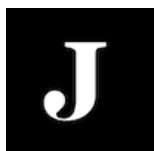


Audi MIB2+ Input Method Improvement

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August 2017



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1 User Cases Analysis

1.1 Ten Often Used User Cases Overview

PHONE	
ID	Description
001	PIN entry
002	DTMF
003	Phone call
004	Search contacts
005	Search message
MEDIA	
ID	Description
006	Radio search
007	Music search
NAVIGATION	
ID	Description
008	Destination search
CONNECTIVITY	
ID	Description
009	WLAN name entry
010	WLAN password entry

1.2 Phone User Cases

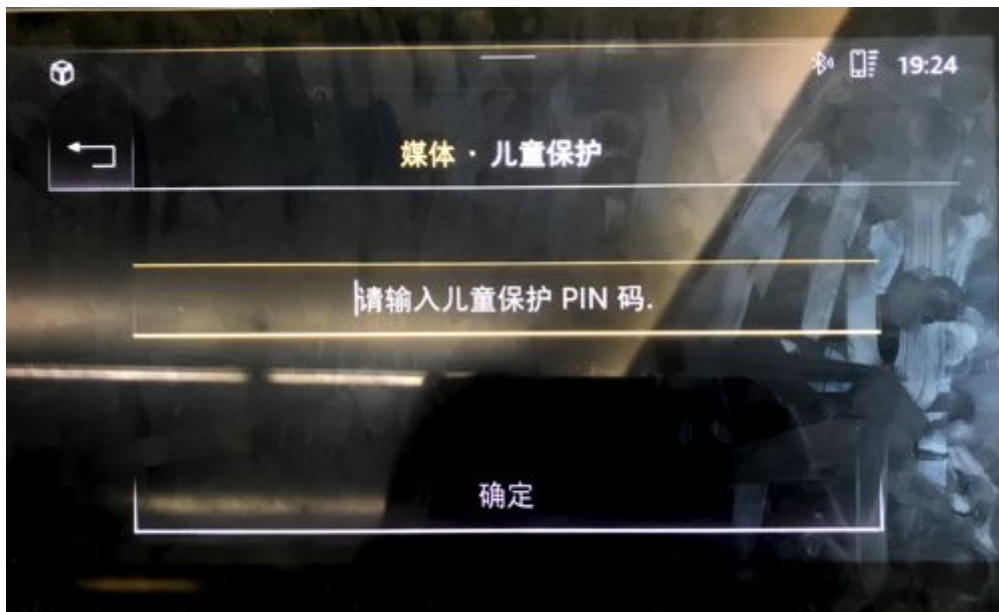
1.2.1 PIN Entry Analysis

1. Keyboard:



PIN keyboard

2. Input field display: **no clear signifier which tells user how many digits they should input.**



Input field display

3. Search result: no.
4. Triggering action: the 'ok' triggering button is redundant. The system can read the input number, and automatically trigger the verification process when the numbers gets to specific amount.

1.2.2 PIN Entry Improvement

1. Default keyboard: set number only keyboard as the default keyboard, which maximumly suit the scenario.



PIN keyboard

2. Input field display: provides 6 rectangles for user to input 6 PIN numbers. No delete button for this scenario.



↓ Enter "1234"



Input field display

3. Search result: no.
4. Triggering action: there is no "ok" button to trigger the verification. After user enter the 6th numbers, the system will automatically verify the PIN code.

1.2.3 DTMF Analysis

1. Keyboard:

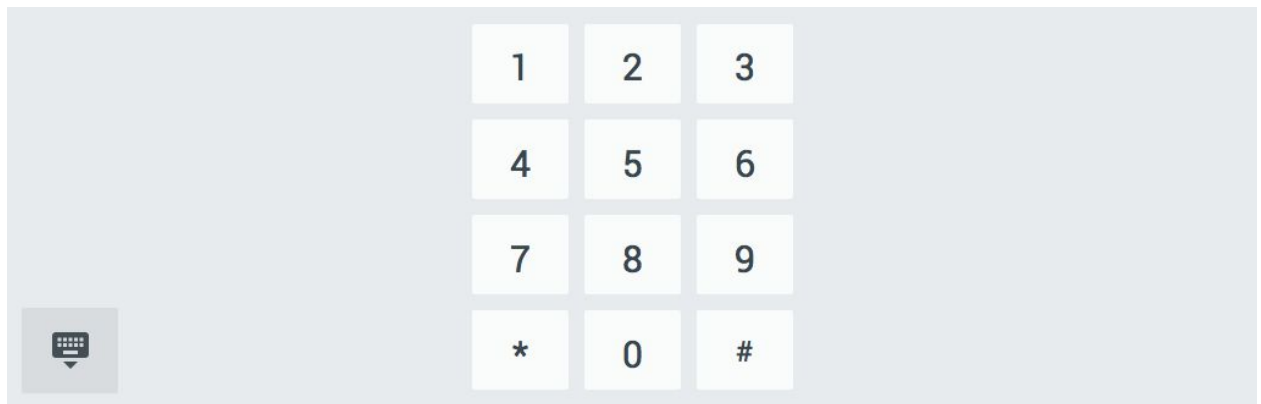


DTMF keyboard

2. Input field display: no.
3. Search result: no.
4. Triggering action: there is no “ok” button to trigger the verification. After user enter the number, the system will automatically verify the corresponding number.

1.2.4 DTMF Improvement

1. Default keyboard: set number plus “*” and “#” keyboard as the default keyboard, which maximumly suit the scenario. No delete button for this scenario.



