

A Kind of Chinese Language Phonetic Input Output System Code

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Abstract-in this paper, A kind of Chinese language Phonetic input output system code, phonetic code is used as input and output signal. The phonetic codes include: syllable code, syllable time and syllable rhythm. There are the codes of the initial of syllable, the final of syllable, tone, phoneme with sensibility and sub-information of linguistics in syllable code. The user of the system can express the initial and final of a syllable, tone, feeding and other. Phonetic information by making a limbs movement towards input device. The designer of the system intends to let deaf-mutes input the Chinese phonetic code to phoneme-forming equipment to talk with others naturally, character input can be finished if the phonetic code input into word-processor. Blind person can operate the computer by the input equipment of Chinese phonetic code. Through the sensor of phonetic code, user can feel the phonetic information without looking and listening.

Key words-Chinese phonetic code; input and output system of phonetic code; deaf-mutes; blind person

I. INTRODUCTION

Human phonetic information is very complicated, one Chinese character is just a syllable, the final of syllable and the tone, and affected by feeding the loudness of pronunciation and other sub-information of linguistics. The time of a syllable and the rhythm between syllables are very important information. The time and rhythm to input code is very important if the user wants to driver phoneme-forming equipment to produce nature pronunciation by input of code with rhythm like speaking.

Firstly, if the user wants to input the initial and final of a syllable, tone, feeding, the loudness of pronunciation and other information simultaneously with the emphasis of the time and rhythm of input, the parallel input must be taken, namely, when people make a limbs movements, output a lot of relevant information simultaneously with the equipment that can discern the movement. So, it's the key to select the limbs movement that can indicate the initial and final of syllable, tone, feeding, loudness of pronunciation and other information simultaneously, and can be discerned easily by equipment from human complicated limbs movement. Let the time for a limbs movement correspond to the time of a syllable, the time between movements correspond to syllabic rhythm of pronunciation. One the problem is solved, the problem to input character into word-processor is also solved.

Second, a input device is needed to discern the special movements when people do them. It should be as simple as possible, so as to use it wisely.

Finally, it should not be limited to monitor to receive phonetic code. It would be best that user can feel phonetic code without looking and listening, in this way, deaf-mutes can use it more conveniently and common people get a new channel to receive phonetic information.

II. WORK OUT THE CHINESE PHONETIC CODE

Five fingertips touching or pressing other object is one movement. There are 32 movements of fingers in all, which are indicated by 32 different numbers. These numbers are codes of fingers movement. The movements of fingers wrist joint and elbow joint can be finished simultaneously, therefore, the codes of tone, phoneme with sensibility, sub-information of linguistics are indicated with wrist movement and elbow movement.

There are three states for wrist joint: curving towards the back of hand, not curving, curving towards palm. The movement codes of wrist-joint of two hands are indicated with 9 numbers. Wrist can also curve towards palm edge little finger corresponds to or palm edge thumb corresponds to, in order to describe conveniently the wrist curving directions in this invention only include towards the back of hand and towards the palm. For the movements of palm only is it needed to distinguish if the two pieces of muscles corresponding to thumb and little finger respectively touch or press other objects. Thus, the movements of one palm include four states. The movement codes of two palms are indicated with 16 different numbers. Whether the elbow joint touches other objects includes two states, the movement codes of elbow joints of two hands are indicated with 4 numbers, the curving angle of elbow is indicated with 0. Information distinguished with classification in phonetic information, such as: tone and phoneme with sensibility correspond to different movements; information distinguished with degree such as: Strength of tone, degree of feeling correspond to curving degree of joint.

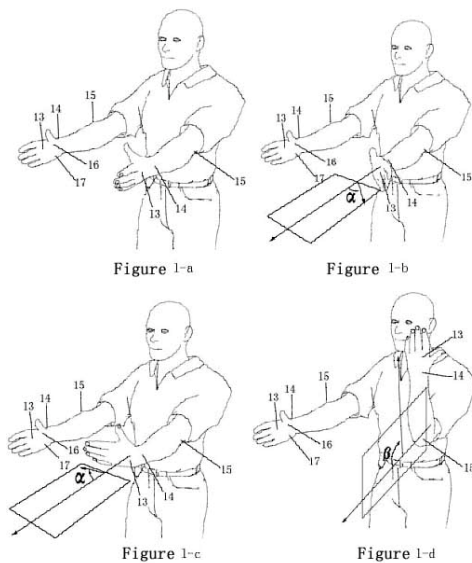


Figure 1. shows the typical movements users input

Figure 1, the name of each part.

