Smart Keyboards: Need of Customization and Personalization of Mobile Keyboards

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Abstract:-**The keyboards used by handheld devices have changed since the first mobile devices appeared. They have evolved from tactile keypads to QWERTY keypads to touch screen keypads. As an electronic machine, a mobile requires an input method so that it can produce an output after processing the input information. Therefore an input method i.e., a keyboard is assimilating within a handheld device. This paper comprises the types of default keyboards that are provided by handset manufacturers in the handsets that are widely consumed across the market.**

With technological advancements and need for better quality products, companies are more focused towards their core competencies. This lead generation of standardization and platform creation,has resulted in platforms such as Google Play Store and Apple App Store. Growing expectation and need of the customers is realized by various application developers. This paper discusses the various features demanded by the customers and the areas where the stock keyboard lags. These voids are filled by various application developers. Various features are available in keyboard applications which make typing faster and easier from a user's perspective. Also discussed, is how keyboard applications work as an interface between device and user to make a device more interactive and personalised to the user.

Keywords: Smart Keyboard, Customized features, Mobile Keyboard, Keyboard applications, Touch screen keypad, Stock keyboard, Customization, Swype, Swiftkey, Google play store, Apple app store, Adaptxt, TouchPal, Google keyboard

I. INTRODUCTION

A **keypad** is a set of buttons arranged in a block or "pad" which usually bears digits, symbols and usually a complete set of alphabetical letters. There are different types of handset manufactures available in the market. A handset manufacturer either builds a keyboard in-house or outsources it to different vendors. Following is a list of some handset manufacturers and the type of keyboards they support which are currently available in the market:

Handset Manufacturer	Keyboard	Devices
Samsung	Samsung keyboard, swype	Galaxy y duos, GT s5302
	Samsung keyboard, Samsung Indian keyboard, swype keyboard	Samsung grand, Galaxy S,
	Samsung keybard	S3, Note II,
Micromax	Android Keyboard(AOSP)	Canvas HD
Xperia	Xperia keyboard	Xperia E, J
HTC	HTC sense input	HTC desire x,v
	HTC sense input,	HTC desire 516
	Google keyboard	
Nexus	Google keyboard(stock jelly bean)	Nexus 5
	Google keyboard(stock jelly bean), ASUS keyboard	Nexus 7
Xiaomi	Google keyboard, Google Pinyin, SwiftKey	Mi3, Redmi
Apple	Apple default keyboard	Iphone 4, 3
Nokia	Nokia default keyboard	Lumia series

The arrangement of symbols and characters can be of various ways[2]. Depending on their arrangement and working they are classified into different categories:

A. Tactile Keypad

A Tactile keypad is also known as a T9 keypad. The tactile mobile phone consists of a physical keypad. The keypad is numeric and can be used to type alphabets by tapping them for a particular number of times. There are only 12 keys on the keypad i.e. numbers 0-9 and # and *. This keypad is the default setting. Mobiles with this type of keypads are quite cheap. These phones are best suited for people looking to buy a phone under a stringent budget. These keypads are very easy to repair and replace.

B. QWERTY Keypad

The QWERTY keypad on cell phones and other portable electronic devices first appeared in 1996 as the successor to the T9 keypads.

A QWERTY keypad is comprised of a series of keys used to input data for an electronic device, such as a cell phone. It is a smaller version of a traditional computer keyboard, and is commonly laid out in a very similar way. The name QWERTY comes from the first six letters on the top row of alphabet keys on a standard keyboard: Q-W-E-R-T-Y. A keypad is used to enter letters, numerals, and usually common symbols, such as exclamation marks.

C. Drovak Keypad

Dvorak keyboard was designed in the 1930s by August Dvorak. Itis designed in such a way that the middle row of keys includes the most common letters. Moreover, common letter combinations are positioned in such a way that they can be typed quickly and easily. Additionally, it is set up to facilitate keying in a back and forth motion.

