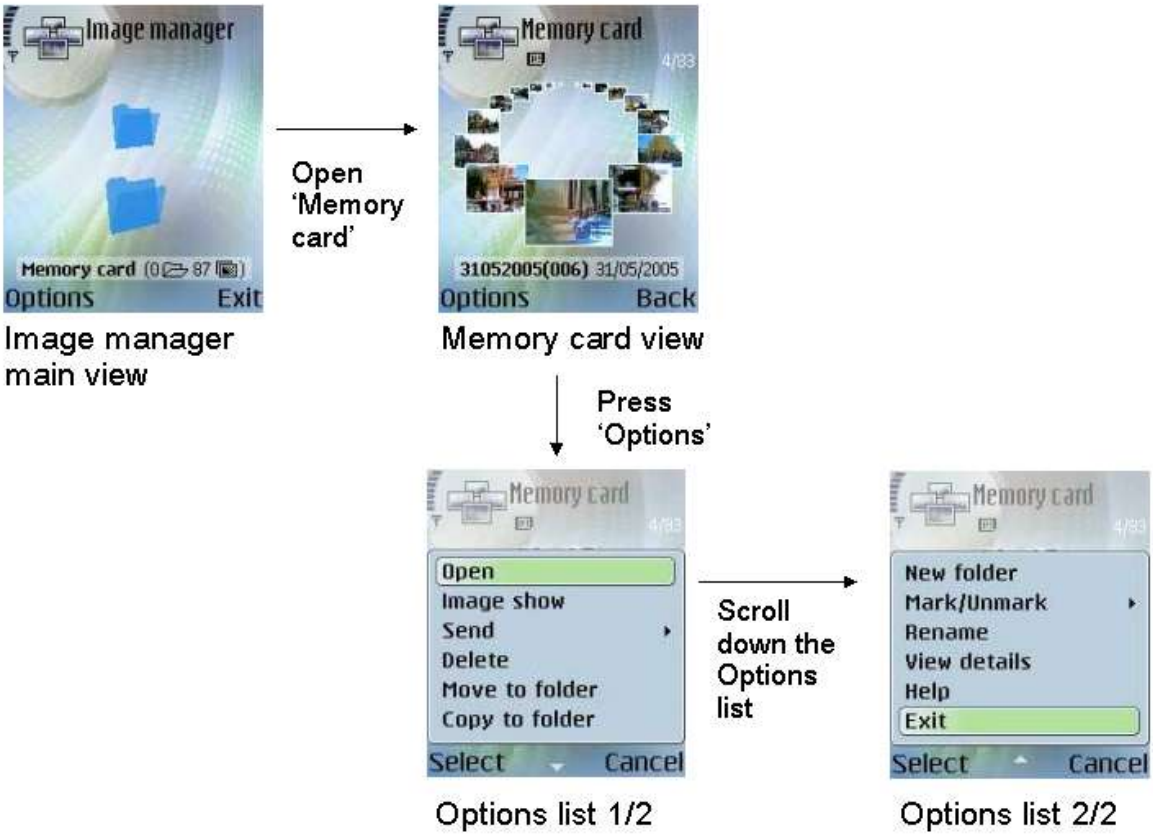

Figure 3. Screen shots from Image manager application.