(1)sensor for fingers movements (2)sensor for wrist movements (3)sensor for palm movements (4) sensor for elbow movements (5)phonetic code processor (6)input device of phonetic code (7)sensor for the initial and final of syllable (8)sensor for tone (9)perceiving-device for phonetic code (10)phoneme-forming equipment (11)words processor (12)monitor (13)palm (14)wrist joint (15)elbow joint (16)Thenar (17) hypothenar

Indicate the codes of fingers movement with a five-figure number of binary system ,indicate the thumb with the first figure, indicate the index figure with the second figure ,indicate the middle finger with the third figure, indicate the ring finger with the fourth figure, indicate the little finger with the fifth figure. Take a movement code from 32 finger movement codes (of one hand) to indicate at least an initial of syllable, until corresponding to all the initials of syllable. Mutually complementary initial of syllable " g " and " j " , " k " and " q " , " h " and " x " correspond to a code of finger movement together or correspond to a code of finger movement respectively ; take a movement code from 32 finger movement codes of the other hand to indicate at least a final of syllable until corresponding to all the finds of syllable, mutually complementary final of syllable " ü " and " uai " 、 " ia " and " ua " 、 " o " and " uo " 、 " üe " and " uei " (ui)、 " uan " and " üan " 、 " uen " and " ün " " iang " and " uang " " ong " and " iong " " in " and " uai " correspond to a finger movement code together or correspond to a finger movement code respectively. According to the above method, choose 21 finger movement codes of left hand to correspond to the initial of syllable, in them the 11100 of the left hand correspond to " er " ; There are 35 finals of syllable in all, some couples of

mutually complementary finals of syllable only correspond to a finger movement code as shown in table 1:

Serial number	the code of left hand	Corresponding Pinyin finals	the code of right hand	Corresponding Pinyin finals
1	00001	b	00001	ei
2	00010	p	00010	u
3	00100	m	00100	ü uai
4	01000	f	01000	ai
5	10000	d	10000	ia ua
6	00011	t	00011	o uo
7	00101	l	00101	e
8	01001	n	01001	ie
9	10001	g	10001	üe (ue) uei (ui)
10	00110	k	00110	a
11	01010	h	01010	i
12	10010	j	10010	ao
13	11001	q	11001	ong iong
14	10100	reserved	10100	reserved
15	11000	x	11000	ou
16	00111	zh	00111	iou(iu)
17	01011	ch	01011	an
18	10011	sh	10011	ian
19	01101	r	01101	uan üan
20	10101	reserved	10101	reserved
21	01100	z	01100	en
22	01110	c	01110	in
23	10110		10110	reserved
24	11010	s	11010	uen(un) ün
25	11100	er	11100	ang
26	01111	w	01111	iang uang
27	10111	reserved	10111	reserved
28	11011	reserved	11011	eng
29	11101	reserved	11101	ing
30	11110	y	11110	ueng
31	11111	reserved	11111	iao
32	00000	reserved	00000	reserved

TABLE I.

The codes of tone、phoneme with sensibility and sub-information of linguistics correspond to movement code of wrist and elbow. In diagram 1a ,the curving state of the initial movement of wrist joint (14) is indicated with 000 , the curving angle $\theta=0$, if the palm curves towards the back of hand for angle α , as shown in diagram 1b, the curving state of wrist joint (14) is indicated with 100, the curving angle $\theta = \alpha$. If the palm curves towards the center of palm for angle α , as is shown in 1c, the curving state of wrist joint 14 is indicated with 001, the curving angle $\theta = \alpha$, for the wrist joint (14) of right hand ,if it curves towards the back of hand for angle α , the curving state is 100, $\theta = \alpha$. If it curves towards center of palm for angle

a , the curving states is 001, $\theta = a$. The initial movement is supposed for the convenience of description, the movement code of wrist joint is set according to its coordinate, no matter what posture a person is in, for either hand, as long as palm curves towards the back of hand for angle a , the movement code of wrist joint (14) is 100, $\theta = a$, as long as the palm curves towards the center of palm for angle a , the movement code of wrist joint (14) is 001, $\theta = a$. The definition of movement code of palm: the medical term of the muscle under the thumb in palm (13) is thenar (16) and the medical term of the muscle under the little finger is hypothenar (17). If the Thenar (16) or the hypothenar (17) of palm touches or presses other object, indicate the movement state with 1. If not, indicate the state with 0. Thus there are four movement states for palm. 00 indicates that both Thenar 16 and hypothenar 17 hang in the air

10 indicates Thenar (16) touches or presses object but hypothenar 17 hangs in the air 01 indicates that hypothenar (17) touches or presses but Thenar 16 hangs in the air 11 indicates that both thenar, and hypothenar (17) touches or press. The definition of code of elbow movement is described with pressing state and curving angle if the elbow joint (15) presses other object, then indicate the state with 1, if not, indicate the state with 0, if the elbow joint curves for angle β , as shown in diagram 1d, then $\theta = \beta$, of course, the code of elbow movement is also set according to its own coordinate, if the movement codes of wrist joint palm and elbow joint are defined, these movement codes can correspond to the codes of tone. Phoneme with sensibility and sub-information of linguistics, the code of palm movement can be used as reserve, if the phonetic codes of the initial the final of syllable and the tone are defined, the movement code of elbow joint can indicate the feeling and mood of phoneme.