D. Touch Screen Keypad

Touch screens are visual displays that allow users to enter commands and information by touching images that

appear on the screen. On a computer, this serves to eliminate the need for a mouse or other pointing device, and on handheld devices like cell phones, it removes the need for a keypad[1]. Early touch screens required the use of a stylus, though many modern versions also allow users to interact with the visual information directly with their fingers[3].

Touch screens can be used in a variety of ways and are often implemented in conjunction with pointing devices or keys. However, many portable electronic devices use the touch screen as the sole method of navigation and data entry. When the user wishes to type information, a virtual keypad is presented, and the user can type information using the touch screen.

Touchscreen phones have a virtual QWERTY keyboard – meaning the screen shows keys that are set out in the QWERTY layout like on a computer. In portrait mode, the keyboard's smaller making it better for one handed typing. In landscape mode, the keys are larger, easier to hit and one can use both hands to type faster.

II. PROBLEMS WITH CURRENT KEYBOARDS

Default keyboards which are present in the handsets facea lot of problems in functional as well as technical problems. Some of the problems listed by the users are as follows: First and most widely occurring problem is the crashes in the keyboard. Now these crashes can take place due to various reasons in a system. For instance, android systems display the following message in HTC handsets: "Unfortunately HTC sense has stopped working". It is very difficult to detect the actual reason for such crashes. Generally stock android keyboards did not give default suggestions to the users. It starts displaying the message as soon as the user types the first letter on the keyboard.

A. Language Support

Secondly, stock android keyboards do not detect the language of the user automatically. If a user wants to type in another language, he has to configure that language manually. Also the number of languages supported at a time is one or two while certain keyboard applications supports up to five languages at a time. Also stock keyboards do not have an option of pre-loaded colloquial languages such as Hindi with Latin script (Hinglish), Marathi with Latin script (marathish) etc.

As auto correction feature is available with most of the stock keyboards but an option to disable auto correction feature is not available. Due to the unavailability of such a feature, it is very difficult for the user while typing a website name or an email id. Auto adding of words in the dictionary is another problem faced by users. For instance in case of HTC sense, the system does not add words in a dictionary which are less than three letters [8]. Even most of the stock keyboards do not support auto addition of the words in their dictionary. Because of the cumulative effect of all these reasons typing speed of user decreases. Also the number of keys pressed to type a word which is also termed as Key Stroke Per Character (KSPC) also decreases.

B. Physical Appearance

Stock keyboards are generally a combination of white, grey and black. This is sometimes annoying for the users who want some themes in their keyboards which stock keyboards do not support. Also there is no provision for resizing the keyboard.

Moreover stock keyboards are not connected keyboards. They are not application based. Nor are they connected to the web to give any typing suggestions to the user based on trending words and location. Default keyboards don't learn from the applications underlying them. For instance, if the user accesses Facebook, Twitter or Gmail from his/her handset, these stock keyboards do not have any interaction with these applications nor do they give a suggestion to the user by learning the words typed by the user using these applications. And by chance a user has lost his/her device or changes his/her device, typing is an all-new experience for a user. He has to add words all over again to the dictionary.

Despite lagging in features it is not always true that stock keyboards are not innovating. Instead they are also continuously working for better user experience. Such as old smartphones of Samsung support both Samsung keyboard and Swype keyboard[14]. Swype is a third party application by nuance communication. While new Samsung handsets such as Grand series and S series support only Samsung keyboard. Also Grand series supports region specific keyboard such as Samsung Indian keyboard which is available in the Samsung handsets sold in India.

III. NEED OF CUSTOMIZATION

With the increasing mobile data usage, volume of browsing and usage of instant messaging applications is also increasing. To perform such functions, an input method is required which can be a hardware keyboard, touch keyboard or a voice command. With the growth in technology, lesser buttons are required on a handset as a user interface. Touch screen provides variety of interactive user actions to manage virtual content. These include swiping, pinching, and other such actions on the virtual screen.

