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June 2020

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Recommended Citation

Anonymous, "Seamless Remote Controller Software Update for Smart Display", Technical Disclosure Commons, (June 15, 2020)

https://www.tdcommons.org/dpubs_series/3331



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Seamless Remote Controller Software Update for Smart Display

ABSTRACT

This disclosure describes seamless firmware updates for a remote controller associated with a display device, such as a smart display or smart television. When a firmware update is available, a controller software update sequence is initiated. It is determined whether the display device is in use, and if it is not in use, the remote controller firmware is updated as a background process without turning on a screen of the display device. Otherwise, the firmware update is not attempted and the controller software update sequence is initiated at a subsequent time. The update can be performed if a current time matches a predetermined time window associated with low likelihood of device use or if a threshold time has elapsed since the display device was turned off. Upon successful completion of the update, the system reverts to its previous state before the update sequence was initiated.

KEYWORDS

- firmware update
- smart display
- smart television
- remote control
- remote clicker
- software update
- television remote
- universal remote

BACKGROUND

Display devices such as smart displays, televisions, etc. are commonly operated by users via remote controllers. Firmware utilized in the remote controllers needs to be periodically updated by the device manufacturer or a service provider, e.g., to enhance device security, to upgrade and/or add features, implement bug fixes, etc. A remote controller firmware (software) update process that is non-disruptive to the user can enhance the user experience.

DESCRIPTION

This disclosure describes techniques for a seamless firmware (software) update for a remote controller associated with a display device. The display device can be a smart display or smart television, e.g., that includes audio/video calling software, virtual assistant software, media playback capabilities, etc. The display device may include a screen or may be coupled to a screen (e.g., TV) that is powered separately. Per techniques of this disclosure, the update (upgrade) for the remote controller is performed in the background, when the display device is not in active use, such that the update is performed without disruption to user activities via the display device.

Fig. 1 depicts two options of an example firmware upgrade workflow for a display device remote controller, per techniques of this disclosure.

