

TECHNICAL REPORT



**Form factor of smart mobile device –
Part 2: Use cases of multimedia services**

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TECHNICAL REPORT



**Form factor of smart mobile device –
Part 2: Use cases of multimedia services**

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FORM FACTOR OF SMART MOBILE DEVICES –**Part 2: Use cases of multimedia services**

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INTRODUCTION

In IEC TR 63447-1, various form factors of SMDs are described. As SMDs have different shapes, SMDs have their own use cases which are applied for the intuitive use of multimedia services.

In other words, there is the same basic use case framework for a multimedia application, but it is essential to set different screen configurations and audio interactions for the optimized use cases, depending on the SMD form factors.

This Technical Report introduces various use cases of multimedia services that depend on three representative form factors (flat, folded, and swivel type) released so far.

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FORM FACTOR OF SMART MOBILE DEVICES –

Part 2: Use cases of multimedia services

1 Scope

This document introduces use cases of multimedia services depending on form factors of smart mobile devices. It also includes use cases of multimedia applications with user interactions.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1.1

folded posture

condition where the screen or two screens are folded

3.1.2

swivel posture

condition where one of the displays can turn or spin while the other display does not move

3.1.3

context menu

menu in a graphical user interface

3.2 Abbreviated terms

OTT over-the-top

SMD smart mobile device

4 Overview

SMD form factors described in IEC TR 63447-1[1]¹ have their own use cases which are applied for the intuitive use of multimedia services. The differentiating factors that characterize between SMDs and traditional personal computing (for example, desktop computers) are their ubiquitous use, usually small size, and mixed interaction modalities for multimedia services. The SMD can be deemed to be a computer that has become small enough to enable mobile usage.

¹ Numbers in square brackets refer to the Bibliography.

SMDs contain numerous multimedia applications that use cameras, speakers, microphones, a touchscreen, and a light sensor, enabling them to acquire information and interact with users. The form of an SMD can be altered with various components and the features of these components can impact the use cases. Some interaction components of different research fields are shown in Figure 1 [2].

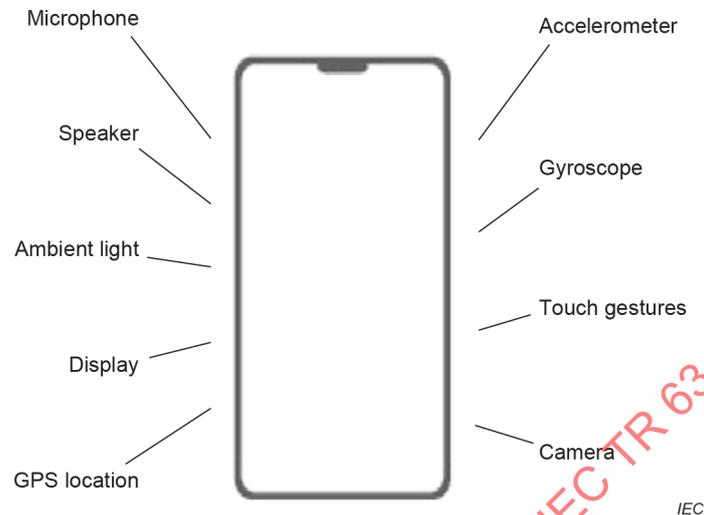


Figure 1 – Interaction components for multimedia services

5 Multimedia services depending on form factors

5.1 Multimedia services on flat type SMD

5.1.1 Use cases of audio applications

When using the audio part, in some cases, the user switches the SMD to silent so as not to be disturbed by unexpected sounds such as ringtone and incoming message tone. In this situation, they also mute unnecessary sounds such as sound effects, game soundtracks, and other audible feedback. When the SMD is in silent mode, audio explicitly initiated by the user, such as media playback, alarms, and audio/video messaging, could be played.

Depending on the selected audio category, the sound of the application can be mixed with other audio, played while the application is in the background, or stopped when the user sets the ringtone/mute switch to silent. As much as possible, a category that helps the application meet the user's expectations would be selected. For example, if possible, the user would be allowed to listen to music from other applications without interruption.