DTMF keyboard

2. Input field display: no delete button for this scenario.



DTMF input field display

3. Search result: no.
4. Triggering action: there is no “ok” button to trigger the verification. After user enter the number, the system will automatically verify the corresponding number.

1.2.5 Phone Call Analysis

1. Keyboard: **the keyboard could be more simpler. No letters show on the keyboard.**



Phone call keyboard

2. Input field display:



Phone call input field display

3. Search result: no.
4. Triggering action: press call button to trigger the phone call.

1.2.6 Phone Call Improvement

1. Default keyboard: set number plus "*" and "#" keyboard as the default keyboard, which maximumly suit the scenario. Adding call button.



Phone call keyboard

2. Input field display: show text that user enter.

↓ Press "110"

Phone call input field display

3. Search result: when search engine detects saved contacts whose phone number matches the entered number, show possible contacts in proposal list.

↓ Press "1385518"

小明

13855186717

Phone call words proposal

4. Triggering action: press call button to trigger the phone call.

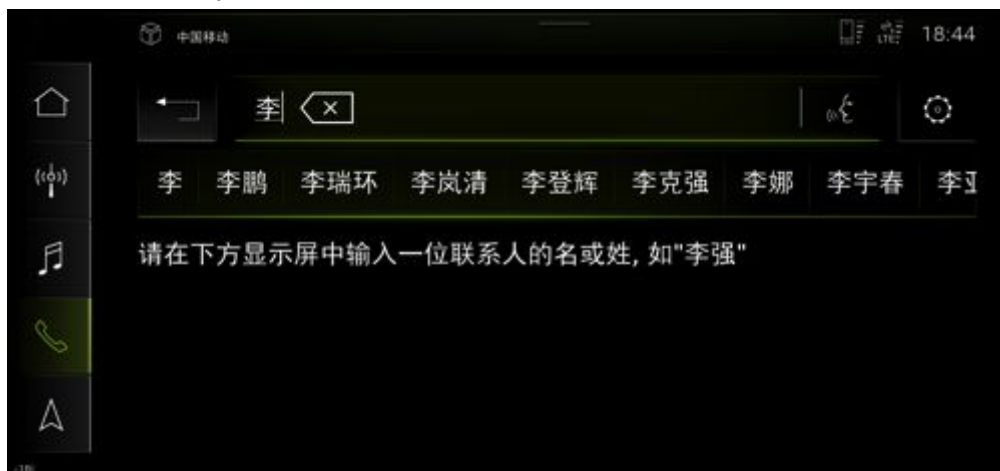
1.2.7 Search Contacts List Analysis

1. Keyboard:



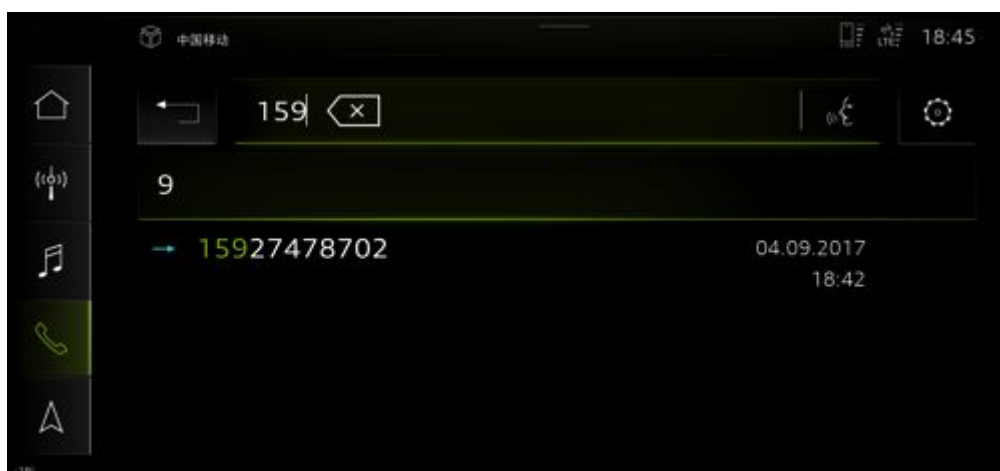
Search contacts keyboard

2. Input field display:



Search contacts input field

3. Search result:

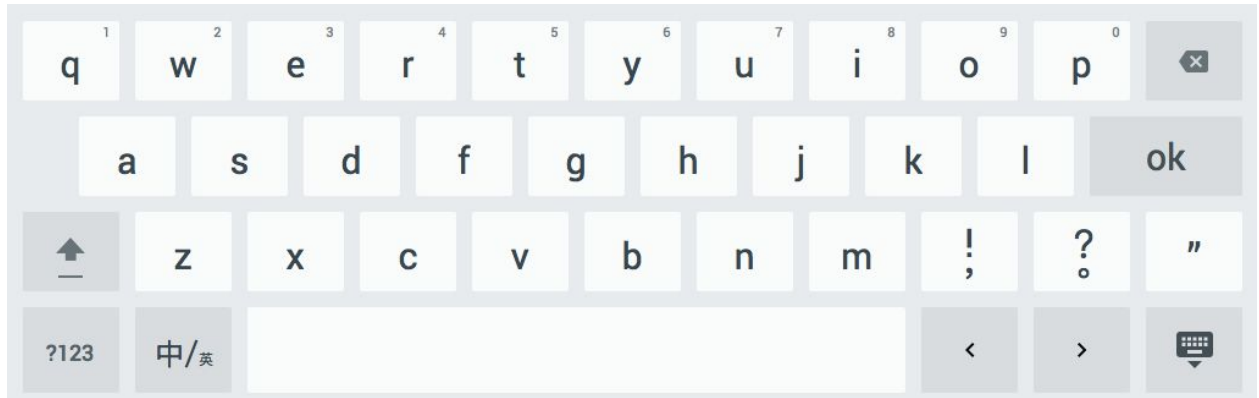


Search contacts words proposal

4. Triggering action: select proposal candidate to finish the action.

1.2.8 Search Contacts Improvement

1. Default keyboard: In static mode, default keyboard is pinyin keyboard.



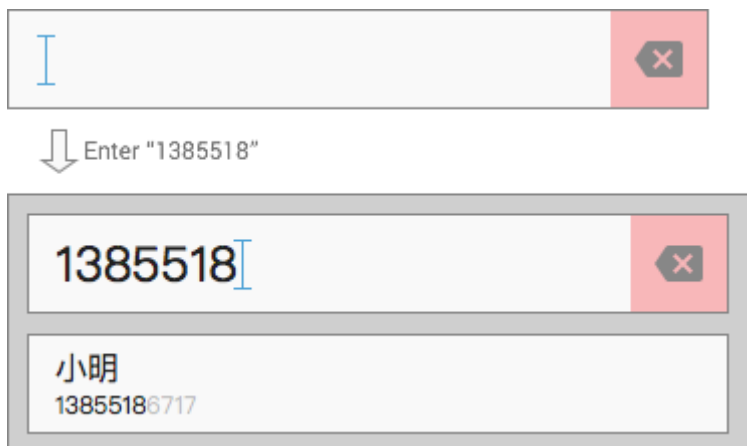
Search contacts keyboard

