

Wearable Augmented Reality Display for Wellness

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ABSTRACT

A concept of mobile augmented reality (AR) use for wellness data is explored. We are especially interested in using aesthetic wearables as AR markers for augmented reality applications. A focus group based user study, and a concept design and prototype of a mobile AR based wellness wearable interface is presented. The work extends the research body on wellness wearables in an under-explored design direction.

Author Keywords

Augmented reality; mobile augmented reality; wellness; aesthetics.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Ever increasing numbers of mobile applications related to wellness and health are entering to markets, and the general interest to track and access one's wellness information is growing. Typically, UI design in the wearable domain involves utilizing gadgets such as smart watches, or approaches where the UI is distributed between a mobile phone and the wearable, e.g. a bracelet with a simple display. Earlier research on wearable displays conveying wellness information include shirt integrated displays showing heart rate [6] or information to fellow joggers [3]. As an aesthetic wellness display, a bracelet for monitoring water drinking behavior has been presented in [1].

We present a concept and prototype where wearable augmented reality is used to display wellness related information. We are especially interested in utilizing aesthetic design of the wearable parts, such as garment ornaments, for the purpose, and making the augmented reality (AR) marker a low resolution pervasive display, which informs the wearer of the status of the wellness data.

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A mobile AR application is then used to gain more detailed information. Prior art has demonstrated static wearable AR markers [5], and reported that chest and arm as the preferred locations for wearable markers [2]. When charting user expectations of wearable wellness devices, the comfort of wearing, and the form factor design were amongst the most appreciated characteristics [4]. We believe the aesthetic mobile AR approach has potential to answer these requirements.

In the following, we describe a focus group user study, and present a design concept and prototype of a dynamic wearable AR display. Our approach provides an under-explored direction for UI design of wellness wearables and wearable displays.

FOCUS GROUP

We conducted two focus group sessions with altogether 10 participants (3 male, 7 female), where 7/10 belonged to the age group of 18-29 and 3/10 were older, and where 5/10 had earlier experience on mobile AR. The focus group sessions consisted of tasks, where perceptions of existing wearable concepts were collected on post-it notes, discussion of different mobile AR wearable concepts presented with visual stimuli, and a paper prototyping session, where participants were asked to illustrate a mobile AR application concept utilizing an aesthetic wearable jewellery type AR marker.

The perceptions of wellness related mobile AR brought up the following main themes: Firstly, applications related to wellness provoked positive interest, but the data was considered very private, and concerns about other people seeing it were raised. Thus, the application should preferably be designed for the wearer him/herself. Secondly, ideas around wellness application mobile UI were mostly presenting quite detailed information, and typically with physical activity tracking content. The use of a mobile phone UI was described as handy, e.g. with comments such as *"Maybe a mobile app would be the most practical [UI for smart jewellery], as it is nearby all the time anyway"* (#4, Female).

The focus group discussions were also used as inspiration for an aesthetic mobile AR wellness application concept development. For instance, during the discussion about using illuminating elements, participants gave the following reflections: *"All different methods [for information delivery] have their place. A mobile app for instance for*

large amounts of data, lights for quickly passing a message, ...” (#5,M), and “Lights don’t give a clear enough message. Considering AR or a mobile app would make sense” (#9,F). Brainstorming around these comments, as well as general findings around using aesthetic AR for a health and wellness application, lead us to develop the following concept, introduced in the next section.

PROTOTYPE

In our approach we used a visible, ornament type design as an integrated ambient status display, and an AR approach to present more detailed information to the user. The AR marker pattern is created with thermocromic ink, which is printed on top of the garment, and which changes its colour with temperature change (black to white). The thermocromic ink pattern functions as an ambient display, changing dynamically to show different abstract designs, see figure 1. The appearance of the pattern is controlled with heating elements attached to the underside of the fabric, causing the pattern to appear and disappear according to the areas heated.

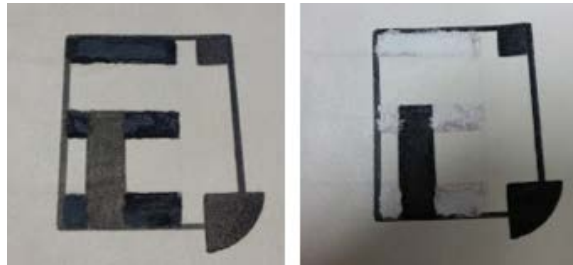


Figure 1. AR marker on leather.



Figure 2. Reading the two stages of the thermal AR marker.

Based on appearance of the pattern, the user knows that a certain wellness data item has changed its threshold value. To gain more detailed information, the user can then take his mobile phone, and read the AR marker via the camera. This functionality is illustrated for two different marker presentations and the corresponding AR views in figure 2. The abstract design of the marker preserves privacy, and seeks to provide a simple aesthetic information display.

DISCUSSION

Wellness and health related information can be considered as private, and the display design should reflect this design requirement. In our demo, the public display has an abstract, aesthetic design, and the detailed information is shown on a private AR view. We acknowledge that this approach provides usability challenges e.g. in providing an affordance for reading the marker, and marker recognition e.g. in dim conditions. However, as the display is primarily targeted to the wearer him/herself, we consider these issues secondary. In our future research, we will focus on evaluating the concept.

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