

A Program Analysis Study for Making Prototype of Mobile Phone Application Design

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Abstract

Application that arose from the combination of internet environment improved by development of information and communication technologies and multimedia technology starting with mobile phone has permeated our everyday lives rapidly. At first, application was merely regarded as means of public relations or information sharing but its use has expanded as new space has increased through interaction with users which is one of the characteristics of application. Such virtual space has been used as means of communication due to the development of smart phone which is a necessity of people today who experience rapid change in advanced technology. Efficient application interface design has been considered important for visualization which user experience is regarded important due to rapid development of mobile phone environment, systematic application design development and continuous cooperation between designers and developers are necessary. Interface design that has undergone sufficient verification is required so that application design can provide users with various information effectively. In order for application design to provide users with various information effectively, a design which is beautiful and functional is required. Various design demonstration programs have been developed for smooth cooperation between designers and designers when making prototype which is design mock up process. In this paper, I will study easiness and flexibility of design development by making comparative analysis of functions of programs for making application design prototype.

Keywords: Application, Prototype, Application design, User interface, Interaction

1. Introduction

As user oriented design that considers users' experience value important has received lots of attention, visualization of design has become more important. Most enterprises have considered a design important in developing application. The development of existing advanced technology industry has a great role in improvement of application design. The focus of consumption has been moved to overall experience around products from products and application design has been considered as a part of contents service. As users are considered important in economic activities, the outcome of science and technology such as IT and media revolution has played a role in strengthening power of users in all areas of our lives [1]. Prototyping becomes more important in developing a design while studies and technologies that can analyze and understand the needs of users get the spotlight. Designs are to develop tangible and intangible elements [2]. Prototyping

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is fundamental method that can represent ideas visually in design development process [3]. Unlike other prototyping, for design prototyping, gaining various experience is important through cooperation among developers [4]. Design prototyping is used as means of communication between developers and designers. Actual verification is introduced in design process through prototyping. Prototyping helps users interact in various ways by making them directly involved in design process [5]. Design prototyping plays an important role in improving ideas by allowing those who are involved in a project to share ideas and feed the ideas back to them [6]. Therefore, it is important to make a good selection and use of programs for making prototypes which apply to a design. There are tools which allow users to experience service while doing role playing and programs which simulate process or situation of service by using mock-up as prototyping tools that are used for designs [7]. The advantage of above mentioned programs is that they are free from restriction of time and place [8]. Prototyping a design by making good use of mobile devices anywhere and anytime helps get feedback rapidly and maximize work efficiency [9].

2. The Use of Prototype in a Design

Prototyping is a tool through which developers can realize and evaluate final design solution. Prototyping allows developers to verify a design solution [10]. Developers verify interface or animation which varies easily through prototyping. Developers express and experiment with ideas looking into size or shape of image or overall layout of pages. Whenever interface of new design is developed, ideas arising from new design is simulated and corrected. Prototyping aims to build efficient working environment by reducing costs [11]. Prototyping checks error rate in various ways and allows developers to supplement faults. Furthermore, prototyping gives shape to abstract or ambiguous ideas. In addition, prototyping makes it possible for developers and designers to have smooth communication by showing results of work. Prototyping allows developers to test lots of cases and alternatives easily and find problem or weakness and retest a design [12]. It is desirable for users to take part in a test. Users' opinions are reflected in a design. This study aims at helping application design development by making a comparative analysis of aforementioned programs.

3. Study and Comparative Analysis of Programs to Make Prototypes for Application Designs

Five programs for making prototypes that are used for developing designs were selected and evaluation is made for each program. The name of each program is as follows; ① Proto.IO, ② JustinMind, ③ Pixate, ④ axure, ⑤ Oven. I will explain and analyze a diagram with numbers assigned to each program.

First, I examined function of pop-up slide icon motion twin. Findings of function of popup slide icon motion twin are as follows; ① can adjust effect naturally through timeline but J Query effect function is not provided and motion should be made through toolkit. In ②, motion that uses J Query effect is possible but when entering object variables, image transition is not natural. ③ does not provide J Query effect function and should make a motion through toolkit. In ④, motion is possible by using J query effect but like ②, icon revolution variables are not possible as image transition is not natural at the time of object variables. ⑤ cannot produce pop-up slide or icon motion twin.

Second, I examined function of fixed table scroll. The findings of function of fixed table scroll are as follows; ① uses formula of unknown signs such as? and when a user applies a script, he should designate true or false by scripts by setting option window additionally. ② is difficult to apply a script and therefore a script should be applied with

new UI method. There is a vibration in the table as a table is not fixed firmly when a scroll is used. ③ provides fixed table function through tool option. ④ does not provide a function of hiding scroll bar and using chrome makes preview speed slow due to slow reaction speed of a table. ⑤ cannot produce fixed table scroll function.