In some cases, the audio of another application can stop audio from being played in the application. Interruption can or cannot be resumed, such as when the user gets a call and the user starts a new music playlist. The user can resume playing audio by ignoring the type of request or pause playing audio by accepting the request. For example, a media playback application that actively plays audio when an interruption occurs could check whether the type could resume before continuing playback when the interruption ends. On the other hand, applications such as games do not need to check the type of interruption before automatically resuming playback.

If the application can temporarily suspend audio from another application, the user could flag the audio session so that the device can know when the other application could restart.

If the application actively plays audio in a clear audio-related context or is connected to a wireless device, it is recommended to respond to an audio control. Otherwise, when users activate controls, the application could not interrupt the audio of other applications that are

currently playing. Table 1 summarizes the audio action items to cover several multimedia interactions.

Table 1 – Use case items of audio action

Category	Meaning	Action
Solo ambient	Sound is not essential, but other audio is silent.	It could respond to the silence function. It cannot mix with other sounds. It does not play in the background.
Ambient	Sound is not essential, and it does not silence other audio.	It could respond to the silence function. It can mix with other sounds. It does not play in the background.
Playback	Sound is essential and might mix with other audio. For example, an audio book or educational application that teaches foreign languages which the user might want to listen to after shutting down the application.	It could respond to the silence function. It can or cannot mix with other sounds. It can be played in the background.
Record	The sound is recorded. For example, there is a memo application that provides an audio recording mode.	It does not respond to the silence function. It cannot mix with other sounds. It can be recorded in the background.
Play and record	Sound can be recorded and played simultaneously. For example, it is a voice message or video call application.	It does not respond to the silence function. It can or cannot mix with other sounds. It can be recorded and played in the background.

5.1.2 Use cases of applications with finger touch interaction

The SMD is configured with minimum physical key buttons and interacts with the user through the touch screen display. These touches allow for easy access to applications and operation of objects within the application on the screen.

In general, it is familiar and does not force them to interact in different forms to do the same thing. In the case of 3D touch, one of the touch functions, various levels of pressure can be applied to the touch screen to access additional functions. For example, a context menu can be used to access additional functions related to items without complicating the application interface. To display the 'contextual menu', the user can use a touch method defined in the system, a hold gesture, or a 3D touch. When the screen is opened, the menu suitable for the situation displays a preview of the item and lists commands that operate for the item. At this time, a visual group can be created to help the user scan the menu more easily. If the user touches the application icon for a long time on the home screen, the available quick action menu is noticed. Through the application's 'contextual menu', the user can quickly perform general app-specific tasks and view various information. For example, Figure 2 shows a calendar provides a 'shortcut' to create a new schedule item in addition to displaying the following schedule.



Figure 2 – Pop-up menu action with finger touch interaction

In a general environment, selection tools such as brushes, an eraser, and pens are designed to float on the screen to avoid interfering with the user. However, in a limited screen, the selection tool remains fixed at the bottom edge of the screen. The user could adjust the content frame to ensure the entire content is visible while considering the height of the tool selector so as not to cover the user's content. Alternatively, the user could move the content by inserting a scroll to facilitate touch operations throughout the screen. Figure 3 shows the mark-up screen displaying the entire content on the left side, as shown in Figure 3 (a). It is recommended to use the mark-up screen on the left side rather than the one on the right side, which is matched in height to the content, as shown in Figure 3 (b). By matching the entire content, the user can adjust the content zoom-in and zoom-out level and position with a finger touch gesture.



(a) Recommended entire content matched



(b) Not recommended height matched (left-right side out of the screen)

Figure 3 – Content view mode with brush tools

Haptic feedback improves the experience of interacting with the screen interface by being involved in the user's tactile sense. For example, the system can reproduce haptic feedback along with visual and auditory feedback to highlight and display the feedback in a specific situation. If a user recognizes haptic feedback as a "success" notification in some applications, it is important to maintain consistency with haptic use. Therefore, it is important to specify and use the scope of application of haptic feedback under the system's definition.

5.1.3 Use cases of applications with pen touch interaction

When touching using a pen, tasks such as writing a memo, sketching, painting, and displaying a document can be performed. The user does not switch from pen to finger to interact with the control of the application but keeps responding with pen input. The experience of placing a pen on the screen reflects the experience of placing a pencil on paper.