With the advancement in the android versions, quality of stock android keyboard is also improving. Text prediction and auto correction quality is also improving. But the requirement of features and supporting languages is ever increasing from the user side. Also till April 2014, Apple does not support third party keyboard applications. But due to ever increasing user demands Apple started supporting it and laid guidelines for keyboard application c developers in the form of App Extension Programming Guide [9].

A customised keyboard replaces the stock keyboard for users who want capabilities such as a novel text input method or the ability to enter text in a language not otherwise supported by stock keyboard. The essential function of a custom keyboard is simple: Respond to taps, gestures, or other input events and provide text, in the form of an unattributed object, at the text insertion point of the current text input object.

Third party applications which are available in the market support different type of features and languages along with some specialized languages. Some of them are feely available in the market while some charge $0.99 to $3. These applications use artificial intelligence through which they can provide a feature termed as "next word prediction" to the users. Also these applications learn according to the typing pattern of the user. Which means for every user, his/her keyboard is customizable according to him/her.

A. Predictive Text Input and Auto Correction

Both stock keyboards and third party applications provide a feature known as predictive text and auto correction of the words typed by the users. Developers and handset manufactures link in build dictionaries with their keyboards. These dictionaries use some algorithms which help them to predict the current word and next word. These algorithms also help in auto correction of the spelling of current word typed by the user. More advanced features such as sentences formation is also provided by certain applications such as TouchPal[11]. Predictive text input and auto correction results in fast typing and reduces Key Stroke Per Character (KSPC). Default KSPC is 1 and lesser the KSPC better is the predictive engine of an application [12].

B. Different Layouts of Keyboard Applications

Since smart devices are available from 3 to 9 inch in size, these applications has to adjust themselves according to the size of the screen. Developers have to maintain height to width ratio of their application, so that it look consummate on the screen. Most of the smartphones, tablets, fablets support both landscape and portrait mode[4]. Due to this each application at least supports these two layouts. Along with this some applications supports split keyboard. In split keyboard, keyboard is split vertically into two parts and keys are shifted toward extreme left and right end of the keyboard as shown in the figure 1. This type of layout is very convenient to use specially in the big screen devices.

Figure 1: Split Keyboard layout

9 key layout or tactile keyboard layout is also available with most of the applications. Some of the applications such as SwiftKey[10] also support dock option of the keyboard. In dock option user can move the keyboard anywhere on the screen according to his convenience as shown in figure 2. There is one more attractive feature which is provided by some of the applications which is termed ascompact keyboard. In compact keyboard, the whole keyboard is shifted towards extreme right or extreme left. Previously application developers provide two separate applications for phone and tablet but now as the technology advances both the layouts are customizable into one application.

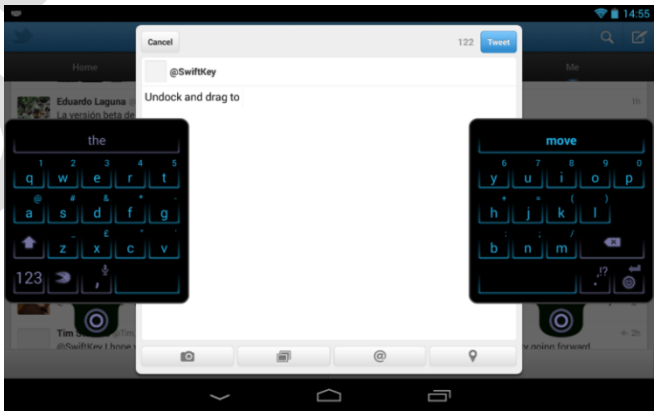

Figure 2: Dock layout

C. Mass Customization

The process of delivering wide-market goods and services that are modified to satisfy a specific customer need is termed as mass customization. Keyboard application developers provide different themes with in their applications. This is sometimes also termed as in app purchase when users can installs certain themes from online store. These themes are made by considering different segments of the society and their demand[5].