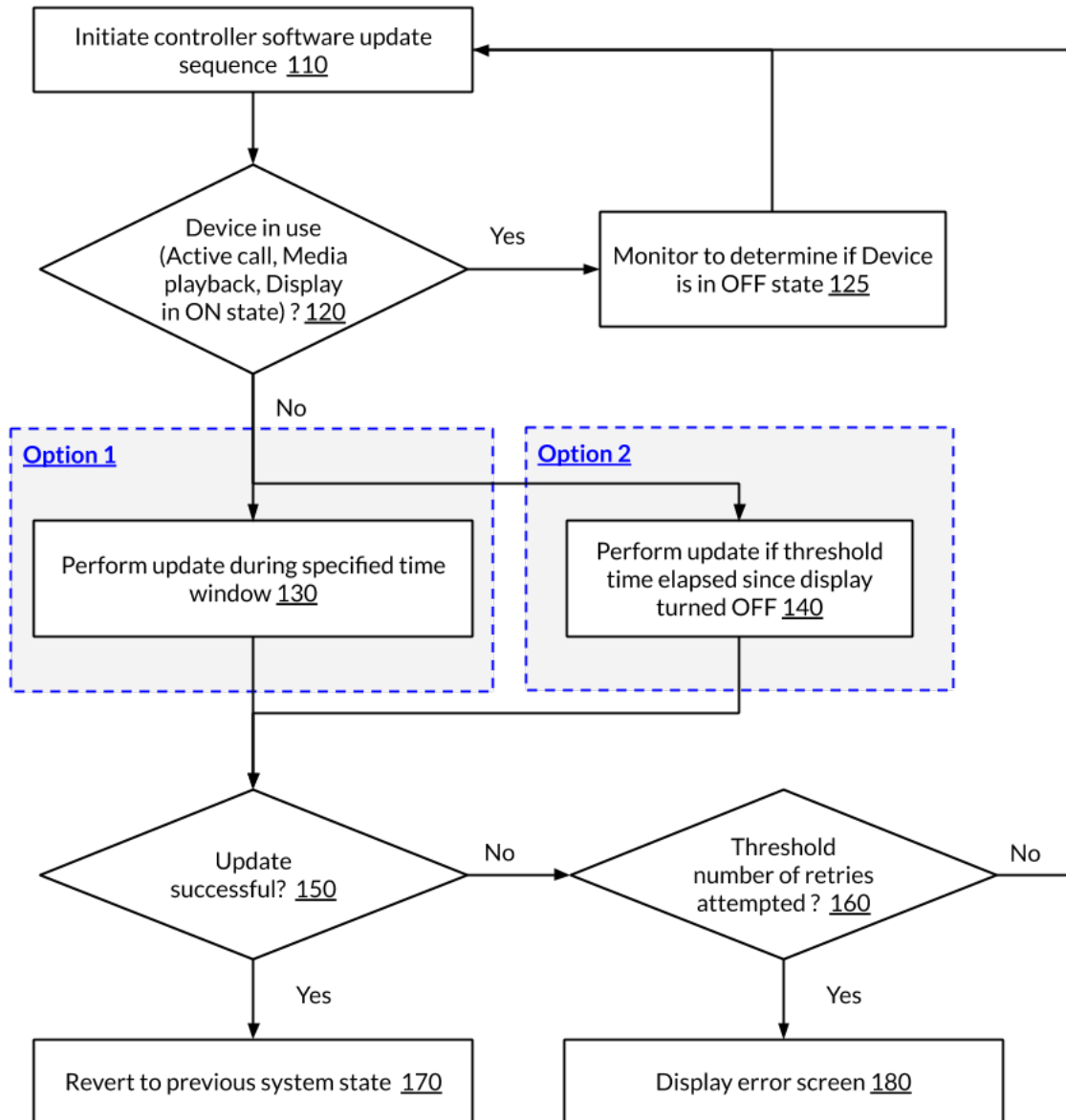


Fig. 1: Firmware update performed in the background

When a firmware update is available, a controller software update sequence is initiated (110), at a time when the remote controller is connected to the display device. It is determined (120) whether the device is in use, e.g. whether the device is in an active call state, whether a virtual assistant application provided via the display device is in use, whether the device is being utilized to play media, whether the screen of the display device is in an ON state, etc.

If it is determined that the display device is in use, the firmware update is not attempted. Instead, device signals and triggers are monitored to determine if the display device is no longer in use (125), and the controller software update sequence is initiated at a subsequent time, when it is determined that the display device is in OFF state. If it is determined that the display device is not in use, the remote controller firmware is updated as a background process without activating the screen of the display device. If the user happens to turn on the display device during the update (e.g., using a different remote controller or other mechanism), a user interface is displayed to the user that is indicative of the progress of the update.

According to a first option, the update is performed if a current time matches a predetermined time window (130) that is associated with a relatively low likelihood of device use, e.g., 2 am to 4 am. The time window is configurable, e.g. by the display device manufacturer, a service provider associated with the display device, the user, etc.

According to a second option, the update is performed if a predetermined threshold time has elapsed since the display of the display device has been turned off (140). The time window is configurable and utilized to confirm that the device has not been in use for at least the predetermined threshold time interval. This can avoid a situation where an update is initiated where a user switches the device off and switches the device back on right away, while the update is in progress.

Upon completion, it is verified if the firmware update is successful (150). If the update was successful, the update sequence is deemed complete, and the system reverts to its previous state (160) before the update sequence was initiated. If the update is unsuccessful, it is determined if a threshold number of retries have already been attempted (160). If the threshold number of retries have not been attempted, the controller sequence update is retried. If a

threshold number of retries have already been attempted, an error/support message is displayed (170) that provides information about the error, contact information for support, etc. In order to not disturb the user, the display screen is not activated until the user switches on the display device.

Example use cases

- ***Failure of firmware update:*** When a user tries to use the display device after a failed update for the remote controller, the remote controller may not function as expected. If the user switches on the display using some other mechanism, e.g. by utilizing a different remote controller, an error message is displayed regarding the failed update. If the display device is rebooted by the user, the remote controller firmware update is initiated automatically.
- ***Display device use during firmware update:*** A user can attempt to switch on the display device using the remote controller while the update is in progress. The remote controller is disabled during the update, and is in an unresponsive state. If the user removes the remote controller batteries, the update is interrupted (due to lack of power to the remote controller), and resumes when the batteries are reinserted. If the display device is switched on using another mechanism, an ‘update in progress’ user interface is displayed.
- ***Suitable time for firmware update not available:*** In some scenarios, it may be difficult or impossible to identify a suitable time window for update. For example, the user may utilize the display device during the predetermined time window (Option 1), the display may not proceed to an off state due to an app being open, the user may place the remote controller at a distance from the display device that causes the remote controller to not be connected to the display device, etc. To handle such scenarios, a timeout period can be specified for a background firmware update. Upon expiration of the timeout period, a foreground firmware

update is attempted. The foreground firmware update is attempted at a suitable time, e.g., when no active call in progress, no media playback is in progress on the display device, the virtual assistant is not in use, and no other application is in use. The user is prompted to update the remote controller via a dialog displayed on the display device. The dialog can be configured to be non-dismissible, thereby ensuring that the remote controller firmware is updated.

CONCLUSION

This disclosure describes seamless firmware updates for a remote controller associated with a display device, such as a smart display or smart television. When a firmware update is available, a controller software update sequence is initiated. It is determined whether the display device is in use, and if it is not in use, the remote controller firmware is updated as a background process without turning on a screen of the display device. Otherwise, the firmware update is not attempted and the controller software update sequence is initiated at a subsequent time. The update can be performed if a current time matches a predetermined time window associated with low likelihood of device use or if a threshold time has elapsed since the display device was turned off. Upon successful completion of the update, the system reverts to its previous state before the update sequence was initiated.