Information on the tilt (altitude), force (pressure), and direction (orientation angle) of the pen could be utilized in the application to affect the line (stroke). The detection of pen position is depicted in Figure 4. The response to these parameters is maintained in a simple and intuitive manner. For example, it is natural to alter the pressure to impact continuous properties such as ink opacity or brush size.

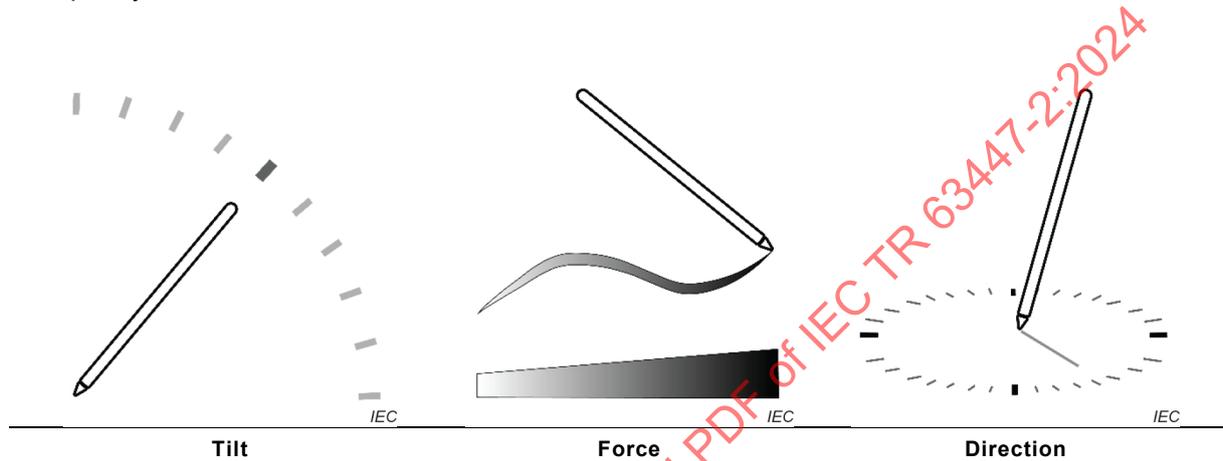


Figure 4 – Pen position detection

The pen could give the impression of directly and immediately manipulating the content touched on the screen. The pen could not initiate act, making it appear disconnected from the content or affect other parts of the screen, and the control could be placed in a position that can be reached by either hand. If there is a possibility of the control being obstructed, the user would be allowed to rearrange it. An example of the controller position for creating multimedia contents is shown in Figure 5.