2. Input field display: show text that user enter.



Search contacts input field

3. Search result: when search engine detects saved contacts whose phone number or name matches the entered text, show possible contacts in proposal list.



Phone number matches



Contacts name matches

4. Triggering action: select proposal candidate to finish the action.

1.2.9 Search Message

1. Keyboard:



Search message keyboard

2. Input field display:



Search message input field

3. Search result: when search engine detects message whose phone number or content matches the entered text, show possible message in proposal list.

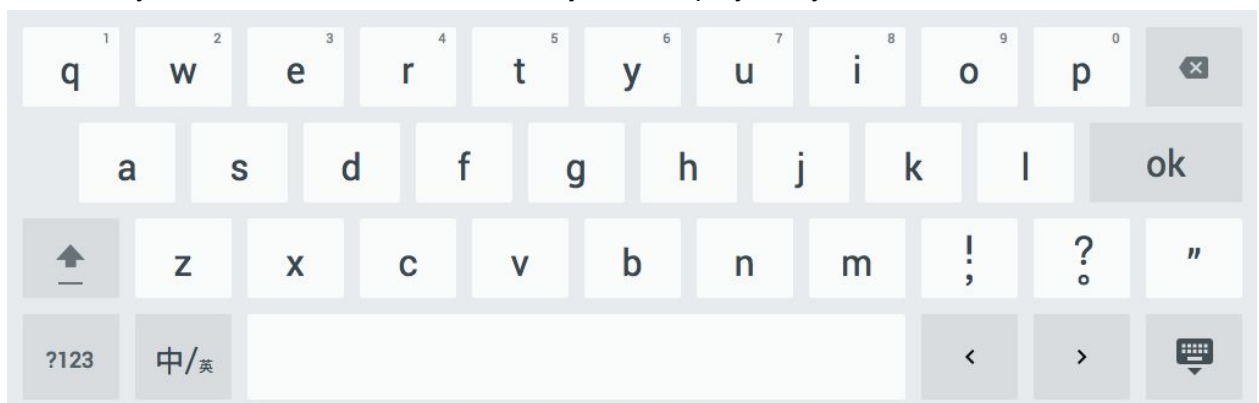


Content matches

4. Triggering action: select proposal candidate to finish the action.

1.2.10 Search Message Improvement

1. Default keyboard: In static mode, default keyboard is pinyin keyboard.



Search message keyboard

2. Input field display: show text that user enter.



Search message input field

3. Search result: when search engine detects message whose phone number or content matches the entered text, show possible message in proposal list.

Enter "10086"

10086
【流量提醒】尊敬的客户您好，截至08月21日08时34分，您...

Phone number matches

Enter "流量提醒"

10086
【流量提醒】尊敬的客户您好，截至08月21日08时34分，您...

Content matches

4. Triggering action: select proposal candidate to finish the action.

1.3 Media User Cases

1.3.1 Radio Search Analysis

1. Keyboard:



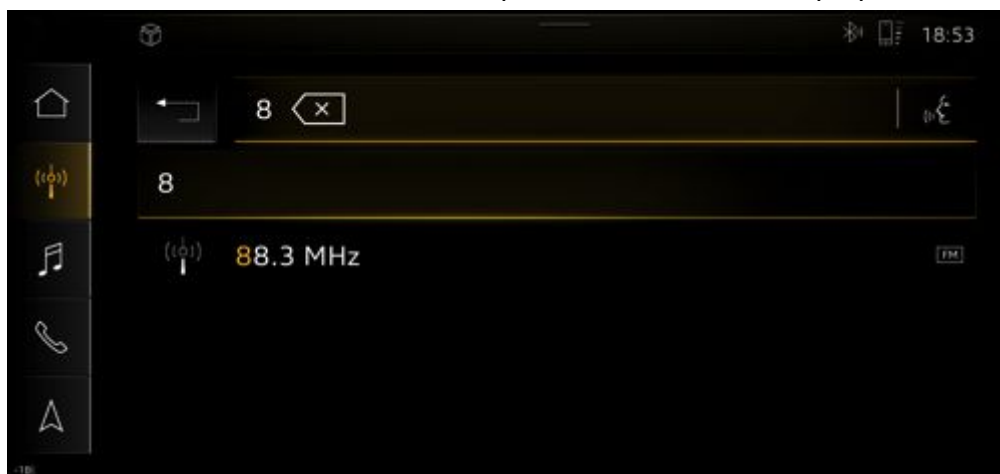
Search radio keyboard

2. Input field display:



Search radio input field

3. Search result: when search engine detects radio station whose frequency or station name matches the entered text, show possible radio station in proposal list.

