

# Smart Bag: Managing Home and Raising Children

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**Abstract.** Dual-income families experience stress as they attempt to manage the conflicting responsibilities of work, school, home, and enrichment activities. Opportunities exist for technology to provide support in managing their children’s activities, helping parents feel more in control of their lives. In this paper, we explore opportunities to support children’s activities. Based on our contextual fieldwork with dual-income families, we suggest a concept of the Smart Bag, which addresses two design opportunities: (i) a reminder system that helps people remember their schedules and what they need to take, and (ii) a reminder system that allows parents to engage in parenting.

## 1 Introduction

Dual-income families – a growing segment of the US population – experience stress as they attempt to manage the conflicting responsibilities of work, school, home, and enrichment activities [2]. Children’s activities are especially important to parents [3]. Parents are driven to enroll their children in as many activities as possible to help them prepare for their future. The resulting tight schedule makes the activities susceptible to breakdowns, which disappoint children and make parents feel like they are not the parents they wish to be. This causes parents to feel out of control of their lives [6]. Opportunities exist for technology to provide support in managing their children’s activities, helping parents feel more in control of their lives [3][6].

This paper explores opportunities to support managing children’s activities. Following a human-centered design approach we explored the needs, goals, and desires around children’s activity management. This research led us to suggest the concept of the Smart Bag, which addresses two design opportunities: (i) a reminder system that helps people remember their schedules and what they need to take, and (ii) a reminder system that allows parents to engage in parenting by passing appropriate responsibilities to their children. This paper presents our design process and provides an overview of how families can interact with the Smart Bag.

## 2 Related Work

Studies have identified many different strategies families use to manage all the work they need to complete around the conflicting responsibilities of work, school, home,

and enrichment activities [2][3][4][8][9]. However, few attempts have been made to design systems that leverage these strategies and support families. Examples of research into helping families manage their responsibilities include LINC, a digital calendar for the home that improves synchronization and coordination by making the calendar available in many locations [7] and Gate Reminder, which focuses on providing just in time reminders as people exit their homes [5]. While our Smart Bag also works as a reminder based on the tasks and routines of a household, our work advances the previous research by exploring how reminders can work to increase the social connections between parents and children.

### **3 Research Process**

Following a user-centered design process, we explored the needs of dual-income families around their activity management processes focusing on children's activities. We conducted three-hour contextual interviews with 12 dual-income families with school-aged children. The interviews included directed storytelling, artifact walkthrough, and role-playing activities. All family members were asked to participate. We focused questions on how they manage their activities – their daily routines and deviations, artifacts that they use, and difficult and pleasant experiences. Following the interview, we left families with cultural probe packages and a reminder dairy for a week. After collecting and synthesizing the data, we generated concepts and then conducted an experience prototyping session. We asked dual-income parents to enact a set of common scenarios while our low-fidelity prototype attempted to offer assistance. To know more on this experience prototyping, please see [1].

Based on our fieldwork, we identified two main characteristics of a family's activity management: (i) activity management functions as a process of interdependent steps, and (ii) activity management provides an opportunity for social interaction between parents and children, particularly at the point that a parent passes a responsibility to a child.

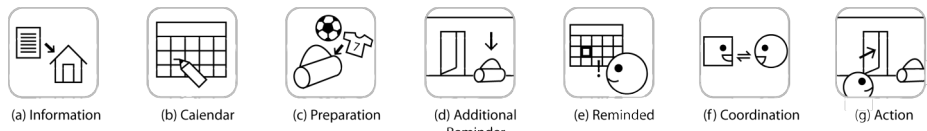
### **4 Smart Bag: a Family Activity Management System**

As we observed in our fieldwork, family activity management is a process of interdependent steps, where each step relies on the outcome of its corresponding steps (Fig. 1). An activity bag is an important part of this management process. Information describing the activity, such as the initial soccer schedule, arrives in the home (Fig. 1(a)) and has been added to the calendar or to other reminder systems (Fig. 1(b)). A bag then gets assigned to be (i) a container of necessary objects, (ii) an ambient reminder due to its placement where it can be seen, and (iii) a holder for messages related to activities for which the bag is used. For example, as an event such as soccer practice approaches, people prepare all required objects and put them in a designated bag (Fig. 1(c)). After, they place the bag in a prominent location as an ambient reminder about that activity (Fig. 1(d)). People also leave a message on the bag so they

can get the message at the right moment – for example, they may place an empty water bottle on top of the bag to remind them to fill the bottle before they leave home.