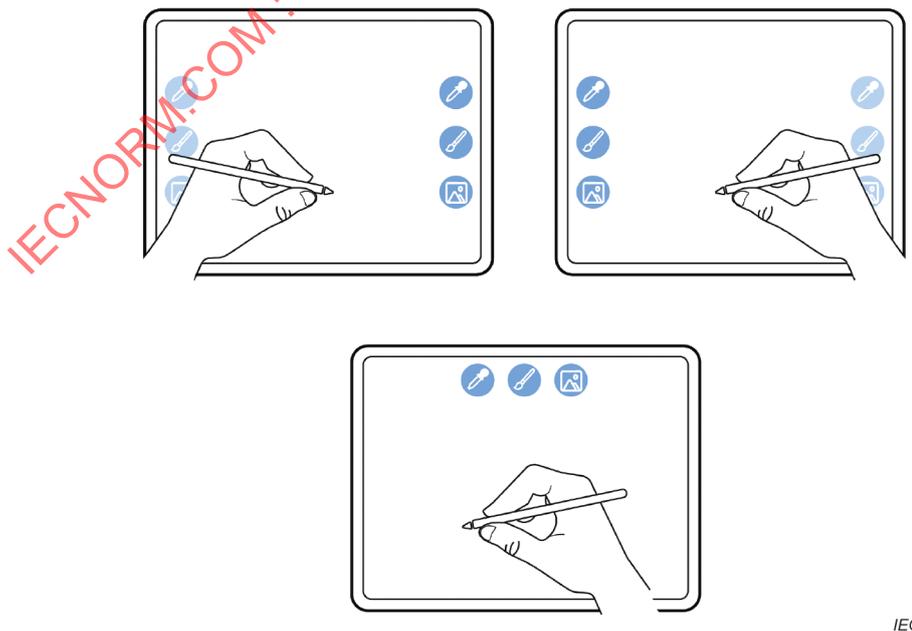


Figure 5 – Controller and hand positions

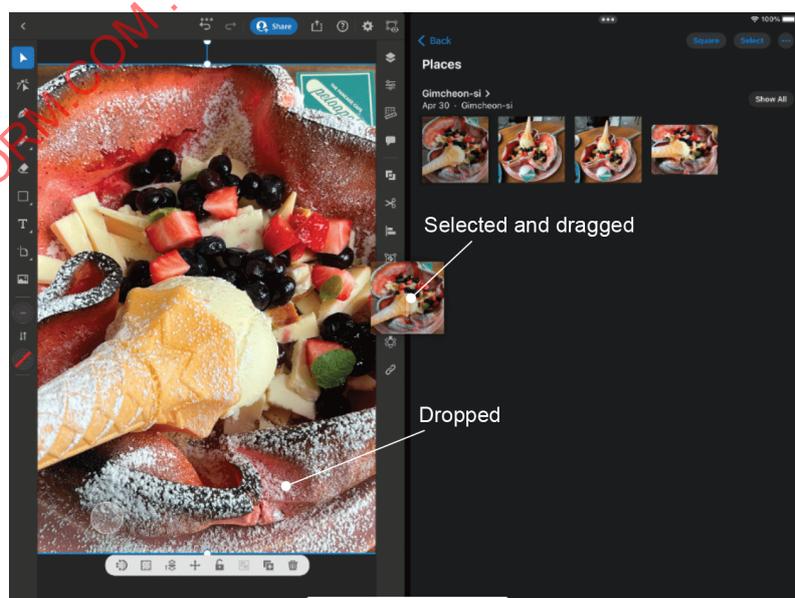
Users can tap a specified number of times (set in the application's property as two or three) on the screen with a pen to switch between the current tool and the previous tool or to display, hide, or do nothing in the drawing application. However, if the user designates to follow the system-wide setting (for example, switching between current and previous tools) for two tabs (for example, a specified number of times), all applications will perform the function (even if the two-tab settings are meaningless in the application).

While writing with a pen, the application could fix the screen to input so that the text field is fixed, and the content is not scrolled. For example, the search field can move to secure more space to display the result. This movement is okay when using the keyboard, but when the user writes, the user could feel as if the user is losing control of where the input goes. To this end, it is necessary to prevent automatic scrolling while writing and editing with a pen in the input field.

5.1.4 Use cases of applications with drag and drop interaction

The user can drag a picture, multimedia file, text, or other contents selected with one finger or pen from one location to another, and then move or duplicate it by lifting a finger. When the selected content is touched or pushed for a long time, the SMD can feedback in a form that rises or floats above the screen in response to the user's finger. When content is attracted, it is possible to identify objects that can be animated and visual signals. The system could also display information indicating when it cannot be placed or replicates content instead of moving it. When multiple applications are on one screen, that is, when the source where the content exists and the target location where the content is to be moved to exist as different applications, the interaction between applications can be possible. In addition, while dragging content, the user can move the content by moving to the home screen or to the application list to access other applications and activate the target application. At this time, if the application contains or generates text, photos, videos, audio, or other content that the user can move, copy, or insert, the application could support dragging and dropping. Selectable content could be draggable, and editable content could allow dropped content. The user can select an additional item with another finger while dragging one item with one finger. The user can then drag the item into a group and place it on the desired object.

Figure 6 describes the drag and drop interaction. For example, a photo application is on the right-hand side and the photo editor application is on the left-hand side of the screen. A photo is selected in the photo thumbnail and moved to the photo editor window.



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Figure 6 – Drag and drop interaction

5.2 Multimedia services on folded type SMD

The device posture is the physical position in which a device is held, which can be derived from sensors in addition to the angle. One of the new types of SMDs, which is a foldable device, can implement a kind of ability to change posture. The most common types of devices are the ones that can fold (its screen inwards or outwards), allowing them to alter their form factors. The main interest in knowing the folded posture of a device is to enable new user experiences with responsive design.

