RFID Event Specification Using Templates in Scenic and Event Notification

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ABSTRACT

The proposed project will allow a user to customize predefined events that they wish to be notified about. The system will watch for those events and if it is relatively sure that the event is occurring, it will send a notification. The system will make use of the RFID Ecosystem in the Paul G. Allen Center and the related event detection systems that have already been developed.

1. PROJECT PURPOSE

This project is will explore how using predefined templates in Scenic will help to increase the ease of creating events and the correctness of the events created. Upon completion, this project will be able to aid the user in keeping track of events involving their belongings and other events that are important to them.

2. PROJECT DETAILS

2.1 Event Specification

Events will be specified using Scenic. Currently the user has to drag and drop icons into a field to specify the event they wish to keep track of. While this is relatively easy, the accuracy is sometimes questioned because the relative positions of the icons can change the meaning of the event.

This project will create a list of event templates that the user can choose from. The templates will load visually and prompt the user for the needed details, such as the person involved or the item's name. The user will be able to select a template event to modify and will also be able to create an event from scratch.

Some example events that the system would handle include:

- Notify me if I leave the building without my car keys
- Notify me if my wallet moves without me
    - Wallets can't move on their own so it may be being stolen
- Notify me if my book comes into the building
    - I lent my book to my friend and I want to know when they are returning it.
- Notify me if the statue moves
    - The statue is bolted down so it may be being stolen
- Notify me if I am by <person>
    - Remind me to tell the person something

Some of the templates will be decided ahead of time by the developer both to ensure valid templates and to allow the program to be able to handle specific known templates. The user will also be able to create their own templates but those templates will be only visible to the user who created them. The user will be the only one who can see events that they have specified.

The user will also specify how they wish to be notified when the event occurs. There will also be an option to change the probability thresh-hold for the event. For example, if the system is only 60% certain that the event has occurred, it will not bother the user unless they have specified a certainty thresh-hold of 60% or less.

2.2 Event Monitoring

The system will make use of the Cascadia Event Manager which will take the event specified by the user and notify the project's system once it has decided that one of the user's events has occurred. Cascadia uses PEEX to monitor data streaming in from the antenna and to ascertain if the probability that the data matches the specifics of an event.

2.3 Event Notification

Once the system has ascertained that the probability that a specific event has occurred exceeds the user's thresh-hold probability, it will send the user some sort of notification. The three types of notification that are expected to be included in the project are email messages, SMS text messages to a cell phone, or phone calls which will play a prerecorded message.

3. PROPOSED SCHEDULE FOR PROJECT COMPLETION

The project is anticipated to roughly follow the schedule outlined below, where the week in parentheses is the anticipated week of completion and there will be 10 weeks allotted for the project. Note that work on each of the sections may overlap and that only the end dates and not the beginning dates are listed.

- Invent example events (Week 1)

    - Around 10 events that the system should be able to handle on completion.
- Come up with template events (Week 1)
    - From the example events, isolate a number of common themes and turn these into templates.
- Create an interface so that the user can see what events they have created (Week 3)
    - The user should be able to view the details of these events, change them, delete them, and create new events.
- Allow template events to be loaded into Scenic (Week 5)
    - The user should be prompted to fill in the missing details before they save and activate the event.
- Test the event detection (Week 6)
    - Create some events from templates and run through the sample event, or run the system on previously collected data to see if the system will accurately detect the event.
- Add notification detail specification (Week 7)
    - Allow the user to choose whether to be notified via email, SMS or phone.
- Add reminder methods(Week 8)
    - Add the email, SMS, and phone notification abilities.
- Test the system (Week 10)
    - Enlist other developers to help test the system and maybe run a user study.

4. PROJECT EVALUATION CRITERIA

The project will be considered successful primarily if the system will run and not crash. Beyond that, the project will be evaluated on how easy it is for the user to select a template and customize it. The accuracy of the created events will also be measured in comparison to events created by users not using the template events to see if using templates increases the accuracy of the specified events.

If time permits, the project will also be evaluated in terms of how well it serves and is liked by a group of voluntary users. This will test how the system works when given a wide variety of user needs and how easily users can adapt the templates to their specific needs.

5. RELATED STUDIES COMPLETED PREVIOUSLY

The following papers were written concerning related studies that have been completed:

[1] Welbourne, E., Khoussainova, N, et al. 2008. Cascadia: A System for Specifying, Detecting, and Managing RFID Events. MOBYSIS, 2008.

[2] Sohn, T., Li, K., Lee, G. et al. 2005. Place-Its: A Study of Location-Based Reminders on Mobile Phones. UBICOMP, 2005.

[3] Borriello1, G., Brunette, W., Hall, M, et al. 2004. Reminding about Tagged Objects using Passive RFIDs.

[4] Lamming, M., Bohm, D. 2001. SPECs: Another Approach to Human Context and Activity Sensing Research, Using Tiny Peer-to-Peer Wireless Computers. UBICOMP, 2001.

6. RESOURCES NEEDED

It is not entirely clear this early in the project what resources will be necessary besides the RFID ecosystem that is currently in place.

There will need to be some sort of database to store user information such as which events they have specified and their notification details such as phone number and email address.

At some point it may be necessary to expand the functionality of Scenic to include other event specifying keywords such as “before” and “after” and the ability to add a time. This would allow, queries such as “If I leave the building after 2PM, remind me to get groceries.”

Scenic will also have to be modified so that it can load templates or other previously specified events, as well as being able to generate some sort of intermediate representation of the event other than just the final PeexL.

The event detection of PEEX may need to be expanded to allow for data from multiple antennas to be incorporated into the detection of a single event.

It may also be necessary to get some sort of SMS gateway software or service, as well as VOIP or some other method of sending recorded messages to phones.