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## Docking and Bridging Devices

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## **Docking and Bridging Devices**

### ABSTRACT

This disclosure describes core devices, like a phone, tablet, or other screen, and how they could be docked to a second device, like a speaker or charger, to take on a new role. This disclosure describes a system that offers more flexibility and allows users to benefit from different combinations of devices. The techniques allow an object to be docked to effectively create a new device, e.g., a tablet docking to a speaker would be like a home hub, and/or to alter their function, e.g., a phone can be placed in a stand or on a charging mat to default to a more passive role.

### KEYWORDS

- Docking device
- Bridge device
- Device constellation
- Near Field Communication (NFC)
- Smartphone
- Tablet
- Speaker
- WebSockets

### BACKGROUND

Different companies explore device versatility. Tablets have been pitched as laptop substitutes or screens can be paired to speakers so they can work together. But other examples fail to allow true flexibility: only select devices work together and they often require extended software settings. For example, while a stylus or keyboard might connect seamlessly to a tablet, it often ends there; the same tablet cannot be used as a screen for another device.

A more mix-and-match friendly portfolio could allow displays in particular to be used interchangeably, supported by a series of docks, which are called “bridge devices” because they serve as a sort of bridge between combinations.

This system uses hardware as a cue for software. Transitions are seamless – placement on a dock is a signal to connect. While a few devices might have similar one-off examples, e.g., pairing a stylus to a tablet, it has not been done system-wide, and therefore has never allowed such ease and flexibility.

In practice, near field communications (NFC) can be utilized to allow a device to know when it is close enough to another device to trigger a change in its expression. An NFC tag embedded in one device allows another device with an NFC tag reader to know when it has been docked onto that first device. A communication channel is also opened up between the devices via Bluetooth or WebSockets to allow the devices to share their relative intents with each other. By coordinating tag IDs, user contexts, times of day, and inter-device communication, appropriate actions can be orchestrated that the given devices can exhibit across various docking scenarios.

## DESCRIPTION

This disclosure describes techniques for signaling a change in a device constellation based on docking and undocking of one or more devices within the device constellation. FIG. 1A illustrates an example of a device (100) in a docked state. FIG. 1B illustrates an example of that same device (100) in an undocked state. FIG. 1C illustrates another example of that same device (100) in a different docked state.



