Chapter 5:

iOS 8 Accessibility

Author: Luis F. Pérez, Ph. D., Apple Distinguished Educator

This chapter is licensed with a Creative Commons Attribution-NonCommercial 4.0 International License Download this book for free at: http://archives.pdx.edu/ds/psu/13340
Chapter 5
iOS 8 Accessibility

Luis F. Pérez, Ph. D., Apple Distinguished Educator

Released in the fall of 2014, iOS 8 is the latest version of Apple’s operating system for mobile devices such as the iPad, iPhone and iPod Touch. This update was not as significant as iOS 7, with its completely overhauled user interface, but in terms of accessibility it continues to refine the user experience so that it works even better and for more people.

To locate the iOS accessibility features on your device, go to Settings > General > Accessibility. The features are arranged into five categories. Three focus on the needs of specific groups: vision, hearing, and learning. In iOS 8, there is a new category called Media for enabling captions and audio descriptions during video playback, and the category previously named Physical and Motor (which includes a number of features for those with motor challenges) has been renamed Interaction.

A handy option is the Accessibility Shortcut (formerly known as Triple-click Home), which appears at the bottom of the Accessibility pane in Settings. This shortcut allows you to enable and disable accessibility features by triple-clicking the Home button on your device at any time. If you include more than one feature in the Accessibility Shortcut you will see a popover menu when you triple-click the Home button. You can choose which features you wish to enable from this menu while you are reading an e-book, surfing the Web, or checking email, without the need to go back into Settings.
What follows is an overview of the key accessibility features available on iOS devices, with a special focus on the updates and new features in iOS 8.

**Zoom**

Zoom in iOS 8 Video: [https://www.youtube.com/watch?v=eH9VHHueSRE](https://www.youtube.com/watch?v=eH9VHHueSRE)

Apple enhanced the Zoom screen magnification feature in iOS 8 to provide even more flexibility and customization. Whereas in previous versions you could only zoom in on the entire screen (by double-tapping with three fingers with Zoom enabled), iOS 8 users now also have the ability to turn on a window mode where only part of the screen is magnified while the rest of the screen remains at its default magnification.
Furthermore, a number of lens filters are available to customize the appearance of the zoomed-in area of the screen. Lens filter options include:

- Inverted (similar to the Invert Colors feature available in previous versions of iOS, which reverses the colors for added contrast),
- Grayscale (for removing all color and replacing it with shades of gray),
- Grayscale inverted (similar to inverted but with only shades of grayscale), and
- Low light (which dims the screen somewhat for those with light sensitivity).

Many of the options for customizing Zoom, such as the lens filters, are available from a popover menu that can be accessed in a number of ways:

- triple-tapping with three fingers while Zoom is enabled,
- tapping the handle on the edge of the window in window mode, or
- tapping a new floating controller that can be enabled in the Zoom settings. You can move this controller if it gets in your way, and there is even an option to reduce its opacity when it is inactive. A tap and hold of the controller turns it into a virtual joystick for panning around the screen with the Zoom lens in window mode.
The popover menu for Zoom also includes options for resizing the lens (the zoomed part of the screen in window mode) as well as for adjusting the zoom level. To resize the lens, choose Resize Lens from the popover menu, use the handles to resize the window according to the user’s needs, then tap anywhere outside the lens area to set its size. To adjust the zoom level, move the slider at the bottom of the popover menu until the magnification is at the desired level. A maximum magnification level for the zoom slider can be set in the Zoom settings.
The keyboard is much easier to use with Zoom in iOS 8. A new Follow Focus feature allows Zoom to follow the keyboard focus as you type, and you can also choose to have the keyboard remain at the default 1X magnification while the rest of the screen is magnified.

**VoiceOver**

VoiceOver is the built-in screen reader for iOS devices. For people who are blind, VoiceOver converts the information on the screen into formats that are more accessible, such as audio and Braille (when the iOS device is connected to a Bluetooth Braille display). VoiceOver navigation can be performed in one of two ways:

- Drag your finger around the screen to hear what is under your finger (including items in the status bar and the Dock). When you want to select an item (i.e. open an app, turn on a setting) double-tap anywhere on the screen (this is the same as a single tap when VoiceOver is turned off).

