Mobile Interface Design

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Abstract

For the majority of the global population, most interactions taken with technology are done through mobile devices. Whether it's ordering food delivery, calling a relative, or attending online lectures, all uses of a mobile device share some basic characteristics. Drawing from those similarities, we can extrapolate design principles and guidelines that apply across most mobile applications for an effective and smooth user experience.

Introduction

Interface design is a complex art form with competing schools of thought, but some basic agreed upon principles have been established to ensure a user friendly and effective design. Rules such as Shneiderman's "Eight Golden Rules of Interface Design" have long guided developers in making interfaces of any kind. Though many of the same principles apply for mobile applications, there are new challenges mobile devices introduce that call for specific solutions and design principles to fit them. Challenges such as the small touchscreens used both for output and input, and users' needs to access on-demand information quickly and easily in various difficult conditions such as one-handed usage, pose new, specific, and crucial requirements for mobile interface design. In this paper, multiple issues in mobile interface design will be discussed, and multiple design principles will be proposed.

Mobile Interface Challenges

Distracting Environments

Unlike with desktop applications, mobile device usage often occurs in a variety of difficult environments that pose a challenge on interface design. When using a mobile device, "environmental conditions (e.g., brightness, noise levels, weather) can change depending on location, time of day, and season." (Gong, 2004). This challenge can affect all aspects of the user experience, ranging from visual output interference in direct sunlight, to audio input interference in a loud environment. Users can also experience privacy issues that wouldn't normally occur in desktop environments, as mobile devices are often used in the presence of strangers. There are multiple design principles that can assist with this challenge, including the flexibility, adaptability, and visibility principles. Adaptability in mobile interface is needed as they are used in different environments; "small text sizes may work well under office conditions but suddenly become unreadable in bright sunshine or in dimly lit spaces" (Gong, 2004). Flexibility is helpful as different users can have different preferences and use their devices in varying environments. Visibility is always relevant in mobile interfaces, but especially so in the context of different environments, "the information presented on the product display should be visible and clear to a user" (Park, 2011). Different lighting situations and screen qualities can affect the color scheme of applications drastically, and designers need to account for this to ensure a consistent and predictable user experience.

Smaller Screens

One of the most difficult obstacles in mobile interface design is screen size. When using written output, designers must consider the difficulty that involved in reading large bodies of text on small screens and should offer flexibility in font size for different user groups. With touchscreen

input, designers need to be weary of placing buttons or functionalities too close together, adhering to the design principle of error prevention & recovery: "the user interfaces and the interaction methods should be designed to prevent a user from making any mistakes or errors" (Park, 2011). Designers should also consider that users will still make occasional errors when using touchscreen input on a small device, and as such applications should follow the forgiveness design principle: the "ability for a user to take corrective actions when an error was recognized should be provided" (Park, 2011). This usually involves confirmation prompts to allow users to cancel a drastic action before taking it. Additionally, in the interest of user comfort, designers should consider using methods of visualization that are less demanding of users. A Stanford University study has suggested that using 3D modeled objects as opposed to 2D shapes when possible could help lower the strain of screen usage and help users better navigate an interface (Schneider, 2016). Other steps such as brightness control should be taken to ensure users can focus on applications without straining their eyes or overwhelming their cognitive load.

Limited Attention

Unlike with desktop usage, mobile users often wish to allocate a limited portion of their attention span to a mobile device while using it. Examples of this requirement include taking a picture in a crowded street, answering a message while doing laundry, or checking a recipe while cooking. Because of these circumstances, "interfaces for mobile devices need to be designed to require as little attention as possible" (Gong, 2004). The lower the cognitive load a mobile application demands the better. Following this, we can arrive at the simplicity principle: "The user interfaces and interaction methods of a product should be simple, plain, and intuitively recognizable" (Park, 2011). This principle entails keeping functionalities simple and easy to learn, and presenting

information in an intuitive and easy to follow way. Users should not be overwhelmed with details in any particular page of a mobile application. Another key principle aiding with this challenge is the feedback principle: "The status of a product and the consequences of any user operations should be immediately and clearly provided" (Park, 2011). This principle is key in mobile interface design as providing feedback can assist users in confirming the success of their actions with little attention, for example via a bling sound when a "Submit" button is pressed.

Important Principles in Mobile Interface Design

Personalization

In contrast with desktop environments, which are often designed to be shared among multiple users either in an office or a home setting, mobile devices are usually personal. This fact can help designers delegate some design choices to their users, allowing them to customize their mobile application experience to fit their needs and preferences. These customizations should involve stylistic choices such as font size and font color, as well as functional choices such as notification preferences and content suggestions. This personalization is useful since "different users have different usage patterns, preferences, and skill levels" (Gong, 2004). It can also help increase a user enjoyment of an application, which helps curb the attention span limitation of mobile applications.

Unique Inputs

One of the great yet little explored potentials in mobile interface design is the plethora of input devices and methods available to developers. Mobile device input in most applications typically entails simple tapping, scrolling, and typing activities. While those are intuitive and widely used, and as such they offer users consistency, in many applications there are other mobile inputs that could improve the users' experience. These include inputs such as Augmented Reality available

with the camera at the back of a mobile phone, gestures available in touchscreens such as dragging and dropping, swiping, or pinching, and various GPS and gyroscope abilities mobile devices often have allowing for gestures such as shaking the device or aligning it across an axis. These inputs can be used in a variety of applications, potentially decreasing the cognitive load on users as some of these are more natural control methods than typing text or tapping on buttons.

Basic Design Principles

Beyond the unique circumstances of mobile devices, there are multiple reliable design principles that carry over from desktop design and apply equally in mobile devices. These principles include the predictability principle: "The interaction method and the meanings of user interfaces should accord with user's expectation" (Park, 2011), which can help lower cognitive load on users and help use mobile interfaces in challenging environments. Another useful principle is the efficiency principle – "A product should be designed to allow a user to perform any functions in a quick, easy and economical way" (Park, 2011) which helps designers format their application's navigation, focusing on the users' ability to access any functionality with little effort. As always with any interface, the design should be made for users' enjoyment, which helps users maintain their attention while using an application; "Aesthetics is also part of designing an overall enjoyable user experience with mobile devices" (Gong, 2004). This principle usually involves style guides and matching color schemes that can work well with the flexibility principle – allowing users to customize their application to their stylistic preferences.

Conclusions

In conclusion, drawing from the main challenges introduced by mobile devices, and drawing from the unique advantages mobile devices offer, we formalized rules and guiding principles for designing a mobile interface. These principles guide designers in making interfaces that are

effective – interfaces that allow users to fulfill the application's purpose - and user friendly. With this in mind, using design principles in applications entails not only following the principles themselves, but matching them with the appropriate usage. For example, the consistency principle should be used when formatting text spacing in an interface, while the flexibility principle should be used to allow users to change text fonts; mixing those two principles would limit the benefit of both. Following the design principles properly, designers can ensure their applications satisfy their users' needs and encourages users to choose their applications over the competition.

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