Third, I examined swipe function of buttons, effects and input functions of search window. Finding of swipe function of buttons, effects and input functions of search window are as follows. ① does not provide a function of mobile keyboard. ② provides a function which is similar to mobile. ③ does not have variable copy function and therefore if ten variables are applied, all ten variables should be put into six objects. Only image file is available because there is no input function including textbox and mobile keyboard function is not provided. ④ can share one variable with several objects and inherit them but a user should X coordinate and Y coordinate in person when using swipe. Input function has lots of bugs and mobile keyboard function is not provided. ⑤ cannot produce because there is no swipe function of buttons, effects and input functions of search window.

Fourth, I examined screen swipe and popup button creation. Findings of screen swipe and popup button creation are as follows; In ① and ③, natural swipe function is possible. In ② and ④, there is swipe before hand's touch gesture finishes. In ④, when using swipe, X coordinate and Y coordinate should be entered. ⑤ does not provide above mentioned function.

Table 1. Detailed Function Analysis and Assessment by each Tool

Detailed contents	Possible	Impossible	Hold
Program function			
Web use	①③⑤	②④	
Program use	②③④	①⑤	
J Query effect	①②	③⑤	④(Partially possible)
Time line	①	②③④⑤	
Command frame	①③	⑤	②④
Input box	①②④	③⑤	
Working window(size)	①②③	④	⑤(Partially possible)
Command copy	①②④	③⑤	
Command inheritance	④	①②③⑤	
Font compatibility	④	①⑤	②③
Font definition	①⑤		②③④
Member sharing	①②	⑤	③(Partially possible) ④
Program compatibility			

Internet Explorer	④⑤	①	②(Partially possible)
Chrome	①②④⑤		
Device Compatibility	②		①④ ⑤(Partially possible)
Device(Screen size)	②	①④	⑤(Partially possible)
QR Code	⑤	①②④	
URL provision	⑤	④	①②
WORD, PDF provision	①②④	⑤	
Interaction function			
Touch	①②③④ ⑤		
Long press	①②③④	⑤	
Swipe	①②④	⑤	③(Scroll similar function)
Drag	①②④	⑤	③(Scroll similar function)
Double touch	①②③④	⑤	
Pinch open	①②③	④⑤	
Pinch close	①②③	④⑤	
Transition effect			
slide	①②④	⑤	③(User production)
Fade	①②④	⑤	③(User production)
Flip	①②	⑤	③(User production) ④
Pop	①②	⑤	③(User production) ④
Turn	①②	⑤	③(User production) ④
Flow	①②	⑤	③(User production) ④

I analyzed learning level, widget usability, animation effect, implementation convenience, device compatibility and sharing by programs so that a designer can build environment of producing prototype efficiently.

Table 2. Result of Analyzing

Separation of functions	Program	Analysis
Learning curve	①	It is easy to use tool as this is similar to Adobe Flash Tool in concept / ex) composed of Screen, Layer, Group. Library is expressed as icon to make it possible to predict functions rapidly. Transition installation is configured easily.
	②	Configuration which is similar to Adobe Flash Tool in concept / ex) providing Screen, Layer, Group. It is possible to develop excellent prototype, Professional technical skills are required / Various functions and scripts
	③	It is easy to use as this provides only two types of toolkit / ex) Interaction type, effect type Transition installation is configured easily.
	④	Configuration which is similar to Adobe Flash Tool in concept / ex) Screen, Layer, Group. Expertise is required for toolkit that is composed of texts and terms.
	⑤	It is easy to use tool as this is composed of Korean alphabet. There are no functions of transition and tool kit
Widget library	①	Support toolkit such as Ios, Android, windows8.0 /image form. Support some input functions such as textbox. Support only font provided by Proto.io.
	②	Support Ios, Android, windows8.0 Toolkit / ex) partial image form. Support various input functions such as textbox and radio button.
		Provide user font - Provide none type user font. It is possible to design algorithm through programs - Functions of designing algorithm and extracting words.

	<p>Toolkit is not provided.</p> <p>Input function is not provided.</p> <p>Only one working space is provided / ex) 1</p> <p>③ Screen - designing complex screen is not possible.</p> <p>It is not easy to select areas and operate an object / ex) Handling.</p> <p>Parameter copy function is not provided.</p>
	<p>It is not possible for a user to adjust the size of screen.</p> <p>Support various input functions such as textbox and radio button.</p> <p>④ Support Ios, Android Toolkit etc. through download / Image form.</p> <p>It is possible to share one variable with several objects and inherit it.</p>
	<p>⑤ There is no input function which can be implemented with programs in a form of image link.</p>
	<p>① It is possible to use J Query effect1) when changing scenes / ex) Screen</p> <p>Adjust effect naturally through timeline.</p>
	<p>② It is possible to use effect provided by J Query / ex) In case of Screen, Show, Hide, adjust speed through easing function / ex) Easing = input numbers.</p> <p>When entering object variables, transition is not natural.</p>
Animation effect	<p>Weakness - J Query effect1) function is not provided.</p> <p>③ Adjust speed through easing function / ex) Easing = input numbers.</p> <p>Provide natural transition.</p>
	<p>④ It is possible to use effect provided by some J Query / ex) In case of Screen, Show, Hide, adjust speed through easing function / ex) Easing = input numbers.</p> <p>When entering object variables, transition is not natural.</p>
	<p>⑤ It is not possible to use effect.</p>
Fidelity	<p>① This is web based program and therefore it is free of place.</p>