- Use gestures: flick left or right to move the VoiceOver cursor (the black square that determines what VoiceOver will read back) then double-tap to make a selection (i.e open an app, turn on a setting).

In iOS 8, Apple added Alex, its natural-sounding voice previously only available on the Mac. As on the Mac, Alex is not limited to VoiceOver, but will work with other iOS speech technologies such as Speak Selection and the new Speak Screen (more on those later). However, note that not all devices are supported (check the Apple website to see if yours is on the supported list), and Siri still has its own voice rather than using Alex.
Building on the handwriting-recognition feature introduced in iOS 7, iOS 8 also supports Braille input. Both of these special input modes are accessed through the Rotor, a special gesture for accessing many VoiceOver settings and navigation options, which involves placing two fingers on the screen and turning a virtual dial.

The Rotor is contextual, and the options that are available will depend on what you are doing. However, you can add and remove options from the Rotor by going to Accessibility > VoiceOver > Rotor and making sure only the options you want to be available in the Rotor have a checkmark next to them.

Figure 2. The Rotor with Speech Rate selected.
In my opinion, command of the Rotor gesture and its options is what allows a VoiceOver user to get the most out of this powerful screen reader and take its use to the next level, beyond basic flick and swipe gestures.

With the Rotor, you can:

• adjust VoiceOver settings such as the speech rate and volume at any time, without having to leave a web page or email to go into Settings;

• navigate web pages by using the page’s structural elements, such as headings, links, form elements, and more;

• edit text by accessing options such as copy, paste, and replace; and

• access the previously mentioned special input modes, Handwriting and Braille Input.

Handwriting, which was introduced in iOS 7, can be used to search for apps, enter text, or navigate web pages by drawing letters on the screen. For example, to search for the Camera app, you would turn the Rotor to select Handwriting, then draw the first letter of the app’s name (in this case “C”) on the screen to hear a list of all apps that start with that letter. While navigating a web page with the Safari browser you can draw the letter “H” to navigate a web page by headings, the letter “L” to navigate by links, and so on. The Handwriting feature supports the following gestures:

• Three-finger swipe up or down: switch between upper-case, lower-case, numbers, and punctuation.

• Two-finger swipe left: deletes the last character.

• Two-finger swipe right: adds a space.

• Three-finger swipe right: adds a new line when entering text.
• Two-finger swipe up or down on the Home screen: navigates a list of apps once you have entered a few letters to narrow down your search (apps do not have to be on your Home screen, they can be anywhere on your device).

• Two-finger swipe up or down in Safari: navigates a list of headings, links or any other element you have selected by writing the corresponding letter first (H for heading, L for link and so on).

Alex and Braille Screen Input in iOS 8 Video:

https://www.youtube.com/watch?v=DUHiIlIrPk

The Braille Input feature involves the use of an onscreen 6-dot Braille keyboard that will translate 6-dot chords into text (on the iPad’s bigger screen you can also enable 8-dot Braille input). Two modes for Braille input are supported: screen away
mode and table top mode. In screen away mode, the device can be held with the screen facing away from the user and the Braille dots will appear on the right and left edges of the screen. In table top mode, the dots are arranged in the shape of the letter V when the device is placed on a tabletop or other flat surface. For the Braille input mode, some of the supported gestures include:

- One-finger swipe left: deletes the most recent character.
- One-finger swipe right: adds a space.
- Two-finger swipe right (while entering text): adds a new line.
- Two-finger swipe right (on a Home screen): opens the selected app.
- One-finger swipe up/down while entering text: accesses typing suggestions.
- One-finger swipe up or down while on a Home screen: navigates a list of apps that start with the letters you started typing.
- One-finger swipe up or down in Safari: moves by the element whose letter you entered (headings, links, etc.).
- Three-finger swipe left or right: toggles between contracted and uncontracted (called “six dot”) braille (on iPads, eight dot braille is also an option)
- Hold with one finger on the screen: enter “explore mode,” where you can move a finger around to find the different dot positions.

