**Final Project Report**

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**1 INTRODUCTION**

**Motivation**

The project of developing an intelligent user interface for VSings fostered two ideas of adaptation among our team: interruption recovery after user idle time and voice-enabled input. After taking feasibility into account , we chose the adaptation suggestions to deal with interruption recovery due to time constraints.

The regular users of VSigns at the home environment might face some obstacles when inserting the measurements data on the system. One significant obstacle is the fact that there may be other simultaneous chores that the user have to deal with. Therefore, in order to offer a more helpful, responsive and efficient[1] interface, we suggest an adaptation to help users recover from task interruptions.

**Problem and solution summary**

When users are taking their vital signs and interacting with VSigns app in the home context, it is very likely that they be multitasking or will suffer some kind of interruption. This can happen after the user being disrupted by other family members, the doorbell, phone calls, or even some other external activities that can interfere on the task performance.

The current VSigns app does not provide any solution for interruptions. After experiencing interruptions and returning to the app, the same screen\menu is displayed, which can induce mistakes on the user’s end. The lack of an attention grabbing tool can make it harder to remember where the data entry activity was left off before the interruption.

With our added solution, VSigns app will provide an adaptation that helps the user recover from an interruption when inserting vital signs measurements on VSigns app. The system will provide the possibility of choosing to start over or continue with the current entry when returning after an interruption; when the option to continue is chosen, it will present an interface adaptation to help task completion.

**2 MOTIVATION**

**Problem definition**

The interruptions during the data insertion can occur and become an issue because they can be understood as bottlenecks on the task performance. We believe that the user will be subjected to interruptions not only because of the context physical conditions, but also because s/he might want to take several vital signs measures and input all this information on the app; this whole activity can take a while and during this period the user is susceptible to be stopped by some other external events.

Since these interruptions can take a while, the user might not remember where the measurements entry was left off, or it might be of the user’s interest to restart the process in order to have the measures up to date according to the new specific recovery time.

**Problem motivation**

As the probability of being interrupted during the task performance is high when using VSigns at home, this problem becomes an interesting opportunity to provide a useful adaptation that helps on successful completion of the data entry activity.

The interruption problem can be an interesting issue mostly because of the two different possibilities of VSigns use we foresee:

* the user has taken all measurements and will input them all at once;
* the user is taking and inserting one measurement at a time.

For the former or the latter, we believe that the adaptation will be able to help decrease the error proneness and increase the interruption recovery.

**Problem occurrence and handling**

This scenario of interruption or multitasking is extremely likely to happen at home context, because by being at home, the users will probably maintain their regular daily activities while they need to take their own vital signs measurements. Because of this, the home environment increases the probability of an disruption during the task completion, either if it is done all measurements inputs at once, or each measurement input at a time.

So far, the application does not offer a specific solution or some kind of support for users which were interrupted; the only visual aspect related to this issue that can be currently noticed is that, when entering data, the focused field is displayed with a colored border. In the case that the task is discontinued and the user returns to the application later on, the app will only display the completed and/or the empty fields from last entry.

**Similar developed solutions**

Nowadays various applications present features that respond to user idle time. A general example is the user system logout, that is automatically executed when no activity is registered. The application Idle Time Connection Manager[2], available at Google Play, uses the idle time (here, idle is considered as when screen turns off after a determined period of time) to enhance the wireless connection management (Wi-Fi and Bluetooth). In addition to that, Nagata[3] described in her work an extensive analysis over the high performance costs caused by interruptions of a task executed in mobile devices.

**3 PROJECT SUMMARY**

**Expected accomplishments**

We expect to acheive an interface adaptation which can support user’s interruption recovery. Towards achieving that, it will be needed to perceive context information by observing the user absence.

The goal is to provide an adaptation that will be able to improve user experience by supporting users to get back quicker at the task execution, after the interface is capable to either directly conduct them to a new task beginning or visually assist users by drawing their attention to the field where they stopped the task.

**4 PROJECT DETAILS**

**Proposed UI adaptation**

We suggest an adaptation to deal with the constant interruptions when performing the data input, either when this is done as all measurements inputs at once, or one measurement input at a time. Our suggestion is to count the time that the user has passed away from the application, and then apply this information from the context\user behaviour to adapt the interface when the user returns.

The application perceives the user idle time for a determined threshold. By idle time, we imply the time that the user spent without interacting with VSigns application while VSigns was the foreground application on user’s phone.