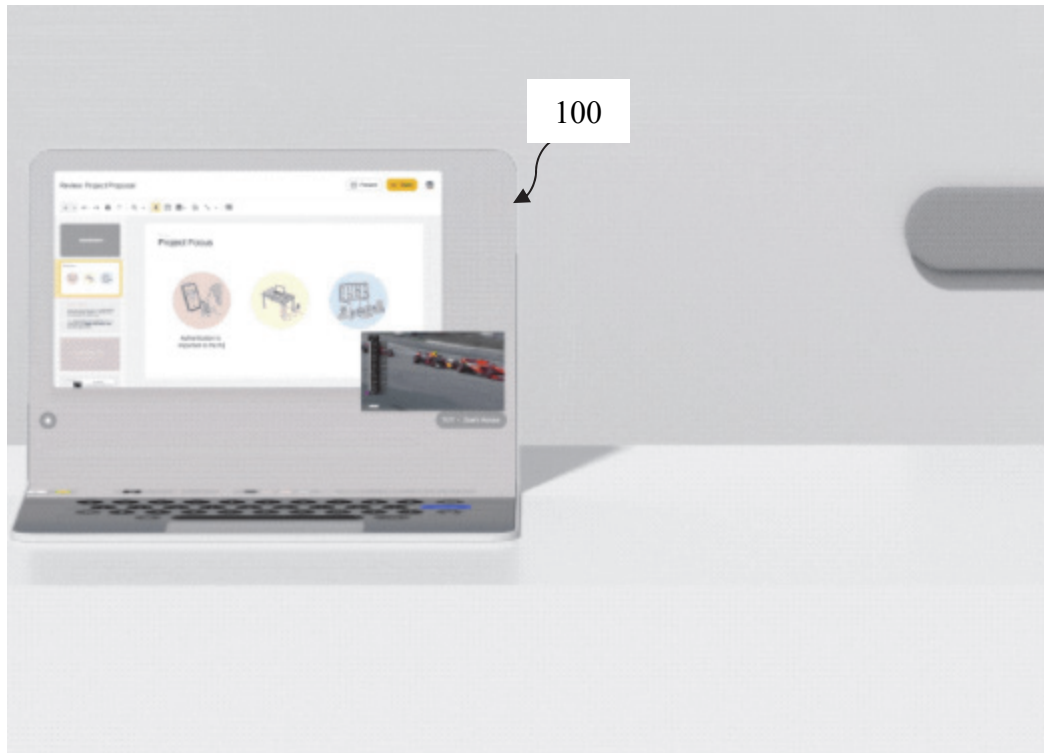
**FIG. 1A**

As can be seen in FIG. 1A, device 100 is docked and is being operated in a full screen mode. That is, the application, in this case a video game, is utilizing the entire screen of the device. In various examples, the device may be a tablet, a smartphone, or some other device for which a screen is the primary component. In some examples, the dock may be a charging pad, a stand, or some other simple docking device. In other examples, the dock may be a speaker or some other multi-purpose docking device. In these other examples, device 100 may utilize a speaker dock for sound output.



**FIG. 1B**

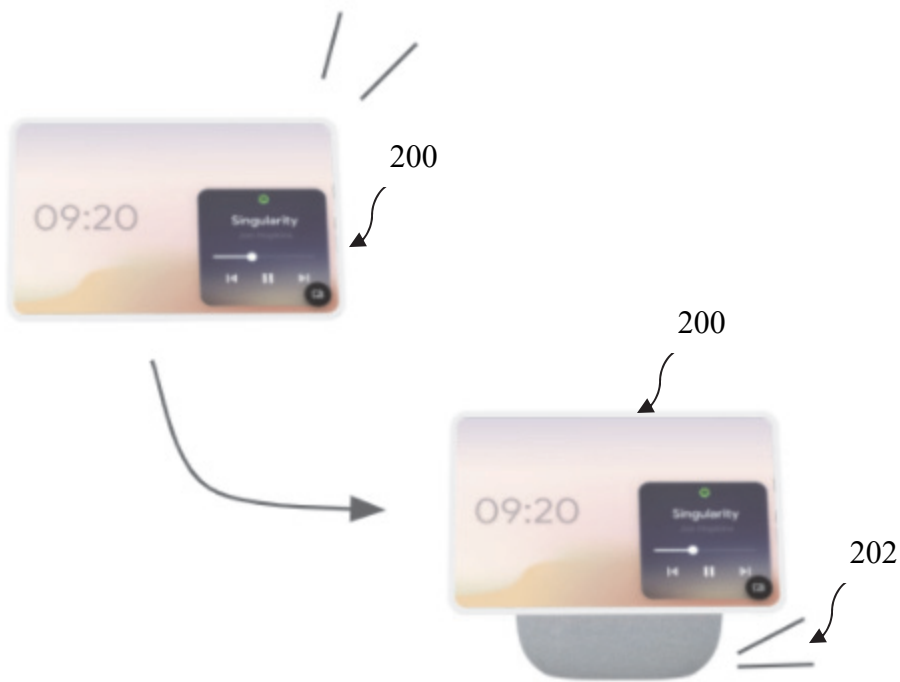
As can be seen in FIG. 1B, the device 100 is in an undocked state. In this undocked state, device 100 maintains a different operating mode. For example, the application previously operating in full screen mode may now only be utilizing a portion of the screen.