	<p>Internet speed influences working speed / ex) buffering.</p> <p>There is a problem of file saving management with automatic saving/ saving mode.</p>
	<p>Stability against errors is high by installation programs.</p> <p>② It is difficult to apply script - Script of new UI mode.</p>
	<p>Web based program and installation program - After merging with Google, Web service is discontinued.</p> <p>Installation program is unstable / Image error.</p> <p>③ - Whenever working with installation programs, PIN should be given</p> <p>- When using internet is not possible, using preview is not allowed</p> <p>- This is unstable with offline automatic saving/ saving mode</p>
	<p>Stability against errors is high by installation programs.</p> <p>There are lots of inputs and program bugs</p> <p>- When exporting with HTML, effect becomes slow</p> <p>④ - A difference in speed by internet browsers</p> <p>There are lots of program function constraints</p> <p>- Scroll is possible in only one object and hide function of scroll bar is not provided</p> <p>- It is not possible to adjust angle through script</p>
	<p>Provide web based program and dynamic interface</p> <p>⑤ - It is not possible to use file of over 5mb</p> <p>- There are lots of constraints in file forms</p> <p>- It is not possible to set the size of screen</p>
Device presets	<p>Function of adjusting aspect ratio on application is not provided / ex)1 to 1 ratio is recommended.</p> <p>① Overall screen function is restricted and operation is possible in specific device only</p> <p>② Provide aspect ratio control function through application – Compatible with various devices</p>

	<p>It is possible to adjust aspect ratio when exporting HTML</p>
	<p>Upload device automatically at the same time you work/ ex) Live - File management is a matter of concern with automatic saving mode.</p>
	<p>③ Provide function of adjusting aspect ratio of all device screens / high compatibility</p> <p>Preview on PC is not provided /on line and off line are the same.</p>
	<p>④ It is possible to share with members' devices through installed programs -It is not possible to preview at the ratio of one to one on device</p>
	<p>⑤ Preview in a form of HTML 5</p>
Sharing	<p>① Share dropbox and members. Export Html and PDF files. Provide URL</p>
	<p>② Share members. Export Html and Word files. Provide URL function.</p> <p>It is possible to share stored files through installation programs.</p>
	<p>③ Provide QR code functions /Check devices through sharing of QR code.</p> <p>It is possible to share stored files through installation programs.</p>
	<p>④ Html and word file export is allowed but URL is not provided free of charge. It is possible to share stored files through setting programs</p>
	<p>⑤ Provide URL, QR code</p>



Figure 1. Analysis Graph

Figure 1 is overall analysis graph made based on Table 2. Oven showed the highest score in evaluation of learning level because it considered user's convenience. Pixate showed the highest score in evaluation of compatibility. Be taken altogether, Pixate showed best scores. Programs which overall scores are low have basic functions and can be implemented fast and simply. Programs which compatibility or animation effect is high can produce prototypes in a various way.

4. Conclusion

Application being generated by development of internet and mobile device becomes a tool not only as media of information provision but also as new communication.

App design is also required to be mobile and open type as interaction added media together with features of existing media [18].

As design methodology is researched to a practical direction, not in a perfunctory and functional form, design development tool also requires this trend. In order to ensure efficient utilization of app, collaboration with experts of other field in addition to interface design is prerequisite. This app design development is possible only when sustained cooperative relation between developer and designer is maintained

In this paper, functions of programs for making prototypes were compared and analyzed. Analysis of each program is as follows; ① can implement natural image transition and requires user's skills such as the use of time line. However, ① is vulnerable to buffering and bug. ② is not smooth in image transition and is not easy to use program but various input functions and J Query effect support are strengths of this program. Like ①, ③ can change screens naturally but it uses only image and it is likely that automatic saving is used in a wrong manner. Like ②, ④ provides various input functions and J Query effect but bugs of input function break down frequently. However, the level of awareness of users is highest. ⑤ has high learning level but functions other than learning level are inconvenient. Initial prototype is produced rapidly. Initial prototype is used to review, test and improve a design concept through cooperation between developers and designers. Late prototyping aims at sophisticated work so that service can be tested in great detail though it takes some time. Late prototyping is made to deliver and verify completed design concept effectively [19].

It is said that prototype is used to determine, explain, correct and test a design [20]. Prototyping helps developers get a new idea in developing application and significant information on designs watching what users perform. Furthermore, prototyping is helpful in cutting cost and saving time when it is tested repeatedly while developing a design because it helps designers, developers and users share opinions. Findings of this paper will be helpful to produce advanced programs.

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