REPORT OF THE COMMITTEE ON STANDARDIZATION OF KEYPAD LAYOUT FOR TAMIL MOBILE PHONES

Introduction

The Government of Tamil Nadu constituted a committee (G.O Ms.No.10, Information Technology (B) Department Dated 28.03.2007) with Dr.M.Ponnavaikko, Vice-Chancellor, Bharathidasan University as Chairman along with few other members and Dr.P.R.Nakkeeran as the convener and the following as members,

MEMBERS

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to look into the matter of standardization of coding and keypad layout standard for Tamil in Mobile Phones and to recommend a good scheme as standard.

This is needed for the usage of the mobile phones by the rural mass in their local language, Tamil. Further, keypad layout standardization is necessary to facilitate the development of tools and technology for the use of Tamil in Mobile Phones. Also it will help all the manufacturers of mobile phones to implement a common keypad layout.

The committee considered various keypad layouts and conducted two levels of testing using emulators in one level and mobile phones in the second level. The opinions of over 80 students were considered during the testing process. The committee recommends the keypad layout shown in Annexure I, after considering testing process, current and future needs for the keypad layout for various applications and factors such as user friendliness, key position recall, overall design, suitability for different type of input methods and key press efficiency. The suggested layout is suitable for implementing four different types of input methods namely, the multi tap method, the two-key "tap and select" method, the alternating consonant-vowel method and the (T9 like) single tap method. The vendors and the users may choose the input methods of their choice. The implementation details for three different input methods are provided, so that all implementations will be the same, and the user will find it easy to use Tamil across all cell phones.

The general features of the layout are given in Annexure I. The implementation details for the multi tap method are given in Annexure II. The implementation details for the two-key "tap and select" method is given in Annexure III. The implementation details for the alternating consonant-vowel method are given in Annexure IV. The way in which the layout helps the particular input method is also given in the Annexure II to IV.

Recommended Keypad Layout

1 க ங அ ஆ	2 ச ஞ இ ஈ	3 ட ண உ ஊ
4 த ந எ ஏ	5 ப ம ஐ	6 ய ர ஒ ஓ
7 ல வ ஔ	8 ழ ள ஃ ஃ	9 ற ன @
* DELINK	0 SPACE	# • ஸ...ஶ்ரீ

Conclusion

The Committee met in seven meetings and examined all the issues relating to the Keypad Layout for mobile phones in Tamil. A suitable keypad layout is recommended through appropriate testing and evaluation procedures and through discussions with all concerned. Considering the outcome of the efforts made by the Committee, it is strongly recommended that the Keypad Layout recommended may be announced as a Standard layout for Mobile phones in Tamil by the Government of Tamil Nadu so that the manufacturers of the Mobile phones may adopt the same.

Aknowledgement

The Committee is grateful to the Government of Tamil Nadu and acknowledges with gratitude for the opportunity given to the members for addressing an important issue of National interest. It places on record with gratitude the enormous support and help rendered by the testing agencies and all others concerned. The role played by the officials of TVU and BSNL and Anna University during the course of this exercise is commendable, without which it would not have been possible to complete the task entrusted to the Committee and the acknowledges their services with utmost appreciation and gratitude.

Annexure I – Recommended Tamil Keypad Layout

1 க ங அ ஆ	2 ச ஞ இ ஈ	3 ட ண உ ஊ
4 த ந எ ஏ	5 ப ம ஐ	6 ய ர ஒ ஓ
7 ல வ ஔ	8 ழ ள ஃ	9 ற ன @
* DELINK	0 SPACE	# • ஸ...ஸ்ரீ

The definition of this layout and the reasons behind the decisions are given below.

The 18 consonants are usually rendered as 9 pairs, while giving them in the sorted order. This sequence is known to all. Hence the consonants are divided as 9 pairs and each pair is allotted to one key. Though consonants come with pulli, it is easier to enumerate them as consonants with the vowel அ. Also people are used to seeing க ங ச ஞ etc. in the typewriters. Pulli is added separately to get the consonants. Hence க ங ச .. are put instead of க் ங் ச் .... These will make remembering and recalling all the consonants easy.

Excepting the two vowels ஐ and ஔ, the other ten vowels occur in pairs as short and long. This pairing and natural sequencing is also maintained in the layout. They need 5 + 2 = 7 keys. They are kept after the two consonants in the keys 1 to 7. The letter ஃ is placed in key 8.

The pulli is kept as the first choice in the # key. The grandha consonants and the special letter ஸ்ரீ are put in the # key, after the pulli. Since pulli is used heavily in Tamil, it is placed as the first choice. Since the usage of the grandha characters are very minimal, all of them are put after the pulli. Their sequence (ஸஷஜஹக்ஷஸ்ரீ) is the same as in the Tamil99 layout, which is easy to remember.