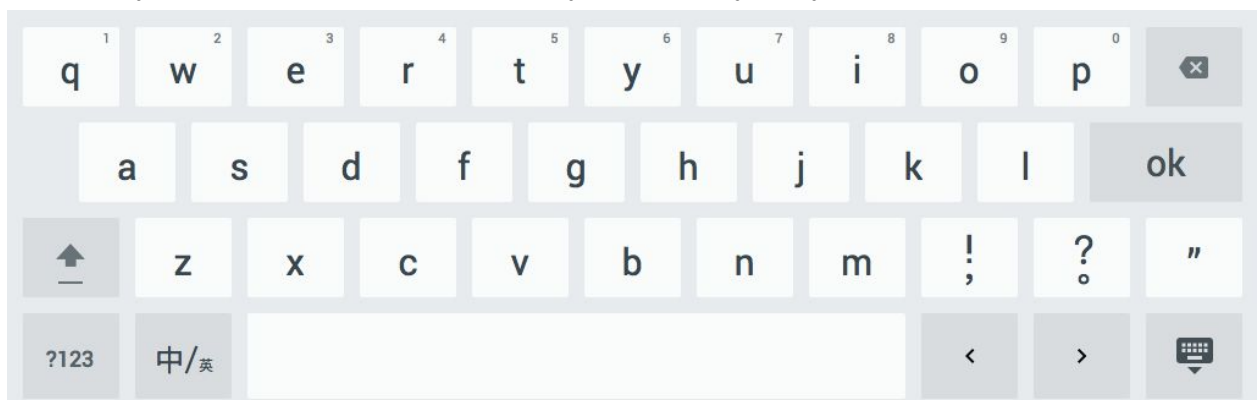


Frequency matches

4. Triggering action: select proposal candidate to finish the action.

1.3.2 Radio Search Improvement

1. Default keyboard: In static mode, default keyboard is pinyin keyboard.



Search radio keyboard

2. Input field display: show text that user enter.

An empty search input field with a light gray background and a red border. A blue cursor is at the end of the field. To the right of the field is a red button with a white 'X' icon.

↓ Enter "88.6"

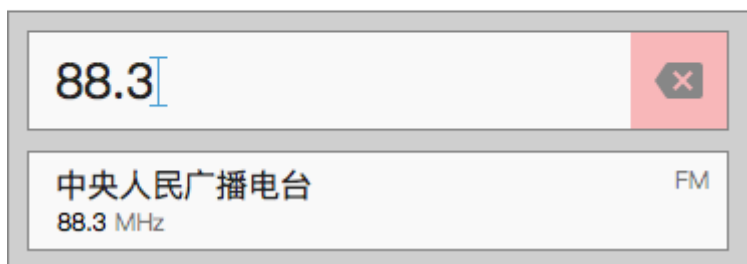
The search input field now contains the text "88.6". The blue cursor is at the end of the text. The red button with the white 'X' icon remains on the right.

Search radio input field

3. Search result: when search engine detects radio station whose frequency or station name matches the entered text, show possible radio station in proposal list.

An empty search input field with a light gray background and a red border. A blue cursor is at the end of the field. To the right of the field is a red button with a white 'X' icon.

↓ Enter "88.3"

The search input field contains the text "88.3". Below the input field, a gray-bordered box displays a search result. The result shows the station name "中央人民广播电台" (Central People's Radio Station) and the frequency "88.3 MHz" in Chinese, with "FM" in English to the right. The input field itself has a red button with a white 'X' icon.

Frequency matches

An empty search input field with a light gray background and a red border. A blue cursor is at the end of the field. To the right of the field is a red button with a white 'X' icon.

↓ Enter "中央人民"

The search input field contains the text "中央人民". Below the input field, a gray-bordered box displays a search result. The result shows the station name "中央人民广播电台" (Central People's Radio Station) and the frequency "88.3 MHz" in Chinese, with "FM" in English to the right. The input field itself has a red button with a white 'X' icon.