With the special phoneme-forming equipment, the type and meaning of phonetic information the limbs movement code express are adjustable. When inputting the phonetic codes into phoneme forming equipment, the codes of initial final of syllable and tone are necessary codes, but the codes of sub-information of linguistics of phoneme with sensibility strength of mood, type of feeling are elective codes.

When inputting the phonetic codes of Chinese or English, the time and rhythm of a syllable can be abandoned, only the phonetic codes of the initial of syllable, the final of syllable and tone are necessary. When inputting English letters, some fingering of right hand correspond to some normal operations.

When inputting Chinese, the codes of fingers movement and wrist movement of both hands indicate the initial of syllable the final of syllable and tone, the homonyms appear in the form of selection-box, pressing with every finger indicates choosing one from the ten items in order. (included in box), when the selection-box appears, just press with the corresponding finger, pressing with the little finger of right

hand has indicated "Enter", so the little finger of both hands pressing simultaneously will indicate choosing the tenth item.

Because the amount of homonyms seldom surpass ten, two movements can finish the input of Chinese character. When the selection box appears, shift up or down, or turn over with the codes of curving state of wrist movements, then press the "Enter" key with little finger of right hand to choose with the same principle, input punctuation mark and other implicated meaning.

III. EXAMPLE OF INPUT AND OUTPUT OF CHINESE PHONETIC CODE.

Figure 2 is the working illustration of input device perceiving device and peripheral equipment, the phonetic code input device (6) (in it) consists of finger movement sensor (1), wrist movement sensor (2), palm movement sensor (3), elbow movement sensor (4), and phonetic code processor (5). Phonetic code perceiving device (9) consists of the initial and final of syllable sensor (7) and tone sensor (8). Finger movement sensor (1) consist of ten buttons fixed at ten fingertips; wrist movement sensor (2) consist of angle sensor fixed at

wrist-joint; Palm movement sensor (3) consists of buttons fixed at Thenar (16) and hypothenar (17). Elbow movement sensor (4) consist of buttons and angle sensor fixed at elbow joint. The sensor of initial and final of syllable consist of electrical stimulator fixed at ten fingers, tone sensor consists of electrical stimulators fixed at back of hand and center of palm, respectively. A typical input movement of user is shown in diagram 1d, suppose the input signal of operator as following: left hand 11001, right hand 11001, wrist code, left hand 100, $\theta = a$ (left)

right hand 000, $\theta = 0$, palm movement code is 0000, the elbow movement code left hand 0, $\theta = \beta$ (left) right hand 0, $\theta = \beta$ (right) according to Table 1, the phonetic code processor (5) input. Phonetic code into phoneme-forming equipment (10) to drive pronouncing-device to pronounce. Phonetic code processor (5) can input the code into word-processor (11) to finish the input of character, codes can also be input into monitor (12) in the form of Chinese Pinyin. The phonetic code processing system (13) record and save the phonetic codes and playback them if necessary, the process is realized through software system of computer. At the same time, the phonetic codes are input into phonetic code perceiving device (9).

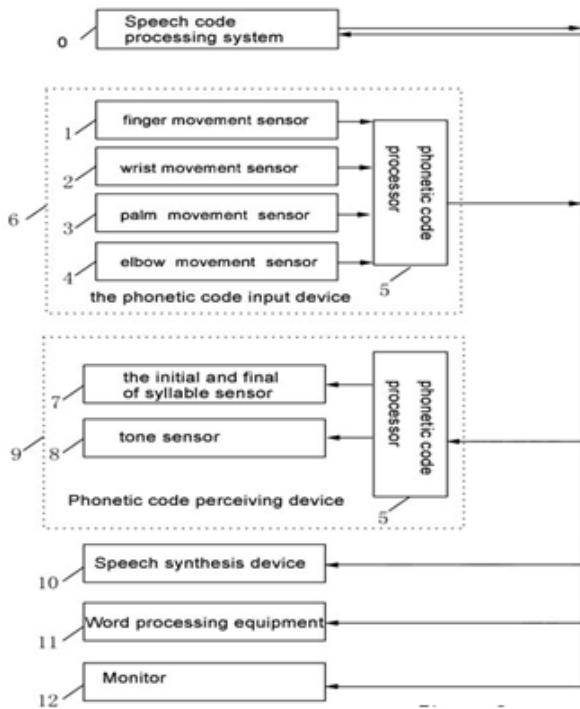


Figure 2.

When inputting codes : 11001、11101、100000, the finger movement code of left hand 11001 indicates the initial of syllable " q ". Finger movement code of right hand 11101 indicates the final of syllable " ing ", wrist movement code 100000 indicates the first tone (of modern standard Chinese pronunciation), then the perceiving device produced a electrical stimulus towards the little finger、ring finger、thumb and the back of left-hand; at the same time, produce a corresponding electrical stimulus towards little finger、ring-finger、thumb of right hand, thus, finish the input of phonetic information and receiver's understanding of information.

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