Since the vuirmeis are got by combining a consonant and a vowel, a BACK SPACE after a vuirmei should erase the vowel part and leave the akara vuirmei. This is common for all input methods.

The SPACE is put in the key 0.

The symbol pad is put after the consonants in the key 9. It is shown by the symbol @.

The numbers are kept at the end of all the above placements.

The formation of letters follows the same principle with which the Tamil99 keyboard is designed.

The formation of akara vuirmei and aaytham are straighforward. When a vowel follows a akara vuirmei, the inherent akara vowel is removed and the new vowel combines with the consonant. If a vowel is got after some other letter, this vowel cannot join with the previous letter, and hence remains as a vowel.

In case a vowel has to follow an akara vuirmei, a de-linking key has to be tapped after getting the akara vuirmei, and before getting the vowel.

The usage of the * key depends on the input method. In the normal multi tap method and in the two key 'tap and select' methods, it acts as the de-linking key. In the consonant-vowel method, it acts as the toggle key for the input modes.

Usually when a selection of another letter in the same key is required, a specified time has to be given before starting the selection of the new letter. At the time out, the current selection becomes a confirmed selection. This time out can also be forced by using the right arrow key.

Placement of heavily used pulli along with rarely used grandha letters, and placing the three 'suttu' letters அ இ எ in different keys, is to make the single tap predictive method (like T9) easier. It may be noted that the above three letters produce many similar words like, அவன், இவன், எவன், அங்கே, இங்கே, எங்கே.

Annexure II - Multi tap input method

1 க ங அ ஆ	2 ச ஞ இ ஈ	3 ட ண உ ஊ
4 த ந எ ஏ	5 ப ம ஐ	6 ய ர ஒ ஓ
7 ல வ ஔ	8 ழ ள ஃ	9 ற ன @
* DELINK	0 SPACE	# • ஸ...ஶ்ரீ

This is similar to the normal multi tap method used for English. In each of the number keys, the number comes at the end of the letters/space/entry point to a table of symbols (shown by the symbol @ in the figure). Tapping a key the required number of times gets that letter or space or the symbol table or the number. At the end, one more tap brings the selection to the beginning. When the table of symbol appears, one of the symbols (including * and #) can be selected by navigation.

For example, to get the letter க the tapping sequence is 1. The letter எ is got by tapping 4 4 4. The number 6 is got by tapping 6 6 6 6 6.

An vuirmei is got by combining an akara vuirmei and a vowel immediately after that. For example, to get the letter கூ the tapping sequence is 1 3 3 3 3. For example, to get the letter ஞ்ச the tapping sequence is 4 (time out) 4 4 4 4.

In case a vowel is to come after an akara vuirmei, tap the * key before tapping the vowel. Here the * key acts as the delinking key. For example, to get the letters கஉள the tapping sequence is 1 * 3 3 3 3.

A pure mei is got by getting an akara vuirmei and then the pulli. For example, to get the letter ம் the tapping sequence is 5 5 #.

If a vowel could not combine with the previous character, it remains as a vowel. So in the beginning of a text and after a space the vowel remains as a vowel.

In the vowels, the short vowels are used more than the corresponding long vowels. In the vallinam mellinam pairs, the vallinams are used more. The placement of the short vowel before the long vowel, and the vallinam before the mellinam reduces the number of taps. Also all the consonants excluding a few grandha consonants, can be got with just one or two taps. The short vowel needs three taps. Hence this layout optimizes the key taps using the frequency analysis in a general way.

Annexure III – Two-key "tap and select" input method

1 க ங அ ஆ	2 ச ஞ இ ஈ	3 ட ண உ ஊ
4 த ந எ ஏ	5 ப ம ஐ	6 ய ர ஒ ஓ
7 ல வ ஔ	8 ழ ள ஃ	9 ற ன @
* DELINK	0 SPACE	# • ஸ...ஶ்ரீ

The two key ‘tap and select’ method works on the principle of choosing a key first and then selecting one of the options provided in that key which are shown on the screen. The selection is by tapping the sequence number pertaining to that choice.

For example, pressing key 1 will bring the five options க ங அ ஆ 1 in a menu. Now, to select க, the user presses 1. For ங, the user presses 2. For அ, the user presses 3. For ஆ, the user presses 4. For the number 1, the user presses 5. In summary, to get க, the user presses 1 and then 1. For ங, the user presses 1 and then 2. For getting the number 1 the user presses 1 and then 5, and so on. After the selection the resulting letter goes to the edit box.

Pure consonants are got by first getting the consonant with அ and then selecting the pulli. The pulli is got by tapping the # key and then selecting the first choice by tapping 1. For example, the pure consonant ப் is got by pressing 5 1 # 1.

A vowel is got by tapping two keys as mentioned already. When a vowel is got after an akara vuirmei, this vowel automatically joins with the consonant part of the vuirmei and gives the corresponding vuirmei. If a vowel is got after some other letter, this vowel cannot join with the previous letter, and hence remains as a vowel.