Name matches

4. Triggering action: select proposal candidate to finish the action.

1.3.3 Music Search Analysis

1. Default keyboard:



Search music keyboard

2. Input field display:



Search music input field

3. Search result:

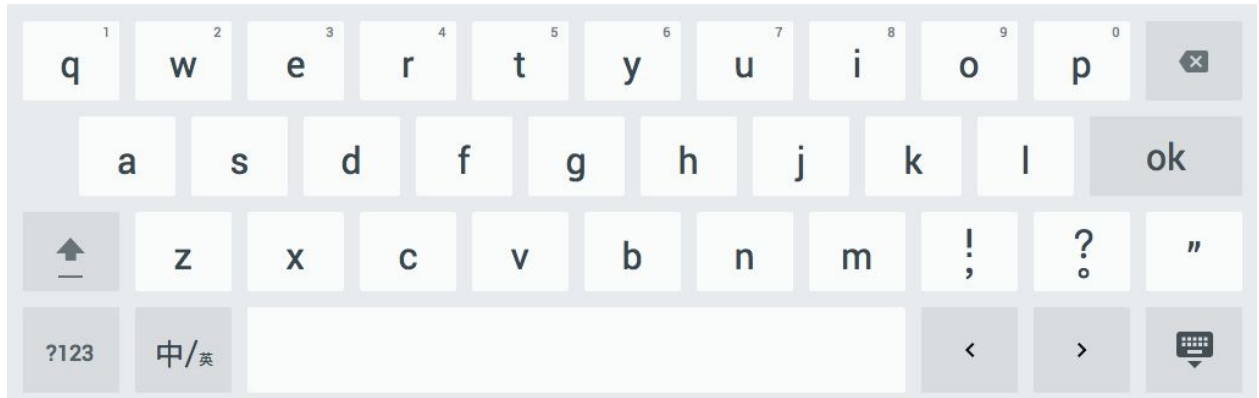


Song name proposal

4. Triggering action: select proposal candidate to finish the action.

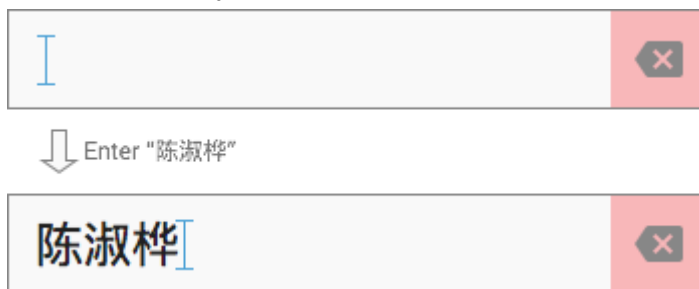
1.3.4 Music Search Improvement

1. Default keyboard: In static mode, default keyboard is pinyin keyboard.



Search music keyboard

2. Input field display: show text that user enter.



Search music input field

3. Search result: when search engine detects song whose singer name or song name matches the entered text, show possible song in proposal list.



Singer name matches



Enter “这样爱你”



Song name matches

4. Triggering action: select proposal candidate to finish the action.

1.4 Navigation User Cases

1.4.1 Destination Search Analysis

1. Keyboard:



Search destination keyboard

2. Input field display:



Search destination input field

3. Search result: when search engine detects destination whose destination name(including POI name) or destination address matches the entered text, show possible destination in proposal list.

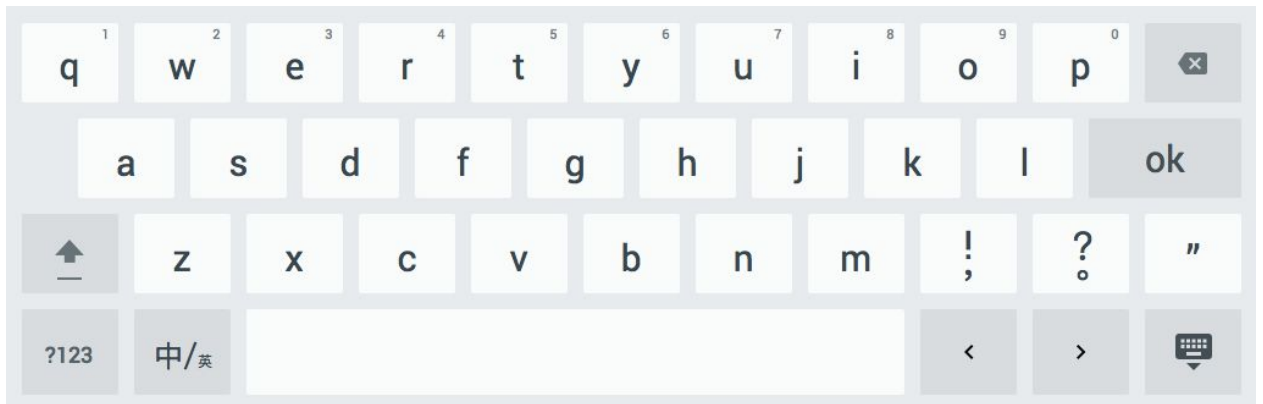


Destination address matches

4. Triggering action: select proposal candidate to finish the action.

1.4.2 Destination Search Improvement

1. Default keyboard: In static mode, default keyboard is pinyin keyboard.



Search destination keyboard

2. Input field display: show text that user enter.

↓ Enter "北京大"

Search destination input field

3. Search result: when search engine detects destination whose destination name(including POI name) or destination address matches the entered text, show possible destination in proposal list.

↓ Enter "北京大"

北京大学
北京市海淀区颐和园路5号

Destination name matches

A horizontal text input field with a light gray background. On the right side, there is a red button with a white 'X' icon.

Enter “海淀区颐和园5”

A horizontal text input field with a light gray background. The text '海淀区颐和园5' is entered. On the right side, there is a red button with a white 'X' icon. Below the input field, a dropdown menu is open, showing the text '北京大学' and '北京市海淀区颐和园路5号'.

Destination address matches

4. Triggering action: select proposal candidate to finish the action.

1.5 Connectivity User Cases

1.5.1 WLAN Name Entry Analysis

1. Keyboard:



WLAN name entry keyboard

- Input field display:

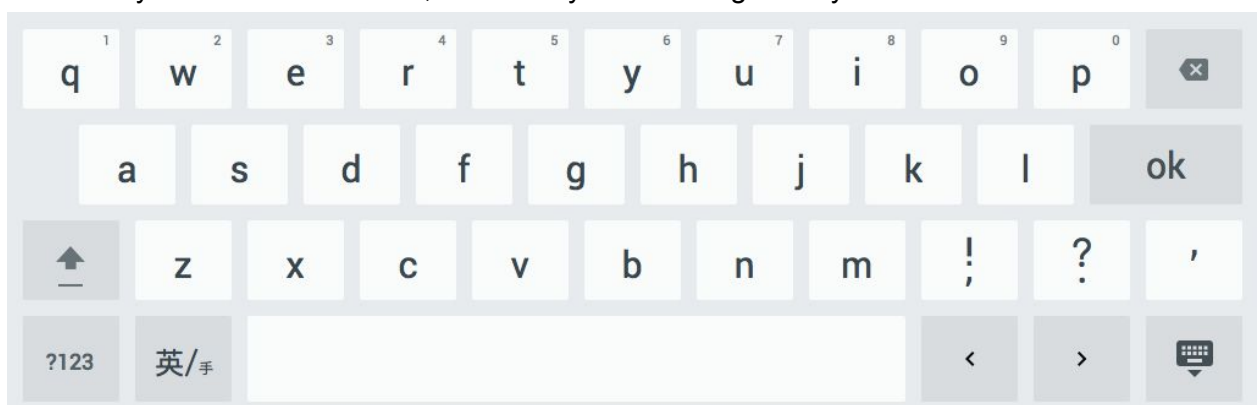


WLAN name entry field

- Search result: no.
- Triggering action: press “done” button to finish the action.

1.5.2 WLAN Name Entry Improvement

- Default keyboard: In static mode, default keyboard is English keyboard.



WLAN name entry keyboard

- Input field display: show text that user enter.



WLAN name entry field

- Search result: no.
- Triggering action: press “done” button to finish the action.

1.5.3 WLAN Password Entry Analysis

1. Keyboard:



WLAN password entry keyboard

2. Input field display:

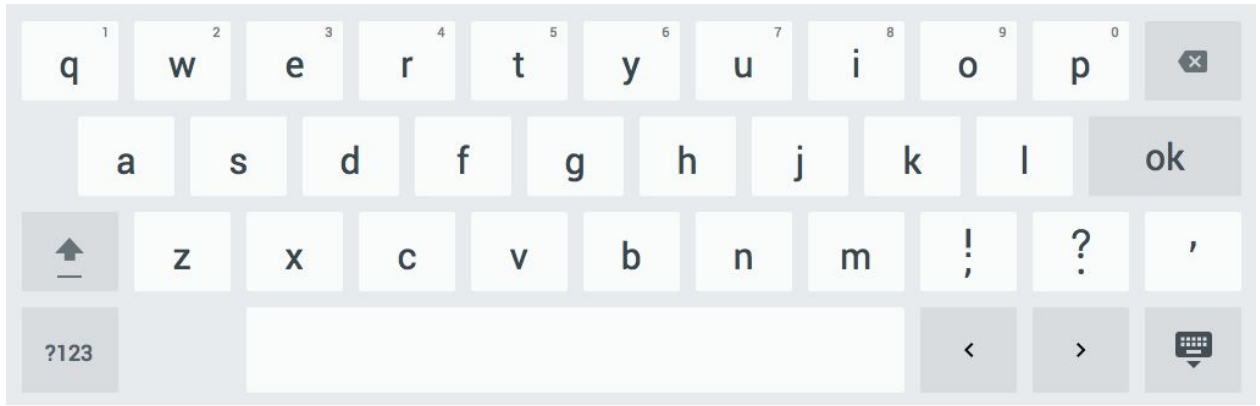


WLAN password entry field

3. Search result: no.
4. Triggering action: press “done” button to finish the action.

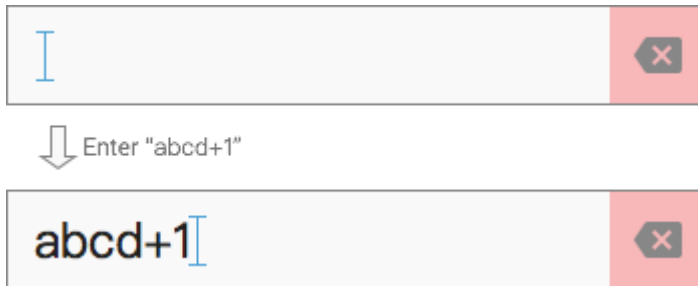
1.5.4 WLAN Password Entry Improvement

1. Default keyboard: In static mode, default keyboard is English keyboard. No “keyboard switch” button.



WLAN password entry keyboard

2. Input field display: show text that user enter.



WLAN password entry field

3. Search result: no.
4. Triggering action: press “done” button to finish the action.

2 Specification Analysis

2.1 Keyboard Switch Specification

2.1.1 Keyboard Switch Specification Analysis

1. For Chinese user, there are 2 local keyboard(pinyin and stroke) and 1 English keyboard. See *MIB2+_Input_Method_SPEC_P98*. **It's hard for user to tell which keyboard they are using now. And it's not efficient to use pop-up to change keyboard given there is only there 3 keyboard. Moreover, for mainland Chinese user, stroke input method is seldom used.**



Keyboard switch

2. For each keyboard, user can switch keyboard to HWR mode. See *MIB2+_Input_Method_SPEC_P146*. **It's redundant to repetitively add HWR button to all keyboards if HWR keyboard can recognize all different languages.**