Among the described folding or foldable SMDs, there are mainly two different physical form factors: devices with a single flexible screen (without a seam on the folding line; it is called a "seamless on the screen"), and devices with two screens (with a seam between displays). They can both fold around a hinge, and the current specification of products applies to both types. It would be clarified as well that both seamless and with seam can be of different dimensions ranging from mobiles to tablets. It would also be noted that different devices will have different default orientations (portrait or landscape) and that the fold might be in a vertical or horizontal way. It is recommended for single screen foldable devices (shown in Figure 7 (a)) that the application can be fully displayed on the screen and the screen size could be controlled. But for devices with two screens (shown in Figure 7 (b)), it is recommended that the application could be divided, and the screen size could be controlled independently on each screen.



Figure 7 – Example of dividing the screen of applications

When the user runs the application to watch multimedia content on a foldable SMD, the user could automatically switch from one screen to another. At this time, the foldable SMD can be folded in various ways (for example, it can display the content on the front display as folded, and the content is moved from the front display to the main screen as unfolded which is shown in Figure 8).

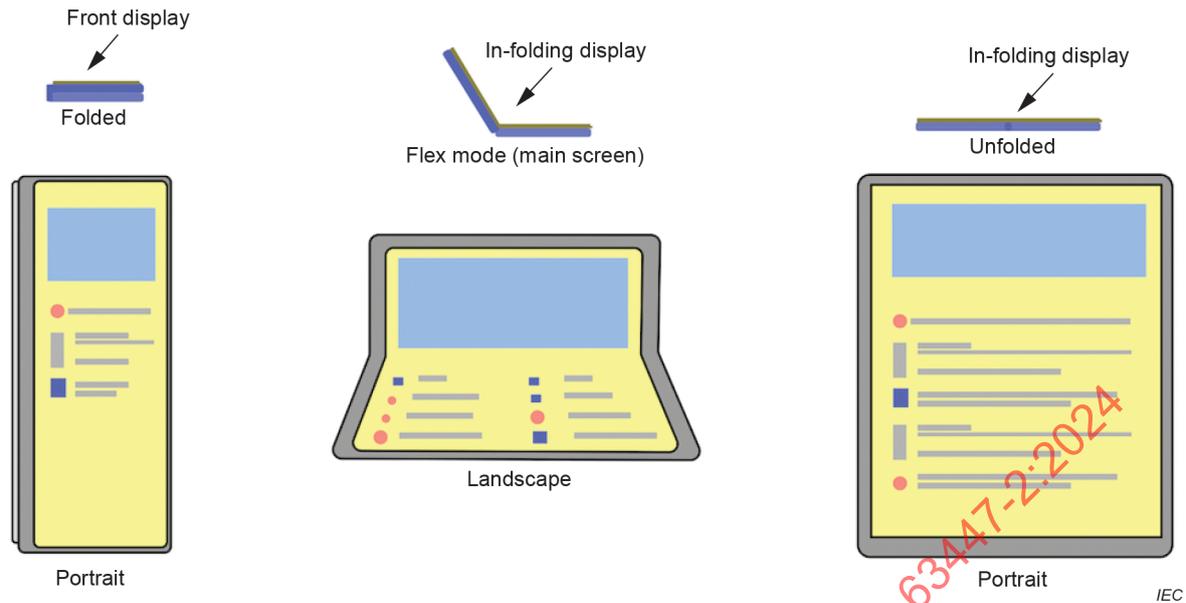


Figure 8 – Application screen configuration change with interaction

In addition, when automatically switching, two or more applications can be simultaneously executed on a large screen and multi-window, and the applications can share content. This is to run various applications on one screen, and when two or more displays are supported, activity between displays can be supported. That is, when the application starts or creates other activities, it is possible to specify which display to run on. Like switching when folding the device, when activity moves to the auxiliary display, it goes through context updates, window size changes, configuration, and resource changes, as shown in Figure 9.