D. Complete Layout Customization

Certain keyboard applications are also available in the market which supports complete customizations. User can adjust certain features such as keyboard colour, key

height, key shape (oval, rectangular, square, rectangular with swift edge etc.), swype or glide colour, font colour, font size, font size, background picture, suggestion bar height, swap keys. User can create themes and save them for the future purpose. Such a feature is available in Adaptxt[13] by KeyPoint technologies as shown in figure 3.

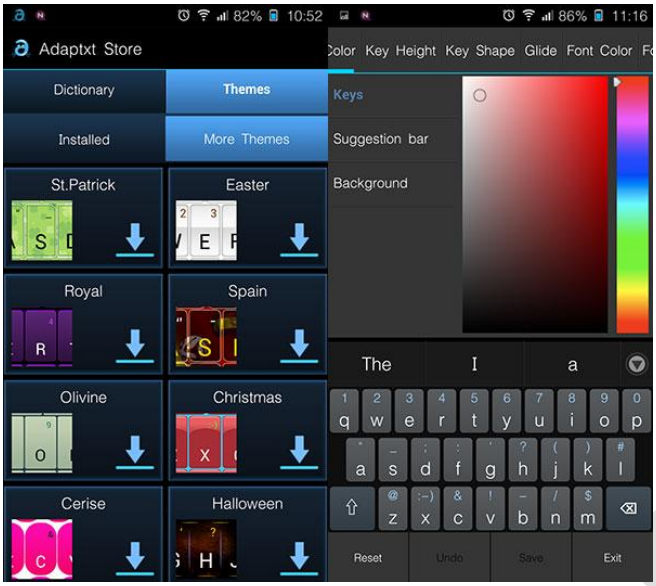

Figure 3: Keyboard Customization in Adaptxt

E. *Synchronization with Cloud*

This means which ever word user type will save in the dictionary of the application which is cloud sync. Applications are downloaded from online stores through user id. Once a user purchase an application it can be installed in as many device as user want using the same email id. By using cloud synchronised applications users can access their personalised words from other devices as well. This saves a lot of time and is very convenient for the users as by using such applications there is no need to make their application learn again and again personalised words. Also in case user lost his device, there is no need to retain the keyboard. Cloud sync also helps in providing trending words as suggestions to users.

F. *Customization According to Application*

Certain third party applications which are available on different stores such as google play store, apple app store, Microsoft market are self-customizable in accordance with the application using keyboard. For instance while entering a phone number a 9 key layout is visible to the user. In some of the keyboard application a dedicated number line appears at the top of the QWERTY layout while typing a password. Also while typing a URL, most of the keyboard applications provide dedicated "@", ".com" symbols. This means keyboard applications are not only customizable according to the user rather they are also customizable according to the background application for which they are being used.

G. *Dictionaries and Specialized Dictionaries*

This is another feature of customization. Applications support different language dictionaries for the ease of the users. By using such dictionaries users can communicate among themselves in their native language. These dictionaries are available in online stores and can be accessed through in app purchases. 10 most famous applications provide 45 to 120 language dictionaries.

To provide better customization, certain applications provide specialized dictionaries dedicated for certain set of customers. These dictionaries are related to professions such as IT and Telecom, law, Medical, Sports etc.

H. *Emoji and Emoticon Support*

Since words can't express every emotions, dedicated structures are required for this which are termed as emoji and emoticon. Generally applications have dedicated symbol on its keypad to access emoji and emoticons. More advanced applications also provide emoji in their suggestion bar. For instance, if a user type "car", a symbol of car will appear in the suggestion box. This feature makes typing and written text more attractive.

IV.CONCLUSION

Stock keyboards are simple and easy to use but as users are becoming more tech savvy they want their keyboard to learn through their typing style. Users want their keyboard to be more interactive. All this can happen by imbibing artificial intelligence in keyboards. Auto correction, default suggestions, trending words, location based suggestions, customised suggestions based on the underlying applications, themes and colours, number of languages supported continuously, colloquial or hybrid languages etc. are some of the features which are required by the user. Most of such features are available in keyboard applications which are available on various online markets such as Google play store and Apple app store.

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