SHK: Single Hand Key Card for Mobile Devices

Masakatsu Sugimoto, Kimiyo Takahashi***

*Fujitsu Laboratories Ltd.
1015 Kamikodanaka, Kawaski 211 Japan
+81 44 777 1111
nab03277@niftyserve.or.jp
**Shinano Fujitsu Ltd.
935 Nosakada, Iiyama, Nagano, 389-22 Japan
+81 269 62 1155

ABSTRACT

A new input unit for mobile devices is discussed. High speed text input through touch typing and mouse data input is possible through an SHK: Single Hand Key card, "castanets operation", an ambiguity resolution logic applied word by word, and the other support software.

KEYWORDS:

Single hand keyboard, mobile device, input device, input unit, touch typing, ambiguity resolution

INTRODUCTION

We are going to propose a new input unit, a new way of operation and the support software by which we can input text at high speed and can also input mouse data, with single hand.

PROBLEM TO ATTACK

The mobile devices such as notebook PC, palmtop PC, PDA are becoming smaller and smaller, and also are becoming light weight. We have a lot of potential for much smaller and much lighter mobile devices. However, input unit for text and for the other operations is really a problem.

A conventional keyboard is not suited for mobile devices. Touch typing on conventional keyboard requires both hands operation. It is not suited for mobile environments: when a user is in standing position, while he or she is walking, while he or she is in a car, etc.[3], [4].

PROPOSED SOLUTION

We propose an SHK: Single Hand Key card which enables us touch typing text input and mouse data input. We can operate the SHK card using only one hand through "castanets operation" and applying an ambiguity resolution logic word by word, and the other support software.

"Castanets operation" is shown in Figure 1. One is holding a card with the thumb and a part of his palm. On the card there are keys for text input and a stick and switches for mouse data input. One can input text and mouse data with the other four fingers: the index finger, the middle finger, the ring finger and the little finger. Thus one is able to operate a mobile device using only one hand.

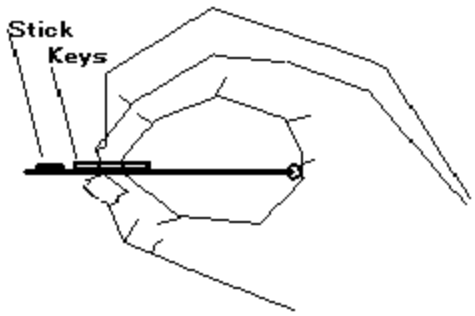

Fig.1 Castanets Operation

Spatial Arrangement of Keys

Figure 2 shows an SHK card with eighteen keys for touch typing by a single hand. The eighteen keys are in three row and six columns. The reason for this key arrangements is that assume we position our four fingers: the index finger, the middle finger, the ring finger and the little finger at a home position, the area where these four fingers will cover easily in touch typing is those eighteen keys, in three rows: the home position row, the upper row and the lower row.

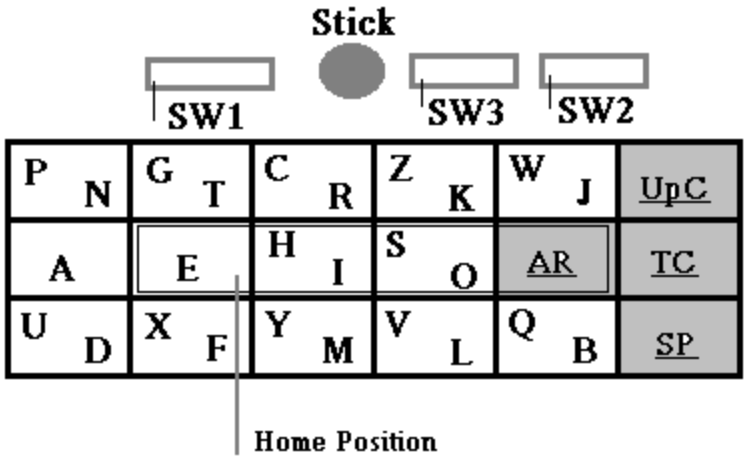

Fig. 2 Arrangement of keys, stick and switches on an SHK card

Each row has six keys. At the home position row, the index finger covers a home position key and a key to the left of the home position key. A little finger covers two keys: the home position key and a key to the right of it. Other two fingers: the middle finger and the ring finger covers only one key each. For the upper row and the lower row, same is applied as for the home position row.

Next step is to divide these eighteen keys into keys for alphabetic characters input and keys for control. Fourteen keys among the eighteen keys are for alphabetic characters. If we would assign one key for an alphabetic character, we would have twelve key less in the card, because twenty six alphabetic characters are needed for English text. So our key assignment scheme is as follows; two alphabetic characters for a key for twelve keys and one alphabetic character for a key for the remaining two keys.

The actual assignment of each of the alphabetic characters to the keys was done according to the frequency of appearance of each alphabetic character in ordinary English text, for easiness of fingers' movement[1].

Ambiguity Resolution Logic Applied Word by Word

We have assigned two alphabetic characters for a key to most of the fourteen keys in the above arrangement. A user must somehow specify which of the two alphabetic characters assigned to a key, he or she intends to input[3], [4].

We have adopted quite a new scheme. No selection operation needed when a user push a key for which two alphabetic characters are assigned. We will apply an ambiguity resolution logic, word by word. That is, after a user types a string of alphabetic characters which consists of a word, he will push a control key: AR-key. AR means ambiguity

resolution. At this moment, some characters in the string have ambiguity, because the user hasn't specify which one of two alternatives he intends to input.

The AR-key is pushed by the little finger at its home position, for typing convenience. When the key is pushed, the ambiguity resolution logic will retrieve a set of words which the logic infers that the user might have intended to, by the input string. The set will be accessed through internal word dictionaries and rules for English words. Then the set of words are displayed on a screen. Interactively, the user selects what word he intends to input among the set. He will use the AR-key again, for this selection process, for input convenience.

The ambiguity resolution logic is realized in the SHK support software[2], [5].

IMPLEMENTATION

The current prototype is designed to be used with IBM PC compatible machines. The input unit: SHK card has PS/2 interface.

The support software is working on MS Windows.

ATTAINMENTS

No special training for text input and for mouse data input is required for the SHK card, because key pushing is one key at a time operation; no need for pushing two keys or more simultaneously, for text input. So a user with various stage of experience at SHK will find himself using it, according to his or her skill level.

We start gathering data on typing speed. We are sure that an experienced user will be typing more that forty words per minute.

APPLICATIONS

The SHK card and the support software is suitable for input units for mobile devices. It will also be conveniently used for presentation with a data projector. It will surely be a good tool for some of the handicapped persons.

FUTURE DEVELOPMENTS

The SHK card is really a human machine interface. We are thinking of at least three types of the card with different size. Because length of fingers are different for individuals and the fitness of one's fingers to the SHK card is very important for easiness of operation.

By combining advances in microprocessors and display units for mobile devices with SHK cards, we will be able to attain very powerful information and communication media which we will use in everyday life, anytime, anywhere.

REFERENCES

1. Beeching, W. Century of the Typewriter, Heinemann, 1974
2. Darragh, J., Witten, I. The Reactive Keyboard, Cambridge, 1992
3. Endfield, C. Portable Word-Processor, US Patent, Appl. No. 188,571
4. Matias, E., et., al. Half-QWERTY: Typing With One Hand Using Your Two-hand Skills, *Conference Companion*, CHI '94, pp.51-52
5. Sugimoto, M. Keyboard with ambiguity resolution logic, filed at US Patent and Trademark Office, #382,781, January 31, 1995