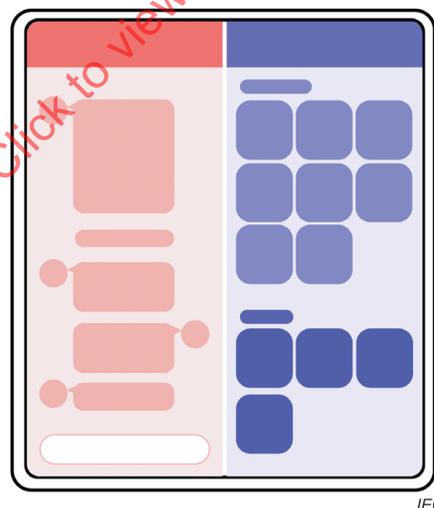


Figure 9 – Multi-window and content share

5.3 Multimedia services on swivel type SMD

There are two displays and they are overlapped. When the front display which is located on the top layer is rotated, it becomes a horizontal screen, and the auxiliary display below is shown. Using the display in front of the major screen, the user could watch the content or enjoy games. The auxiliary display below provides a configuration that allows the user to enter text or check submenus or other information.

Largely, various interactions between users and the SMD are possible with the swivel posture. Applications that allow users to watch content, such as video or OTT streaming applications on

the main display, and write comments at the same time on the auxiliary display. Also, when driving a car, the user could use map navigation and enjoy music applications at the same time on each screen. It is possible to use OTT and check related products' shopping or advertisement information. Figure 10 shows the screen configuration of applications to show information to each other.

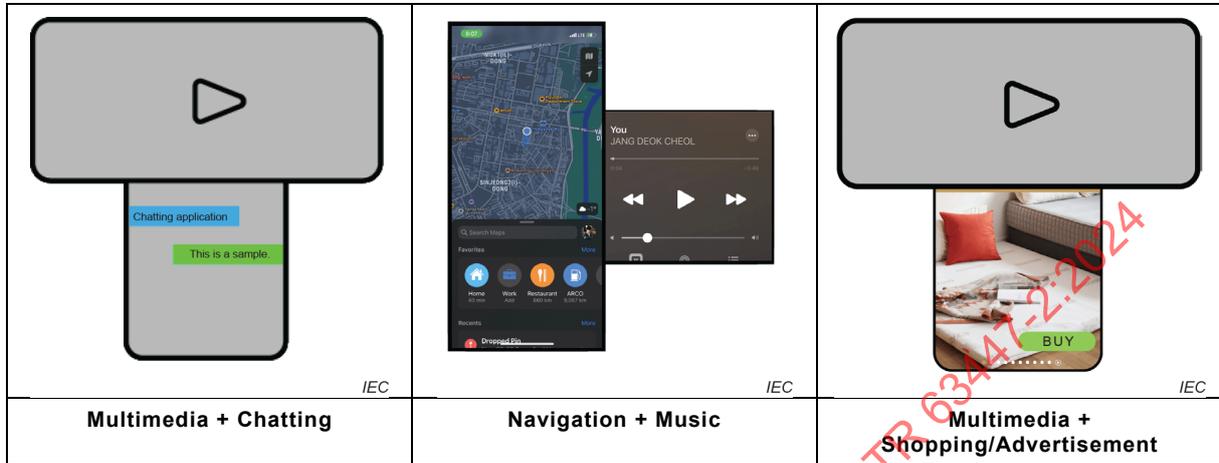


Figure 10 – Screen configuration of applications

To explain the related functions, the two displays are used as overlapping portrait mode configurations, and then the major first screen is turned on so that they can be used with auxiliary displays. At this time, the main display and the auxiliary display can be configured in various ways according to the application functions. Figure 11 is an example of the application configuration in which a photo is viewed on the main display and a photo album is displayed on an auxiliary display. When the main display is turned in the portrait direction again, the two displays overlap and switch to the default mode.

