
Illumee: Aesthetic Light Bracelet as a Wearable Information Display for Everyday Life

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Abstract

We present our vision of a wearable light display integrated into a piece of jewellery – an aesthetic bracelet. As a piece of jewellery, the display is discreetly integrated into some accessory that is worn anyway and therefore integrates excellently into everyday life. The bracelet can be used for various daily reminder tasks like intake of medication. It can also be used to present feedback on a person's health behaviour, e.g. their daily physical activity. We briefly describe our concept and present a number of research questions that need to be investigated.

Author Keywords

Digital Jewellery, Wearable Display, Light, Reminder

ACM Classification Keywords

H.5.m [Information interfaces and presentation]:
Miscellaneous.

Introduction

Mobile displays like those built in smartphones are widespread. In the last few years, wearable displays like those in pedometers, sports bracelets or smart watches have become more and more common in everyday life as well. Typically they are used as reminders or meant to make a person aware of something, like e.g. his or her physical activity behaviour. However, a problem with

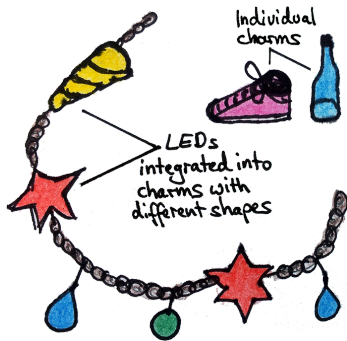


Figure 1: Sketch of a charm bracelet with LEDs placed inside the charms

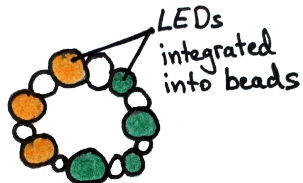


Figure 2: Sketch of a bracelet with LEDs placed inside beads

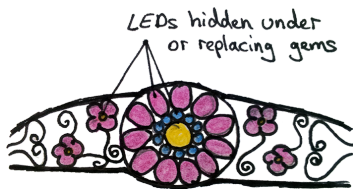


Figure 3: Sketch of an elegant bangle with LEDs replacing gems

current wearable technologies is that they are too obtrusive in terms of their appearance and their interaction behaviour, and that they are often plain and unalluring. Therefore people do not wear them in many everyday life situations, or not at all, which makes them useless.

Related Work

People identify themselves with things that they wear on their body. Therefore, aesthetics, comfort, but also behaviour and functionality of a worn device are crucial for its acceptance [7]. Cawthon and Moore explore the effect of aesthetics on the usability of interfaces [2]. In addition, an aesthetic device that enchants its user can make him or her more willing to wear and to use it [5].

Harrison et al. discuss the suitability of body locations for placing visual displays [4]. In their study results, the wrist was the best location in terms of reaction times and consistency. Previous work has investigated possible use cases for information displays embedded into bracelets. Ahde and Mikkonen describe their vision of communicating spatial proximity of friends by using interactive bracelets [1]. Hansson and Ljungstrand provide some ideas on how to use a bracelet for displaying calendar reminders in an unobtrusive way [3]. Williams et al. present a concept for displaying social network activity cues via LEDs on a bracelet [8].

We believe that the wrist is a good location in terms of perception as well as for displaying information in an unobtrusive way. Our aim is to create an aesthetically pleasing ambient information display embedded into jewellery to make the system more enchanting and thus increase the user's engagement with the display. In the

following, we present our ideas and research questions on creating an information display within digital jewellery.

Idea

Our idea is to discreetly integrate a wearable information display into a piece of jewellery. Like Miner et al. [6] we believe that as such it will not be perceived interferingly and inadequately and therefore can be fully integrated into everyday life. We envision a visual, low-information rate display which provides information on an aesthetic bracelet in an ambient way. Single LEDs replace particular gems and charms of a bracelet in order to keep its aesthetic appearance and not to change its level of obtrusiveness. Figure 1 shows a sketch of our vision: a charm bracelet in which LEDs are integrated into single charms and indicate information by their shape and colour. Each shape represents a certain type of information and exists multiple times to ensure that one of each is always in the wearer's viewing angle. The charm bracelet can be complemented individually by further charms. E.g. a charm shaped like a shoe or a water bottle can represent the user's physical activity resp. water intake in an intuitive way. The shoe-shaped charms illuminate e.g. in green if the user has done an appropriate amount of steps recently and will slightly switch via orange to red when the physical activity of the user decreases. To keep the information private in public, more abstract or ambiguous shapes like stars, or balls can be used. Figure 2 shows a more private design with LEDs integrated into beads. Information can be encoded by colour, the number of illuminated beads, or spatial patterns. The latter can e.g. be created by several, adjacent beads that illuminate simultaneously to indicate e.g. how much percentage of his or her daily activity goal a user has already accomplished. Non-illuminated beads appear like white pearls. In more sophisticated bracelets

like the bangle in Figure 3 LEDs can replace or be hidden underneath particular gemstones, like the gem in the centre of a flower.

We assume the enchanting characteristic of digital jewellery will support its (long-term) usage. Regarding this, we think especially wearable technologies which are meant to motivate people for a healthier lifestyle could benefit from our idea.

Research Questions

1. *Should a visual, wrist-worn display be “always on” or light up on demand?*

A bracelet which continuously glows is glanceable, can support constant awareness of the displayed information and can be perceived in the periphery of the user’s attention. In contrast, a display which lightens up on demand could be less obtrusive and less energy consuming. We have to investigate if there is a general answer to this question from the perspective of user acceptance as this will influence which and how information is displayed.

2. *Which light patterns are suitable to present information on a visual, wrist-worn display?*

Light has many parameters which can be used to encode information. However, not all of them are suitable to encode information on a wearable display as the different and changing environmental conditions will require light patterns that are robust and clearly identifiable under several conditions. An initial user study indicates e.g. that two different brightness levels displayed on a single LED mounted on a bracelet are already difficult to distinguish indoors at daylight.

3. *How do the light patterns perform in different contexts of use?*

As the wearable display will be worn in many different contexts and environments, we have to investigate in situ how the light feedback should be presented to always be easily perceivable but not interfering. E.g. in a dark environment, the light feedback might have to be much more discreet than at daylight. When attending a dinner party, the colour scheme of the display should suit to the outfit. We think, interviews can help to identify relevant context issues before the design, but should be verified and if necessary complemented through an in-situ study with a real bracelet.

4. *How does the worn display perform in terms of personal acceptability?*

For a display to be worn in public, personal acceptability is crucial. We have to ensure that a user feels comfortable while wearing the display. Therefore we have to study in situ how users feel in public when they wear the bracelet and it lightens up. This includes reactions of observers as well, as the display must not be the reason for e.g. being debarred from an event or punished by a teacher.

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