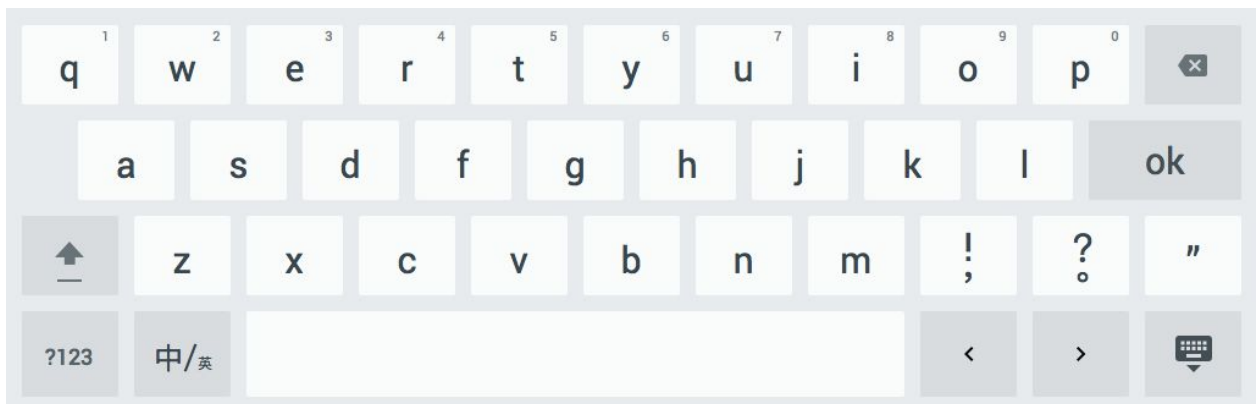
HWR switch

3. Therefore, in total, there are 6 different input method situations, which cause too much mental load for users to remember.

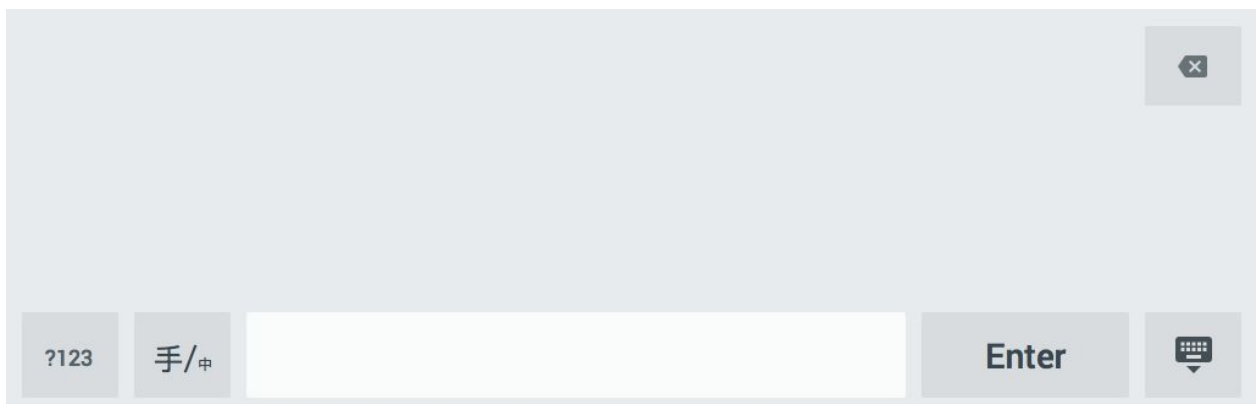
Input Method Situations	
Keyboard	HWR
English keyboard	English HWR
Pinyin keyboard	Simplified Chinese HWR
Stroke keyboard	Traditional Chinese HWR

2.1.2 Keyboard Switch Specification Improvement

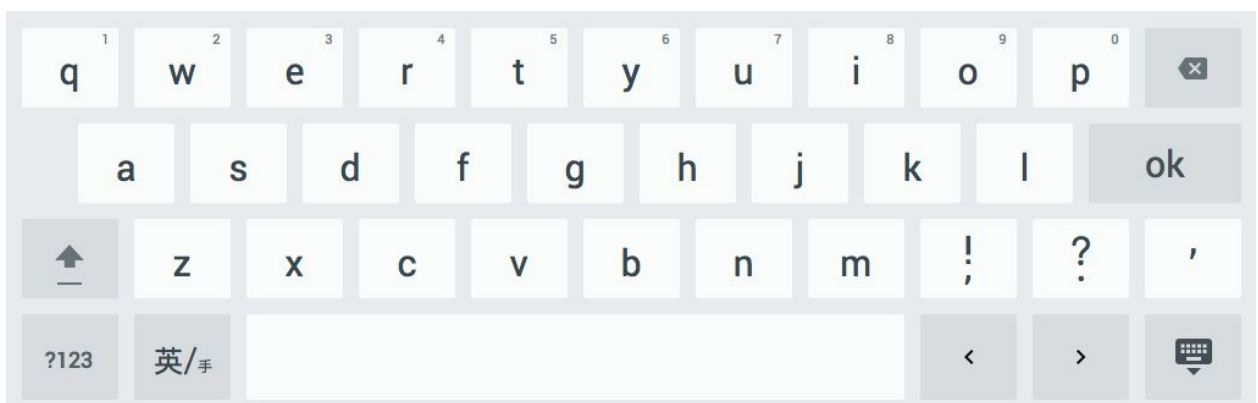
1. For Chinese users, keyboard supports 3 input methods, simplified Chinese pinyin, English, and simplified Chinese handwriting.



Pinyin keyboard

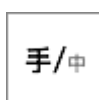


HWR keyboard

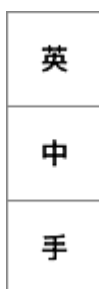


English keyboard

2. When tapping “keyboard switch” button, input method will be changed one by one. When long press it, input method can be manually selected.