You can exit out of either of the two special input modes (Handwriting and Braille) by performing a scrub gesture (moving two fingers from side to side) or by turning the rotor to a different item (speech rate, words, etc.).
In addition to on-screen Braille input, iOS devices support a number of Bluetooth Braille displays for Braille output. A full list of supported displays is available on the Apple website. Some Braille displays not only convert VoiceOver output to Braille but also support control of the device through a number of buttons built into the display. For example, on some displays you can tap a button on the display to scroll up or down a page or screen.

**Speech**

In addition to VoiceOver, iOS 8 includes support for the following speech technologies: Speak Selection, Speak Screen, and Speak Auto-text. The options for these speech features can be accessed under a new Speech pane found under Vision in Accessibility. There you can tap Voices and choose from the many languages supported in iOS 8, and for some languages you can even choose different dialects (U.S. English, Australian English, etc.). Many of the dialects allow you to download enhanced quality voices for even better results, but note that these voices take up some space on your device. Some devices running the latest A7 and A8 processors (iPad Air, iPad mini with Retina and iPhone 5s and later) also support the same Alex voice that has been available on the Mac, providing even higher quality text-to-speech support.

Speak Selection speaks selected text in email, web pages and any document where there is text that can be selected. Use of this feature requires two steps.

- **Turn it on:** in Accessibility > Speech tap the On/Off switch for Speak Selection. Use the slider to adjust the speaking rate.
• Select text (this will depend on the app, but in Safari you tap, hold and let go, then use the blue handles to make a selection. From the popover menu, choose Speak and you will hear the selected text spoken aloud

![Figure 3. Popover menu for a selection showing the Speak option.](image)

Since iOS 6, Speak Selection can highlight words as the selected text is spoken aloud. To enable word highlighting, go to Accessibility > Speech and make sure Highlight Content is enabled.
Speak Screen in iOS 8 Video: https://www.youtube.com/watch?v=WYpzKPyTyGM

Speak Screen is a new feature in iOS 8 that is similar to Speak Selection but does not require the user to make a selection first. With Speak Screen you perform a gesture (swiping down with two fingers from the top of the screen) and the device will speak everything that is on the display (including buttons and other interface elements). If you prefer, you can use Siri to activate Speak Screen. Just activate Siri and say “Speak Screen” and it should start reading the current screen aloud. Speak Screen has a popover controller with a number of options for pausing and resuming speech, adjusting the speech rate, and navigating the selection on the screen. This popover menu can be moved to the side as needed by tapping the arrow on the left side, or you can exit Speak Screen by tapping the X on the right side.
Figure 4. Speak Screen options popover menu.

Speak auto-text: automatically reads the auto-corrections suggested when you start typing some words, as well as the auto-capitalizations. This can save you from typing the wrong thing in email messages, social-media posts and more.
Guided Access

Guided Access in iOS 8 Video: https://www.youtube.com/watch?v=lovgyT06qrw

Guided Access was introduced as a way to set up the iPad or other iOS device in a single app mode. In this mode, users are required to enter a passcode before they can exit an app. Guided Access also can be used to disable certain areas of the interface (for example, the Settings button in an app). To enable Guided Access, go to Settings > Accessibility > Guided Access, then tap on Set Passcode to create the passcode. To use the feature, open the app you want to lock into single app mode, triple-click the Home button, and choose Guided Access. At the bottom of the screen you can disable touch (if you want to use the device for display only) or disable screen rotation. You can also disable the volume buttons, the sleep/wake button, or the keyboard for even more control. Tap Start when you have set your options and you will
be in single app mode (Guided Access). To stop Guided Access, triple-click Home again and enter the passcode, then select End.

While the options screen is visible, you can use your finger to draw a selection around buttons or other parts of the interface you want to disable. Those areas will be grayed out when Guided Access is started.