Our design extends this coping strategy that families have developed. Through augmenting this existing system, the Smart Bag is designed to prevent potential failures in a way that does not radically alter families' daily routines. The Smart Bag knows what it is supposed to contain and can sense what it does contain. It uses this information to reduce the chances of forgetting. In addition, family members can leave messages with the bag for the owner to receive.

Even when the Smart Bag system works without errors, activity management can fail if corresponding steps in the process go wrong. For example, if people forget to check the family calendar in the morning when the soccer practice occurs at a non-routine location, they may be ended up with being at an empty soccer field. Connected to the schedule of events, the Smart Bag can remind the user of these approaching events.



**Fig. 1.** A model of an activity management process for soccer

The use of a bag in the management system is more than a functional process for families. Instead, the bag system is a part of family's social practices. In addition to functional reminders, parents often leave loving and encouraging messages inside the bag. In our fieldwork, one mother reported leaving love messages in her daughter's lunch bag.

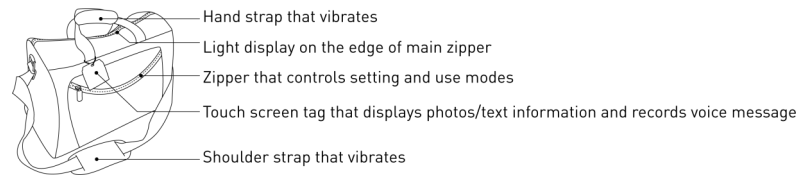
Part of a parent's long-term goal is to make their children independent. The bag system provides opportunities to help with this by allowing parent to teach responsibilities to their children. Parents assign simple tasks to their children such as checking things to bring before going to a Ballet class or taking a lunch box to the kitchen after school. Even though children need constant reminders from parents to remember and perform those tasks without mistakes, parents want their children to do those tasks by themselves. This need for constant reminding can be a source of conflicts between parents and children.

The Smart Bag is designed to encourage social practices between parents and children. The Smart Bag creates a parenting moment when the parents sit with their child to train the bag, allowing them to demonstrate their interest in the child's activity through an investment of time and attention [6]. Parents can show what is supposed to be in the bag to children and construct rules such as putting everything into the bag the evening before the activity. By setting the bag to remind children of approaching activities and packing things, parents pass their responsibilities to their children. In addition, the Smart Bag can monitor the child's behavior. When the child repeatedly remember to pack the bag correctly, the bag can inform parents, so parents may praise their child providing positive feedback on the behaviors the parents want to encourage.

To concretize this concept of the Smart Bag, its design should be situated in the real context of specific activities. We are developing such a detailed interaction by customizing the Smart Bag to an example of playing soccer. The main design builds

on natural interaction with a bag and applies a theme of soccer by leveraging ambient sounds of soccer practice and colored soccer cards.

Figure 2 shows the components of the Smart Bag for children's soccer practice. A few representative interaction examples follow. Light around the main zipper glows when a child closes her bag to carry it to the field without items that should be in the bag. The tag of the bag shows a green, yellow, or red card according to children's use of the bag. A zipper on the side of the bag is an interface to train the bag to remember specific contents. To train the bag, users simply open this zipper, place things in the bag that they want the bag to remember, and close the zipper.



**Fig. 2.** An exemplary illustration of the Smart Bag for playing soccer

## 5 Conclusions

We have presented the concept of the Smart Bag, which addresses two design opportunities identified in our fieldwork. Our next step is to implement the Smart Bag and evaluate it with families in terms of how the Smart Bag decreases failures in activity management and encourages the social interaction between parents and children.

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