After gathering the user idle time, the application will display a “Message Dialog” with confirmation buttons to prompt if the user would like to start a new measurements entry:

1. No: Keep inserting data on the current vital signs entry; or
2. Yes: To start over creating a new entry.

According to the user’s choice, the system will behave differently:

1. No: to continue inserting data on the current entry, the interface will highlight the field background in which the user had previously stopped the measurements input.
2. Yes: user will be taken to the Vital Signs measurements “welcome page”.

By adapting in this way, the interface can catch user’s attention to the “task status”, indicating the exact place in which the activity stopped, in case the user wants to continue, or taking the user to the main page to create a new entry; therefore, allowing an easier recover from interruption.

**Relevant properties for the adaptation**

When considering the adaptation to support interruption recovery at home, we certainly need to consider context properties. At home, external interferences can happen as a result of the user being in different rooms of the house and performing other types of activities simultaneously.

Considering the task performance bottlenecks, we also understand as relevant the possible ways to complete the task: all measurements inputs at once or one input at a time. This condition is important for our scenario and the developed design can be supportive and useful in both situations.

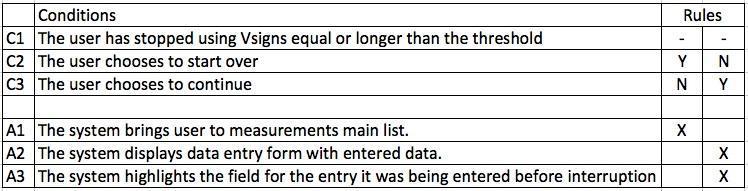
In addition, another important property to be considered is the user model. The range of possible VSigns users at home context is highly varied, therefore some user properties are relevant, such as lack of technology proficiency or health awareness, as well as health condition (mental and physical). As an example, users that present literacy and/or health limitations can benefit from this adaptation because it not only assists the task completion, but also provides feedback to the user, helping to carry out the activity.

**Proposed ‘rules’ to adapt behaviour**

The application will have a first trigger which evaluates the user interruption, by counting the user idle time (inactivity). We set the idle time threshold as 5 minutes after no user interaction with the app, while the app is in foreground. The first adaptation rule defines that if the user has been away for this specific threshold of time, then the application displays a “Message Dialog”, through which the user will either choose to continue the current data entry or to start a new one.

From there, two new rules will finish the adaptation handling:

1. If the user chooses to continue on the current entry, then the interface will highlight the background of the field in which the user stopped his\her activity before being interrupted.
2. If the user chooses to start over (create a new entry and discard the current one), then the application displays the main list of record measurements.



**Relevant user/context/environment information collection**

Even though no direct information from the user will be collected to adapt the interface (such as personal information), the adaptation will need to be aware of user behaviour, which in this case is also related to the context.

The user absence from the application (idle time) is the primary data to provide sufficient information from both user context and behaviour to the adaptation we propose. When perceiving the absence, the system will have enough knowledge to infer that some interruption has occurred, and then adapt its interface after the user returns to input vital signs.

**Issues encountered**

The first design iteration of the proposed Intelligent User Interface (IUI) raised some issues that were addressed and resolved on this second design iteration:

1. Field colour background not refreshing at the current view: a structure of current states was created, so the view would retrieve the field state and adapt accordingly;
2. Confirmation (message) prompts when user returns to VSigns welcome page from data entry: user idle time counter will be triggered only when handling a new entry;

After the iterations mentioned above, we still consider that the maintainance process to perform code refactoring on the current app is time consuming. When designing and developing our proposed IUI, it was necessary to create abstract structures, that will be able to fit the existing code.

The second design iteration also raised new discussion topics about the confirmation request prompting, that should be addressed on the next iterations:

1. Confirmation (message) prompts when user returns from the application menu: we understand that leaving the data entry activity to access the app menu can be seen as an interruption;
2. Confirmation (message) does not prompt if user simply open a new entry: we believe that, if there were no inputs, it is not appropriate to prompt if the user wants to restart.

**5 CONCLUSION**

When inserting their vital signs measurements at the home environment, users are subjected to have the task interrupted by external events, over which they do not have control. Thus, the development of an adaptation that distinguishes user interruptions by idle time and attempts to change the interface towards supporting the user recovery can mean a helpful improvement of the user experience.

We suggest an adaptation that will perceive the time that the user spent away from the application and offer two different options to help on the task recovery: start a new entry or continue on the current entry; on the case of the former, the system will indicate the last accessed data entry field.

In the previous section, we presented some issues encountered during the design and development and we also listed points to be discussed on the next iteration process, which can be seen as possible improvements.

**6 REFERENCES**

[1] Fadeyev, Dmitry. 8 Characteristics Of Successful User Interfaces. 2009. Online resource: <http://www.usabilitypost.com/2009/04/15/8-characteristics-of-successful-user-interfaces/>

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