A new option with iOS 8 is Time Limits. This lets you set up a time limit for how long the user will be able to access the content on the iOS device. You can enable a sound to warn the user the time limit is about to expire or use a spoken warning instead (using text to speech). You set the warning type in Settings, then the length of the time limit in the Guided Access options screen. With iOS 8, devices that included a TouchID sensor allow the use of this sensor as an alternative for entering the passcode to end a Guided Access session.

**AssistiveTouch**

AssistiveTouch provides access to many hardware functions (volume buttons, screen rotation) through software alternatives. AssistiveTouch also makes it possible to use multi-finger gestures even if you do not have full use of all of your fingers.

When you turn on AssistiveTouch, you will see a floating icon that looks like a dot (you can move this icon if it gets in the way). Tapping the floating icon will bring up the AssistiveTouch Menu with the following options:
Figure 5. AssistiveTouch Menu

- Home: the same as clicking the Home button (for people who do not have the ability to perform a click).

- Siri: will activate the Siri personal assistant on devices that support that feature. When you are done, tap anywhere outside the popover window to dismiss Siri.

- Device: for adjusting and muting the volume, rotating the screen, locking the screen, and other device functions. Tap More for options that allow you to take a snapshot of the screen that will be saved to the device’s Camera Roll, and open the task switcher, which can be used to see recently opened apps so that you can switch between apps. The Gestures option is for people who are unable to perform multi-touch gestures with more than one finger. For example, instead of swiping left or right with four fingers to switch apps (if Multitasking gestures are enabled on the iPad), you can do the same thing with one finger using AssistiveTouch.
• Favorites: you can create your own gestures, in the AssistiveTouch section of the Accessibility Settings. A pinch gesture is already included for you.

• Notification Center: for accessing notifications from apps without having to swipe down from the top of the screen.

• Control Center: for accessing the Control Center without having to swipe up from the bottom of the screen.

  AssistiveTouch works well in conjunction with a number of special stylus designs, including some that can be mounted on a head harness or held in the mouth with a special mouthguard. These designs, along with others that have special grips, can be used by those who are unable to hold a traditional stylus.

Switch Control

Switch Control was introduced in iOS 7 and provides access to iOS devices for those who have motor or cognitive difficulties that require them to use an adaptive switch to interact with the iOS device. With Switch Control, items on the screen are highlighted with a cursor sequentially, and when the desired item is highlighted it can be activated by tapping the screen or a separate adaptive device connected to the iOS device over Bluetooth.
A scanner menu can also be brought up to access scrolling, saved gestures, and a number of device functions such as clicking the Home button or activating Siri.

Switch control is highly configurable in iOS:

- You can enable auto scanning and adjust the timing parameters for the auto scanning feature, including the number of times it will loop, how long you have to hold down the switch to activate an item (hold duration), and so on. Auto scanning requires less physical effort on the part of the user, but the timing can be tricky for those who are new to switch use.
- You can adjust the visual appearance and audio effects: for the visual appearance you can choose a large cursor and select from a number of colors for the scanning cursor. For audio, you can choose to hear an audio cue when the cursor advances, as well as enable speech and adjust the speaking rate. This last feature may be
helpful to someone who needs to use a switch device but also has low vision and needs the audio cues for the items on the screen.

- You can add multiple switch sources, and the switch source supports three options: external, screen, and camera. The first two are self-explanatory. You either tap on an external switch device or on the iOS device’s screen to activate an item. The camera can also be set to recognize your head movements as an action, and you can assign different actions to either a right or a left head turn. When a head movement is added as a switch source, an option for adjusting the head movement sensitivity will be available. One thing to note is that you should probably have your iOS device on a stand if you plan to make use of the camera as a switch source. Otherwise, moving the device may cause the camera to not recognize your face as desired.

Switch Control received only a minor update in iOS 8 that is intended to make use of the feature more efficient. For example, the scanner menu does not include all of the available options when it first comes up, but rather those that are most needed based on the current context. The user can then scan to a second menu/screen of options. Overall, the number of options available to the user has not changed, just the way they are presented.