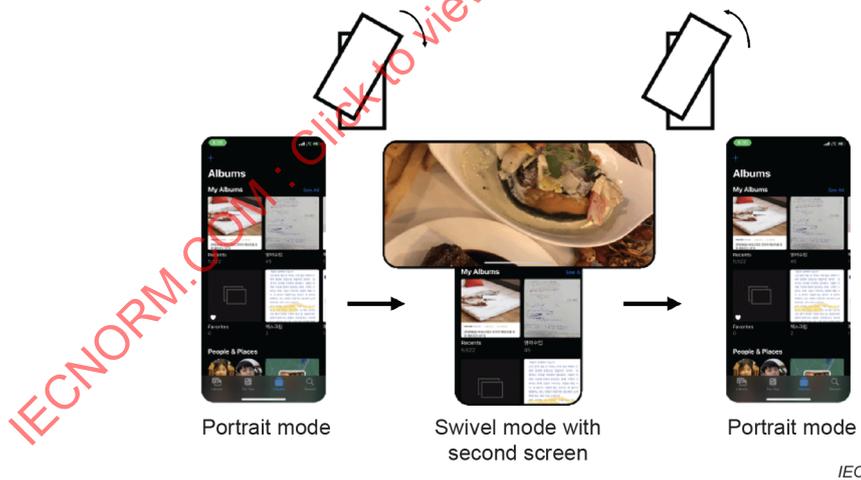


Figure 11 – Screen mode with second screen

Figure 12 illustrates implementing the application on the main display or the secondary (auxiliary) display.

Figure 12 shows that when the application is running on the main screen in swivel mode, the application runs on the main display, and when the application is running on the secondary screen, the secondary display application is activated.

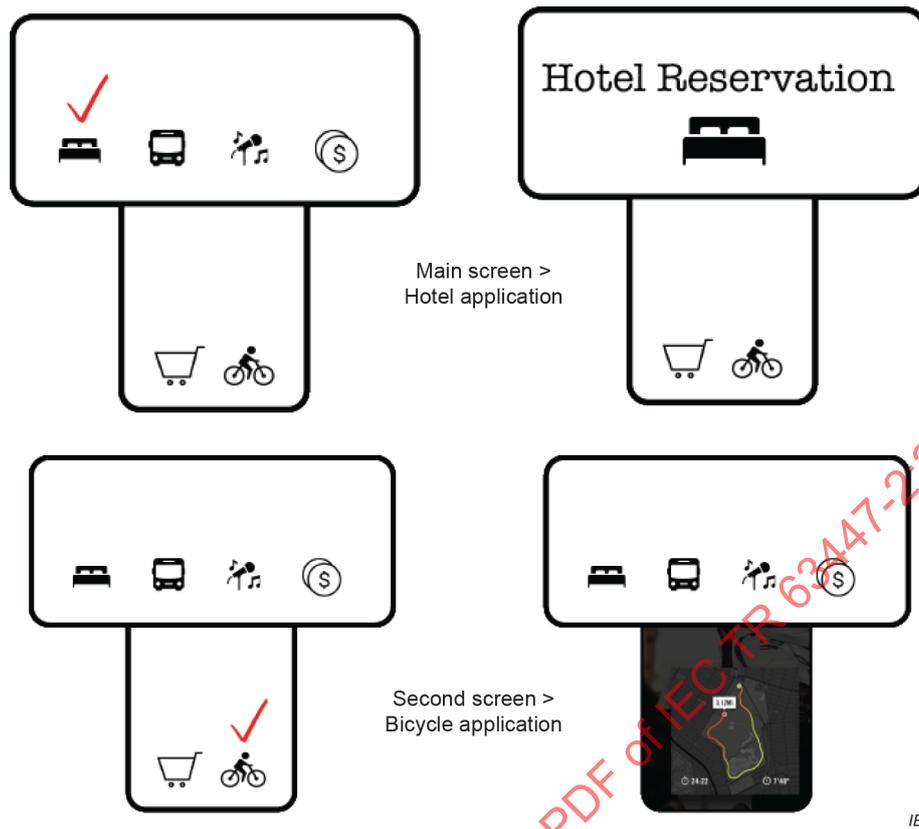


Figure 12 – Application position on two displays

When swivel mode is supported, the application is activated on the main display and the second (auxiliary) display as shown in Figure 13 (b), so that information can be expanded. It is easy to review the extra list. If swivel mode is not supported, the application is implemented on the main display in the default mode as shown in Figure 13 (a). In addition, in the case of an expandable application, all extended mode basic modes are supported.