Chapter 3.13
Tools for Rapidly Prototyping Mobile Interactions

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ABSTRACT

We introduce informal prototyping tools as an important way to speed up the early-stage design of mobile interactions, by lowering the barrier to entry for designers and by reducing the cost of testing. We use two tools, SUEDE and Topiary, as proofs of concept for informal prototyping tools of mobile interactions. These tools address the early stage design of two important forms of mobile interactions: speech-based and location-enhanced interactions. In particular, we highlight storyboarding and Wizard of Oz (WOz) testing, two commonly used techniques, and discuss how they can be applied to address different domains. We also illustrate using a case study: the iterative design of a location-enhanced application called Place Finder using Topiary. In this chapter we hope to give the reader a sense of what should be considered as well as possible solutions for informal prototyping tools for mobile interactions.

INTRODUCTION

The iterative process of prototyping and testing has become an efficient way for successful user interface design. It is especially crucial to explore a design space in the early design stages before implementing an application (Gould et al., 1985). Informal prototyping tools can speed up an early-stage, iterative design process (Bailey et al., 2001; Klemmer et al., 2000; Landay et al., 2001; Li et al., 2004; Lin et al., 2000). These tools are aimed at lowering the barrier to entry for interaction designers who do not have technical backgrounds, and automatically generating early-stage prototypes that can be tested with end users.

The informal look and feel of these tools and their fluid input techniques, for example using pen sketching (Landay et al., 2001), encourage both designers and end users to focus on high level interaction ideas rather than on design or implementation details (e.g., visual layouts or colors). These details are often better addressed at a later stage. In this chapter, we focus on informal tool support for the early stage design of interactive mobile technologies. In particular, we describe informal prototyping tools that we developed for two increasingly important forms of mobile interaction: speech-based interactions (Klemmer et al., 2000) and location-enhanced interactions (Li et al., 2004).

The first of these two types of interactions, speech-based, works well on mobile phones, the major platform of mobile computing. These devices often have tiny screens and buttons to increase mobility, which makes speech interaction an important alternative. Although the accuracy of speech recognition is an important concern for a successful speech-based UI, the real bottleneck in speech interface design is the lack of basic knowledge about user "performance during computer-based spoken interaction" (Cohen et al., 1995). Many interaction designers who could contribute to this body of knowledge are excluded from speech design by the complexities of the core technologies, the formal representations used for specifying these technologies, and the lack of appropriate design tools to support iterative design (Klemmer et al., 2000). SUEDE (Klemmer et al., 2000) demonstrates how tool support can be used in the early stage design of speech-based user interfaces.

The second of these two types of interactions, location-enhanced, is important because of its implicit nature. While the explicit input channels (e.g., keyboarding or mouse pointing) available on mobile technology are more limited than on the desktop, the bandwidth of implicit input (using contextual information) is greatly expanded on mobile platforms. Mobile technology is more available in our context-rich, everyday lives than traditional desktop computing. One especially promising form of context-aware computing that has begun to see commercialization is location-enhanced computing, applications that leverage one's current location as well as the location of other people, places, and things (Li et al., 2004). For example, mobile phone services allow users to locate friends and family (LOC-AID), provide real-time navigation (InfoGation) and monitor and motivate users toward their fitness goals by using phone-based GPS to measure the user's speed, distance and elevation (BonesInMotion). E911 transmits a mobile phone user's current location when making emergency calls. However, location-enhanced applications are hard to prototype and evaluate. They employ sophisticated technologies such as location tracking and their target environment is mobile and in the field. Topiary (Li et al., 2004) demonstrates how high-level tool support can be provided for lowering the threshold and cost for designers to design and test location-enhanced applications.

Using SUEDE and Topiary as proofs of concept, we highlight two techniques commonly used in informal prototyping tools: storyboarding and Wizard of Oz (WOz) testing. To overcome the technical barrier for design, both SUEDE and Topiary employ a storyboarding-based approach for specifying interaction logic. To allow easy testing of prototypes, both tools employ WOz approaches where a human wizard simulates a sophisticated, nonexistent part of the prototype such as location tracking or speech recognition. To demonstrate how these types of tool can actually help prototype and test mobile technology, we introduce a case study using Topiary to design the Place Finder application.

BACKGROUND

User interface tools have been a central topic in HCI research. An extensive review of user

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