**QuickType, Dictation, and Third-Party Keyboards**

The onscreen keyboard has gained smart word prediction in iOS 8. According to Apple, the QuickType prediction depends not only on your past conversations and writing style, but also on the person you are writing to and the app you are using. For example, in Messages the keyboard will provide suggestions that match a more casual
writing style, while in email it will suggest more formal language. Word prediction can save time and effort for everyone, and it can be especially helpful for students who struggle with spelling or those who find it difficult to enter text due to motor challenges.

Figure 8. QuickType and Dictation

Dictation has added real-time feedback in iOS 8. This makes the feature easier to use, as you can see exactly what you are dictating on the screen as you go, helping you catch mistakes sooner. Starting Dictation is as simple as tapping a microphone icon that appears to the left of the space bar, speaking the desired text and punctuation, and then tapping done when finished. Dictation does not require any previous training, but it does need an active Internet connection to work.

In addition to QuickType, there is a new API third party developers can use to create customized keyboards that users can choose from instead of the standard one.
included with iOS. Already, a number of third-party keyboards are available. Some of my favorites are as follows:

- **Keedogo**: special keyboard for early writers with a simplified layout and lowercase letters
- **Keedogo Plus**: similar to Keedogo but with word prediction.
- **Lowercase Keyboard**: lowercase keyboard incorporating the Open Dyslexic font
- **Fleksy**: keyboard with support for swipe gestures and color themes
- **Swype**: keyboard that supports entering text through special gestures that require dragging a finger over the letters that make up each word
- **TextExpander**: enhanced shortcuts that save time by allowing you to save frequently typed blocks of text for use at any time
- **Phraseboard Keyboard**: allows you to create keys for frequently used phrases.
- **Translator Keyboard**: allows you to type in one language and automatically translate it into another language
- **ai.type**: improves the usability of the Shift key and allows for custom backgrounds

Installing and enabling each keyboard is a three-step process:

1. **Download the app for the keyboard from the App Store.**
2. **Go to Settings > General > Keyboard > Keyboards and choose Add New Keyboard. Your new keyboard will be listed under Third-Party Keyboards.**
3. **Activate the on-screen keyboard and tap the globe icon to the left of the space bar and choose your new keyboard.**
Figure 9. Menu for selecting third-party keyboards

The options for customizing each keyboard’s behavior and appearance can be accessed through the keyboard’s app.

**Display Options**

iOS includes a number of options for customizing how information is displayed on the screen. These features can benefit not only those with vision loss, but also older adults whose vision is fading. In iOS 8, the options for customizing the display include:
• Invert Colors: reverses the color on the screen for people who need a higher contrast display

• Grayscale: a new feature in iOS 8 that replaces the color on the screen with shades of gray

• Larger Text: makes the text bigger on apps that support the Dynamic Type feature. Text size can also be adjusted in Settings > Display and Brightness in iOS 8. However, by enabling Larger Accessibility Sizes, you can make the text even bigger.

• Bold Text and Increase Contrast: adjusts the contrast of the text and the background so that the text is easier to read. For Bold Text, you must restart for changes to take effect. You can also adjust this setting in Display and Brightness in iOS 8.

• Button Shapes: adds a shape around buttons to make them easier to perceive

• Reduce Motion: replaces the zoom animation in iOS 8 with a simple fade that may be easier for some people who are sensitive to motion in the interface.

• On/Off Labels: adds an additional visual cue (a 1 or 0) to each button to help you identify its state (whether it is on or off).

Audio Options
With iOS 8, the options for those with any kind of hearing loss will vary depending on the device. On the iPad, there are three options:

• Hearing Aids: allows pairing with a number of Made for iPhone Hearing Aids with advanced features such as the ability to adjust the right and left volume separately
or together, environmental presets, and Live Listen for using the iOS device’s microphone to pick up audio which can be relayed to the hearing aid

- Mono Audio: converts a stereo signal so that both channels will play out of each earpiece when you have headphones plugged in
- Balance control: allows you to adjust the audio level so that more of it plays out of either the left or right earpiece when headphones are plugged in

On the iPhone, you can also enable the device’s flash as a visual alert, as well as turn on Phone Noise Cancellation to improve the audio quality for phone calls when you hold the phone up to your ear. For any of your contacts, you can set a custom vibration pattern. This is done by editing the person’s contact information, choosing Vibration > Create New Vibration and tapping the custom vibration pattern on the screen.

