Keeping Groups Together with a Public/Private Light Display

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Abstract
We present a vision for an interactive city light display system designed to help groups of friends know each other's whereabouts to stay together while on the move at crowded public places such as pedestrian zones or fun-fairs. We briefly describe our concept and list a number of research questions to be addressed.

Author Keywords
Light Display; Group Dynamics; Interaction; Public-Private Display

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

Introduction
Keeping a group of friends together when visiting a fun fair or large city celebration can be quite challenging. Someone is always falling behind or running ahead and soon you are on your own and a complicated process of coordination has to be started to regroup again.

This problem was previously addressed by Pielot et al. [1] through the use of a mobile phone's vibration capabilities, informing group members of each other's location with vibration patterns. We would like to take

Figure 1. Illuminated store-front

and enhance this idea to make it suitable for use with a public light display.

Rukzio et al. [2] have demonstrated the use of light displays at intersections for pedestrian information. This work however did not include the concept of groups or simultaneous use by multiple users.

Idea

The system we envision is based on map information and intersections rather than an open uniform space.

Group members will use their smartphones to send their geo location information to the system. The system will thus be able to match this information to the underlying map. At each intersection a multi-colour light display can tell group members in which direction other members of the group are located. This display could be an array of RGB-LEDs attached to a lamp-post, street-sign, wire- or wall-mount. It could also be an illuminated tree, piece of architecture or even monument. The possibilities are numerous and may add some aesthetic aspects to the unknowing bystanders as well [3][4]. Figure 1 shows an example of a dynamically illuminated store-front that could possibly display a lot of information. Figure 3 shows an LED-lit tree.

To make this public display suitable for exchanging private information such as the location of one's friends, the group can register with the system and choose a colour plus choose or define light patterns for encoding the required information. The encodings will thus only be known to the group members. We collected some possible information dimensions in Table 1. The registration and selection procedure will also allow the simultaneous use of the system by multiple groups.

Information Dimension	**Possible Values**
Direction	Forward, Back, Left, Right
Proximity	Near, Far
Movement	Moving away, Closing in
Number of Members	1<x<n

Table 1. Dimensions of information to be displayed by light display.

We envision that use of light displays placed clearly visible at intersections (e.g. in downtown pedestrian zones) allows a hands-free and head-up orientation regarding the location of other group members (Figure 2). When a group is together the display will remain dark and only comes into effect once the group separates (Figure 4).

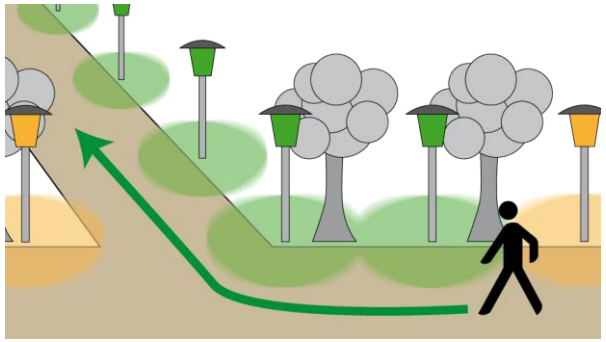

Figure 2. Light signaling a turn at an intersection

Figure 3. LED-lit tree

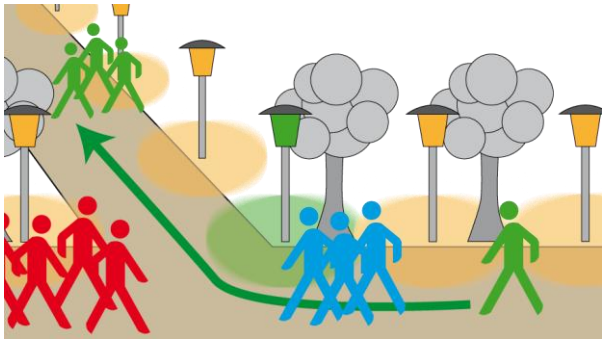

Figure 4. Information is displayed for the separated group only (green)

Research Questions

We see a number of research questions in the proposed system:

1. How to encode the required information with a light display?
   Light has a number of parameters that can be adjusted to encode information. However not all parameters are evenly well suited for the task. An experiment "in the wild" will have to be done to gain further insight in light information displays for persons on the go.

2. How much freedom can and should be given to groups creating their own light patterns?
   Sometimes one has too much freedom for one's own good. With respect to the results from research question 1, users may need to be provided with a predefined set of encodings to choose from. This issue may be addressed in a participatory design study, where further patterns beyond the scope developed in the experiment for research question 1 may be discovered.

3. Social acceptability of displaying private information in public?
   Even though the system is intended to keep a group's information private, there may be concerns such as: "What, if I am the only one at an intersection and the light comes on?" The acceptability of such inevitable events will have to be examined.

Relevant Experience

The authors of this paper have a record of experiences with ambient light displays. An overview has been presented at the DIS '12 Workshop "Designing Interactive Lighting" [5].

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