

# WEATHER TO GO – A BLENDED SONIFICATION APPLICATION

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## ABSTRACT

People often stay in touch with the weather forecast for various reasons. We depend on knowing the upcoming weather conditions in order to plan activities outside or even just to decide what to wear on our way to work. With *weather to go* we present an auditory weather report which informs the user about the future or current weather situation when leaving home in the morning or the office in the evening. The sonification is designed to be calm, coherent and expectable so that it can blend well into the user's familiar environment. In this work the auditory display is activated when somebody leaves through the door. The activity is sensed by a multi-purpose sensor unit mounted at the door. When the door is opened, *weather to go* renders and plays sounds that characterize the weather forecast for the region where the system is located. That way, the system raises the user's awareness for suitable clothes, transportation or route to take to the destination in the right moment.

## 1. INTRODUCTION

Nowadays checking for the weather forecast just requires a peek at our smartphone. With *weather to go* we want to take this a step further: The system removes the mandatory checking process altogether and instead blends the information directly into the user's everyday routine. In the moment users open the door, they experience an auditory ambiance of the weather forecast or the current weather. The system is intended to convey information that matters at just the right moment, when it is of most interest for the users: for instance to remind them to take an umbrella or a warmer jacket. It can be mounted at doors that do not directly lead outdoors as for example the door from a flat to the corridor or the office door but also at doors that lead directly outdoors as the weather forecast blends into the current weather situation. Additionally the system is designed to be calm, pleasant and intuitive for the user. So instead of playing back a spoken weather forecast we decided to mimic sounds that could occur naturally when opening a door to the outside: noises of wind, rain and thunder.

In the following we present the system, how it works and further discuss the guidelines we followed building the system.



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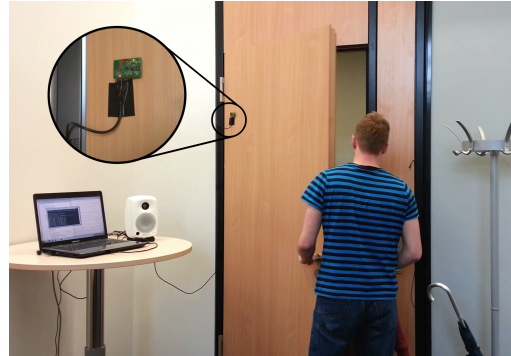


Figure 1: Example setup of the installed system.

## 2. BLENDED SONIFICATION

*Blended Sonification* is a concept and theory to build everyday auditory interfaces [1, 2, 3] so that they are useful but also pleasant to use. Along the four *Blended Sonification* guidelines we will shortly discuss how *weather to go* follows these:

- a) calmness[4] and peripheralness  
When not needed, the system is completely silent and thereby stays out of the user's way. Only when the user opens the door the information is displayed, tightly coupled to the implicit request of the user. In contrast to playing back a spoken weather report the chosen design is also less disruptive as it is easier to ignore (e.g. when the user is on the phone with somebody).
- b) coherency  
The sonification is played instantly when the user starts to open the door – just as someone would hear rain dropping or the wind whistling in a non-augmented environment. The sonification is thereby coherent with the action of the user that triggered the sonification.
- c) expectability and familiarity  
The sounds that were selected for the sonification are sounds that are familiar (e.g. noises of rain, wind, thunder). This allows the users to capture and understand the conveyed information without attentively focusing on it, and thus we expect a rather low cognitive load at interpreting the cues.
- d) physical origin  
The selected sounds are sounds that usually come from outside: rain, wind and thunder. So it makes sense from an

ecological perspective that they become audible when the door is opened.