Although not considered accessibility features, Messages and FaceTime are two communication technologies built into iOS that can be useful to those who are deaf and need alternative modes of communication such as text messaging and video chat for sign language.

Media
The new Media category in iOS 8 includes two options for customizing video content:

- Subtitles and Captioning: turns on captions on any video or podcast that includes them. Starting with iOS 7, you can customize the appearance of the captions by creating your own styles. These styles allow you to change the text size, font, and other options to make the text easier to see and read.
• Audio descriptions: enables a secondary audio track that describes the action for someone who is blind and cannot see what is on the screen.

Figure 10. Closed caption styles pane
Other Options
In addition to the options found in the Accessibility pane, iOS includes a number of other features that, while they are not accessibility features per se, could benefit those with special needs. Some of these include:

• Messages: includes an option for sending audio clips from within the app, which will be of benefit to people who can’t enter message text as quickly as they can speak. On the receiving end, these messages can be played back by just raising the device to hear them, making the interaction easier for those with motor difficulties. Video clips can also be sent in a similar way. For someone with a cognitive disability, the ability to see something in concrete terms with the help of a quick video clip will be helpful (a picture is worth a thousand words, right?).

• Siri now has an always-on listening mode where the user can just say “Hey Siri” to activate the personal assistant. To avoid draining the battery, this mode will only work when the device is plugged into power. This will be helpful to any individual who has difficulty pressing the Home button to activate Siri.

• The new support for a heath data API for tracking physical activity. For someone who is on the road to recovery (from an illness or an injury), such tools should prove helpful in keeping them on track and motivated about their progress. There is even an option for including a health card (with information about medications, allergies, and the like) in the lock screen. This idea will be taken even further when the new Apple Watch is released with a number of sensors for collecting health information that can be accessed with the Health app on iOS devices.
- A similar home automation API could come in handy for allowing people with motor difficulties to more easily control the appliances, lights, and other aspects of their home environment using iOS devices.

- NFC payments (Apple Pay) could make interactions at gas stations, pharmacies, and other places of public accommodation easier for people with motor difficulties. Rather than fumbling with a wallet to take out a credit card or loyalty card before buying a coffee, all that’s required is a simple tap of the phone (or upcoming watch) with the payment station.

The Apple Watch, to be released in early 2015, also points forward to new technologies and means of interaction that will benefit people with disabilities. A great example is the new haptic feedback provided by the Taptic engine in the Apple Watch, which will use subtle vibration patterns to guide someone when using turn-by-turn navigation with the Maps app. Hopefully this technology will appear in future iPhones, as it would be of great benefit for those who are blind.

You can also communicate with the Apple Watch using tap patterns, doodles, and what appear to be animated avatars, and I hope a similar app will eventually be added to iOS. These features could be very useful for young people who are on the autism spectrum or who otherwise have communication difficulties: for example, what would be easier than drawing a big heart to tell your parent you love them?

When you take into account all of the accessibility and other enhancements built into iOS 8, it is clear that Apple is truly focused on creating an ecosystem of hardware, apps, and services that work for everyone. These built-in features are a great example of universal design, an approach where accessibility is built in rather than bolted on
through additional applications that have to be purchased and installed by the user. While iOS provides a great deal of customization through the large number of apps available in the App Store, out of the box a user has much of the accessibility toolkit he or she needs to access information and interact with the device on a level playing field with non-disabled peers. Furthermore, the ability to use the same device as everyone else, regardless of disability status, adds an element of social acceptability to iOS devices that cannot be underestimated when considering their use with marginalized populations.