“Keyboard switch” button default state



Long press “Keyboard switch” button

2.2 Pinyin Delete Specification

2.2.1 Keyboard Switch Specification Analysis

1. For mixed underline text, if the previous step before the delete typing is a conversion or an undo step, then the delete is an “undo”. The undo will undo the last conversion step which is done by user. All conversion steps (including the converted pinyin and the conversion in each step) should be remembered by the system in order to make the undo happen. See *MIB2+_Input_Method_SPEC_P77*. **This definition has two disadvantages. First it takes a lot processing power. Second the logic doesn’t make much sense. Given user normally choose the right candidate, the possibility to choose candidate wrong more than once is low.**

北京朝外dajie

↓ First tap

北京chaowaidajie

↓ Second tap

beijingchaowaidajie

Delete mixed underline text

2.2.2 Keyboard Switch Specification Improvement

1. If text input field has both unconverted pinyin and unconfirmed version, the first tap will undo the last time conversion, then the second step will delete pinyin on the left side of the cursor.



3 Performance Analysis

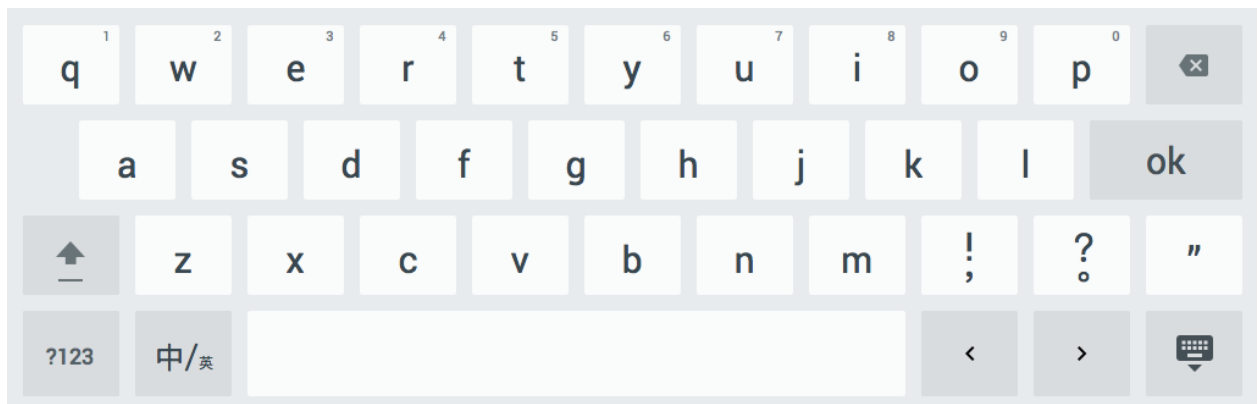
3.1 Visual Feedback

3.1.1 Visual Feedback Analysis

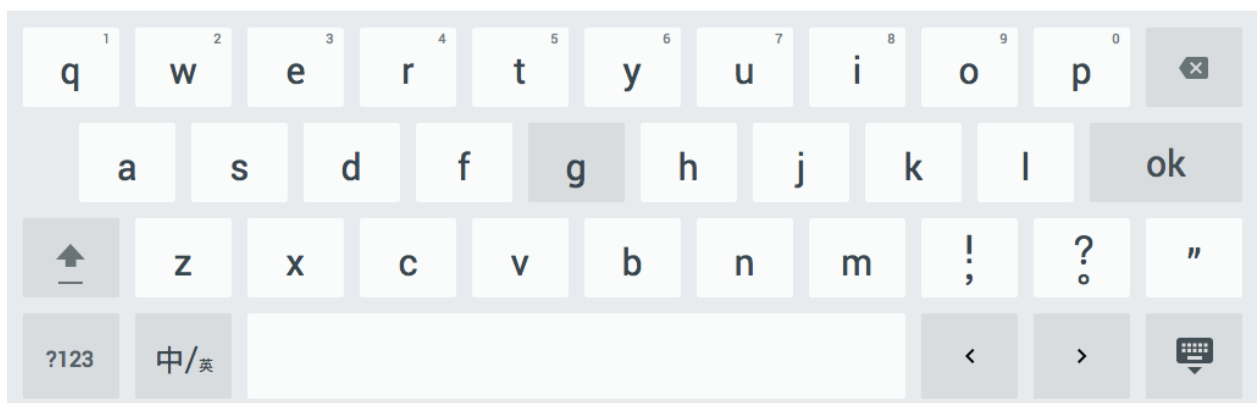
- As a normal user, I am also not satisfied with the current visual feedback.
- When I type a button on the keyboard, the keyboard cannot clearly tell me which button I am typing, very weak button-pressed visual feedback which even cannot tell. The only way I can get feedback is by looking at the input field, which means that I have to keep switch eye focus from downside screen to upside screen.
- Besides, the input field has a time lag (about 1-3 seconds) to display the text user input, which means engine's processing speed is too low compared with mobile phone's performance.

3.1.2 Visual Feedback Improvement

- Add keyboard visual feedback when a button pressed.



↓ Press "g"



Keyboard visual feedback

- Increase input field text display speed to make the time lag within 0.1 seconds.
- Collaborate with function owner and supplier to make beautiful things happen.

3.2 Haptic Feedback

3.2.1 Haptic Feedback Analysis

- As a normal user, currently, the keyboard haptic feedback is not fast enough sometimes.
- If you want to provide haptic feedback to user, you have to make sure its performance is good enough. Otherwise, the haptic feedback is lag behind typing speed, which is strange for me.
- Imagine, when you continuously input text, the visual feedback tells you have input 6 characters but the haptic feedback only tells you have input 3 characters. What should user make a decision now? User may wonder do I make it right or wrong?

3.2.2 Haptic Feedback Improvement

- Increase the haptic feedback speed to syn the speed of typing.
- Collaborate with function owner and supplier to make beautiful things happen.