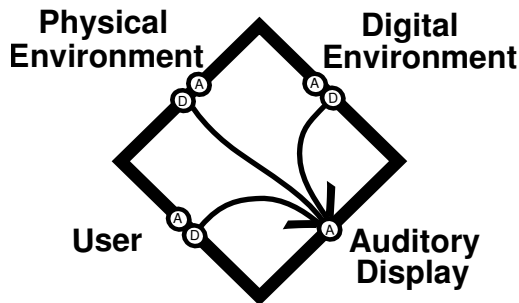


Figure 2: Weather to go scheme diagram following the diagram logic introduced in [1]

The *Blended Sonification* framework offers diagram templates as a supportive tool which enable a convenient structural overview of the application. The diagram in Figure 2 shows the mapping for the *weather to go* application. As depicted, the input data ('D') used for the sonification is from the user's interaction and also the digital (weather) data ('D') queried via Internet. This results in a data flow from the user and the digital environment side towards the auditory display. Hence the user's actions are sensed through the door itself, one could also argue that the door could be opened by a pet or just by the wind, thus the environment data input is also connected to the auditory display. Because no audio signal is used from user or physical environment as input, the audio pins ('A') remain unconnected. Thus, only the data pins are connected to the added ('A') output pin.

### 3. THE APPLICATION

The current *weather to go* system focuses on three main auditory notifiers for: a) rain, b) wind and c) thunder, conceptually demonstrating parameterized auditory icons where here the analog part is conveyed by indexing in a table of sounds, organized according to increasing values. For instance, rain is displayed by choosing between three different audio samples (light, medium and heavy rain.) The thunder display, however, is binary as either a thunderstorm is or is not predicted, and no information about its intensity is available. In contrast to rain and thunder, the sound of wind is rendered in real-time using SuperCollider, thus demonstrating a continuously parameterized auditory icon. The categories were chosen according to their immediate usefulness at the moment a user leaves e.g. her home. While temperature may be also of interest, it is different to the other three. In contrast to rain, thunder and wind, temperature just does not have a direct auditory representation. While it is also an interesting question how to sonify temperature (which was already investigated in [5]), in this work we focused on familiar sounds and therefore it was not included. Regardless of the actual weather forecast, day and night times are audible as singing birds respectively chirping crickets. This optional feature signals the user that the display is operational. The weather data are obtained using the weatherbug.com website. The weatherbug.com API offers weather forecasts and data about the current weather situation for a specific location. Based on the location the *weather to go* application requests the weather data from weatherbug.com. Figure 1 shows our system installed at the labo-

ratory door. A video of this interaction is available on our website<sup>1</sup> as well as examples of the sounds<sup>2</sup>. The sensor is visible at the upper left corner of the door. For audio projection, a single loudspeaker is used which is positioned close to the door, along with a laptop that runs all necessary software components. As soon as the user opens the door, the auditory display is activated and conveys information about the weather forecast. The sounds of rain, wind and singing birds tells the user that the weather outside is going to be rainy and windy. This reminds him to take his umbrella on the way out. As the door is closed again, the sonification stops.

### 4. DISCUSSION

In this paper we presented our design and implementation of a *Blended Sonification* for anticipating the weather using data-driven sounds coupled with everyday interactions in the users' familiar environment. The action of opening a door becomes augmented with a secondary information-providing function which is largely compatible with everyday expectations: as you would expect when opening a door or window to experience more sounds from the outside. The sound, however, continues as long as the door is opened, also allowing unexpected and unplanned uses of the interface.

The concept can be applied to different doors in different settings. For instance, the user's room door can have different semantics and display different data compared to the main door of the house or building. Generally, it will be helpful to couple a door's auditory display to information which is actually related to objects/events outside. Certainly, the opposite is also possible: that the door conveys on entering the room aggregated information about what happened inside while the last time being there. In summary, we presented the concept and design of the implemented prototype. Applying the design concept of *Blended Sonification*, we realized a system that offers a calm, interaction coupled, implicit and unobtrusive experience for the user to support behavior in an everyday setup. A user-study is planned and would allow to measure the effect of the weather to go system in detail. Future plans are to install the system in households for a longitudinal study to gain insight into usability and preferences.

### 5. REFERENCES

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<sup>1</sup>[https://www.dropbox.com/s/lod8ao2y2lynavm/20140204\\_160918.mp4](https://www.dropbox.com/s/lod8ao2y2lynavm/20140204_160918.mp4)

<sup>2</sup><https://www.dropbox.com/sh/2fbuvruzsg26n4/a29MitZdrz/sounds>