**FIG. 1C**

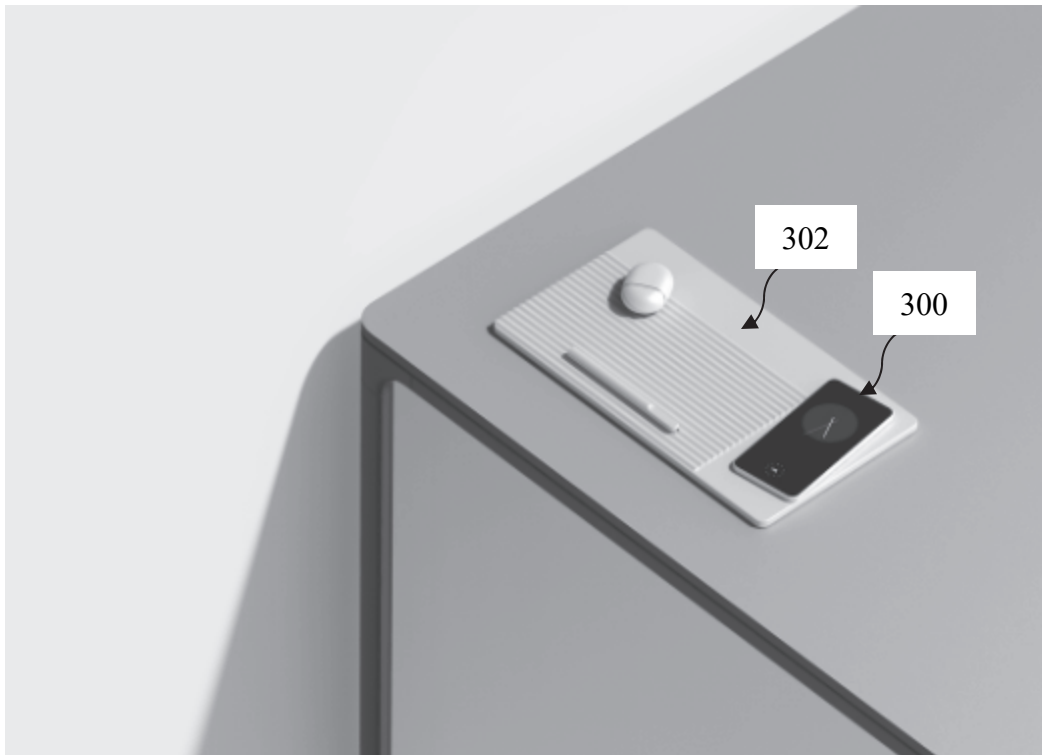
As can be seen in FIG. 1C, device 100 is again in a docked state. However, the docking device in this example is a keyboard. In this docked state, the device constellation of device 100 and the keyboard dock begin operating in a combined fashion, such as that of a laptop. For example, the application previously operating in full screen mode is now operating in a picture in picture mode while one or more other applications may also be operating.

When a device is docked or undocked, active windows can be rearranged or scaled to suit activity. For example, a current window/activity can go full screen when docked to support use at varied distances. When undocked, a current window/activity can go to picture-in-picture to support changes in activity and more direct, touch-based interaction.



**FIG. 2**

FIG. 2 illustrates an example of a device 200 and a dock 202. In FIG. 2, device 200 utilizes an internal speaker for sound output when device 200 is undocked. However, when device 200 is docked with dock 202, sound output utilizes the speaker of dock 202. For example, a tablet playing music may be using its local speakers. But when the tablet is docked to a speaker, the tablet could automatically transition the audio to the better speaker.



