WaterJewel: Be Aware of Your Daily Servings of Water With an LED-illuminated Bracelet

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ABSTRACT

A recent study revealed that every fourth German adult drinks less than 1.5 litres a day. In the long term, this leads to dehydration and can cause confusedness, faint, or can even be mortal. To overcome their problem, people affected use reminder signals which they often miss or yet deactivate because they are too obtrusive. In this paper we present WaterJewel, an LED-illuminated bracelet which reminds the user to drink, as well as it rises the user's awareness for their drinking frequency in an unobtrusive way. Eight single light spots on the bracelet indicate the amount of drinks taken. Another light spot presents the time elapsed since the last drink. We found that with WaterJewel, people manage to drink 2 litres a day and drink more regularly than with current approaches.

Categories and Subject Descriptors

H.5.m. [**Information Interfaces and Presentation**]: Miscellaneous

General Terms

Human Factors; Experimentation

1. INTRODUCTION

Dehydration can cause confusedness, faint, or can even be mortal [4]. A well-known recommendation says one should drink at least 2 litres of liquid resp. eight 8-ounce glasses of water a day. However, a recent study revealed that every fourth German adult drinks less than 1.5 litres a day, and only 55% drink evenly distributed servings over the day [5]. To overcome this problem, people use reminders which are typically based on onetime signals. The problem with one-time signals is that they are either presented very discreetly, or in absence of the user, so that they are missed easily, or they are presented very obtrusively, so that they disturb the user and people nearby. Besides, signals might be triggered in situations which do not allow to go for a glass of water. Then, if not repeated later on, the user will probably forget that s/he was reminded.

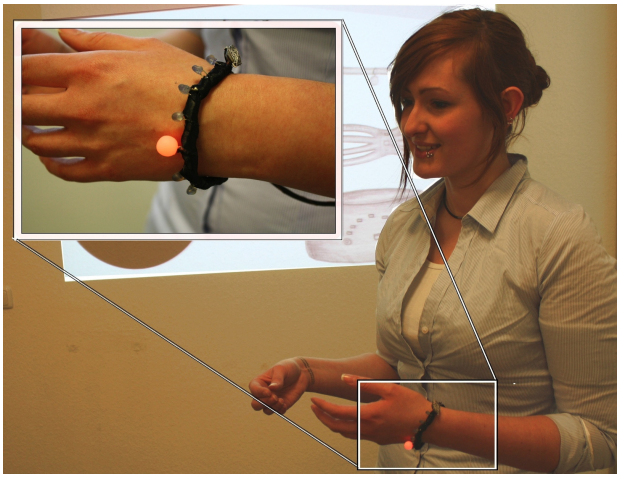

Figure 1: WaterJewel: Single light spots on a bracelet unobtrusively reflect the user's daily drinking behaviour and thus help the user to drink 2 litres in 8 evenly distributed servings over the day.

In this paper we present WaterJewel, an LED-illuminated bracelet which serves as an "ever present" ambient water drinking reminder and awareness display. The idea behind our approach is that a continuously illuminated LED on the bracelet enables the user to be constantly aware of the time elapsed since their last drink. At the same time, the LED is yet unobtrusive as being integrated into a gem on a bracelet. Eight further LEDs on the bracelet light up at the touch of a button and show how many glasses of water have been drunk on a day (see Figure 1). We argue that WaterJewel's

ambient awareness display enables to drink providently and thus makes it improbable that a person forgets a drink or that the reminder breakes in on him/her in an inappropriate situation. WaterJewel's discreet display makes it a suitable everyday life companion. This paper reports on the design rationale, the implementation and the results of a field study.

2. RELATED WORK

There are several tools whose purpose is to remind a user to drink: Alarm clocks in various forms, smartphone applications, such as Carbodroid[1], as well as bracelets, such as the vibro-tactile bracelet Ah!Qua[2]. To remind the user to drink, these onetime reminders alert in preset intervals over the day.

Previous work has investigated the use of wearable, visual displays as unobtrusive information displays. Harrison et al. [3] found that in general, the locations wrist and arm were found to be very suitable to present information effectively and efficiently on a visual display. The Reminder Bracelet was proposed by Hansson et al. [2]. It was composed of a simple bracelet with three red LEDs, which lighted up to show notifications triggered by a connected PDA. Another LED bracelet, Damage [6] was designed to support communication in a social group. It presented information via one white and five coloured LEDs. Ahde and Mikkonen [1] describe their vision to use LED-illuminated bracelets for communicating spatial proximity of friends.

In contrast to previous work, WaterJewel supports constant awareness of the drinking frequency, as well as it shows the drinking progress for the day, while still having an unobtrusive and ambient appearance.

3. IMPLEMENTATION OF WATERJEWEL

WaterJewel is a fashionable bracelet with nine LEDs and a button. The design is inspired by literature, the results of a brainstorming session, and by a user study in which participants evaluated and redesigned our created designs. Our goal was to support the drinking of two litres a day in eight evenly distributed servings. Besides, aesthetic appearance and the unobtrusive display of information were important requirements for the everyday life suitability of the bracelet.

WaterJewel consists of eight LEDs which represent a progress display of eight glasses of fluid that add up to two litres. The LEDs are arranged in a row and light up at the short touch of a button, if previously activated. When a user drinks a glass of water, s/he presses the button for two seconds and another LED on the progress display will be activated. The first seven LEDs light up in blue. The last one lights up in green to emphasise the achievement of the daily goal. Between the fourth and the fifth LED, there is a further, differently shaped light spot which indicates the time elapsed since the last drink. This light spot is always illuminated and serves as the awareness display. The information is presented as a colour value along the gradient green (just drunk) to red (drunk two or more hours ago). WaterJewel was implemented on the *Arduino* Prototyping platform and realised through an *Arduino LilyPad* microcontroller board with some of its hardware components.

[1] https://play.google.com/store/apps/details?id=de.jooce.water&hl=de

[2] http://ahqua.at/index_e.html

4. EVALUATION

In a within-subjects field experiment with 12 participants, we compared WaterJewel to the drinking reminder *Carbodroid*, a popular Android application[1]. Participants were asked to use WaterJewel and the Android application for two weeks each, while following their daily routine.

We learned that with WaterJewel all participants drank two litres a day, whereas with *Carbodroid* only 10 did so. Participants drank significantly more regularly than with *Carbodroid*. All participants preferred WaterJewel to *Carbodroid* and rated WaterJewel's usability significantly better than the usability of *Carbodroid*. All 12 participants liked the appearance of *WaterJewel* as an aesthetic bracelet and especially mentioned the advantage that it was always in the view, did not need to be fetched like a smartphone and was very intuitively to use. The green light spot indicating the goal status was experienced as a motivating sense of achievement. All participants commended that the central light spot allowed continuous awareness of the time elapsed since the last drink. Thus it was possible to drink providently, e.g. a participant drank in an orange lighting phase because she knew that the upcoming appointment would overlap the red lighting phase.

5. FUTURE WORK AND DEMO

In this paper we presented WaterJewel, an LED-illuminated bracelet which serves as an "ever present" ambient water drinking reminder and awareness display. As such, it addresses essential weaknesses of current water drinking reminders. In future work, we want to improve the prototype and to investigate context-related issues, such as in how far the information presentation on the bracelet should adapt to different settings and situations to ensure full everyday life suitability.

For visitors of the demo we will bring several instances of WaterJewel which can be explored freely.

6. REFERENCES

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