In case a vowel has to follow an akara vuirmei, then the * key has to be tapped after getting the akara vuirmei, and before getting the vowel. The * key is the delinking key. For example, the sequence 5 2 2 3 produces ம and இ, and they combine automatically to form மி. But the sequence 5 2 * 2 3 produces மஇ.

The symbols are got in the following way. Pressing 9 and 3 gives a list of symbols. One of them can be selected by navigation.

The word தமிழ் is produced by getting த ம இ ழ ் by tapping **4** 1 5 2 2 3 8 1 # 1.

The number of key presses required for different type of letters is given below.

Pure consonant	4
Akara vuirmei	2
Other vuirmei	4
Vowel	2
Aaytham	2
Number	2

Annexure IV - Alternating Consonant - Vowel Input method

1 க ங அ ஆ	2 ச ஞ இ ஈ	3 ட ண உ ஊ
4 த ந எ ஏ	5 ப ம ஐ	6 ய ர ஒ ஓ
7 ல வ ஔ	8 ழ ள ஃ	9 ற ன @
* DELINK	0 SPACE	# • ஸ...ஶ்ரீ

This method is a variation of the multi tap method. The system is in one of two modes, the consonant mode and the vowel mode. To start with the system will be in the consonant mode. In the consonant mode, the consonants and then the number are the possible selections. In the vowel mode, the vowels / pulli / aaytham / symbol table, and, the numbers are the possible selections.

The Tamil akara vuirmeis can be got by tapping a key once or twice, in the consonant mode. The grandha akara vuirmeis can be got by tapping the # key one or more times. The numbers from 1 to 9 can be got by tapping the key three times.

Once an akara vuirmei is got, usually a dot or vowel follows. In this method, after selecting an akara vuirmei, the system automatically goes to the vowel mode. In the vowel mode to get the first vowel in a key, it is enough to tap that key once. Similarly, to get the second vowel in a key, it is enough to tap two times.

For example, to get மி tap 5 5 2. To get ம் tap 5 5 #. Thus what happens here is that 5 5 (mode automatically changes to vowel model expecting a vowel) 2 gives மி. Now the mode automatically changes to consonant mode expecting a consonant.

The mode toggles automatically between the consonant mode and the vowel mode. Once a vowel or pulli is got it automatically goes to the consonant mode. After a space, or a symbol or a number, the mode goes to the consonant mode.

In case we need a akara vuirmei itself, there is no need to enter a vowel. But the system will automatically go to the vowel mode. To bring the mode to the consonant mode, press the * key once. This key acts as the mode changer. It toggles the mode from one to the other.

For example, to get நட tap 4 4 (time out) * 3. Similarly tapping 1 (time out) * 1 gives ககை.

This mode changer is also useful when a word has to be started with a vowel. For example to get ஆடு * 1 1 3 (time out) 3 have to be pressed.

When a vowel is chosen after an akara vuirmei, this vowel removes the akaram from the mei, and the vowel combines with the mei to give the corresponding vuirmei. If the previous akara vuirmei has already combined with pulli or a vuirmei, then this vowel cannot combine with the previous mei, and it stands as a pure vowel.

For example, 1 2 * 3 gives கிஉ.

Suppose the combination கஅ or கஇ is to be got. Here mode change using the * key will not be useful. It has to be ascertained that the க has to remain as க. This can be achieved by selecting அ after க. The letter அ after க makes the க as a non combinable character. The அ will not be shown. If any vowel is selected after this, it remains a vowel, without combining with the previous character. This is the method used in the Tamil99 keyboard.

Thus, 1 (time out) 1 (timeout) * 1 gives கஅ. Similarly, 1 (time out) 1 (timeout) * 2 gives கஇ. Note that to change the mode, first wait for the automatic mode change and then act.

The table of symbols can be got by tapping the key 9 once in the vowel mode. Any symbol can be selected from this table by navigation.

In the consonant mode, the # key gives the sequence sa, sha, ja, ha, ksha, sri. One of them has to be chosen. In the vowel mode, the # key gives the only choice, the pulli.

The numbers can be got by tapping that key three times. The numbers can be got in this way in both the modes. In each of the number keys, there are only one or two options, in both the modes. Hence it will be consistent across all the number keys and in all the modes, to specify three taps. For the key 0, two taps also may produce 0. The keys for 5, 7, 8 and 9, may also produce the corresponding numbers, in two taps in the vowel mode. If this is implemented, the third tap has to be ignored for these keys.

Advantages

In the multi tap method, the vowels need 3 or 4 taps. Due to automatic change of modes, this gets reduced to 1 or 2 in this method. The distribution of both the consonants and vowels in the keys makes this method possible.

The user needs to understand the toggling to take advantage of the reduced number of key taps, when compared with the normal multi tap method.