**FIG. 3**

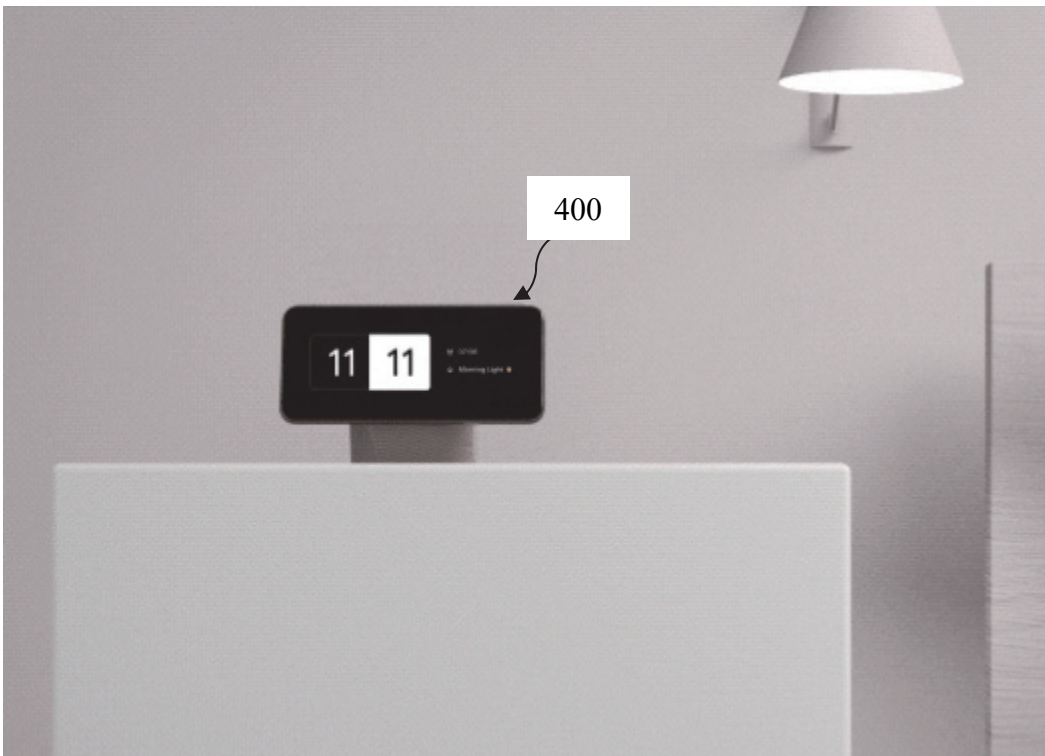
FIG. 3 illustrates an example of a device 300 on a dock 302. In the example of FIG. 3, device 300 is a smartphone and dock 302 is a charging pad. If device 300 is not being actively used or left in a bridge device (e.g., a charging mat, docked to a speaker, etc.) such as dock 302, the device can slowly transition into a passive mode. The device can still display ambient information, but is better suited toward passive, glanceable use instead of active use.

FIGs. 4A-4B illustrate an example of a device 400 for which typical behaviors and/or routines may be recorded and for which a “memory” may be generated and maintained. As shown in FIG. 4A, when device 400 is placed in a particular orientation on a dock (e.g., a bridge device) near another device, such as a laptop or computer, device 400 may be configured to operate in conjunction with the other device. For example, device 400 can be configured to show notes, a calendar, and/or some other ancillary or auxiliary information.





**FIG. 4A**



**FIG. 4B**

As shown in FIG. 4B, when device 400 is placed in a different orientation, device 400 can be configured to operate in a different fashion. For example, a phone may typically be used as an alarm clock when placed on a bedside dock in a landscape orientation. In this example, when device 400 is placed on the bedside dock, device 400 can automatically transition into the alarm clock role without additional user input need.

## CONCLUSION

This disclosure describes an approach for changing a mode of operation and/or a device configuration when a device transitions to/from a docked position. Such change in operation and/or configuration can occur automatically and in coordination or cooperation with a dock to which the device is being docked/undocked as well as one or more other devices docked to the same dock. This disclosure describes a bridge device to which multiple devices can be docked to form a device constellation. Such device constellation can create a unified mode of operation and/or device configurations for the various devices docked to the bridge device.