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## Multi Stream Video Display With Automatic Prominence Switching

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## **Multi Stream Video Display With Automatic Prominence Switching**

### **ABSTRACT**

Viewing or managing multiple video streams, e.g., live streams from a video game, on a mobile device with a relatively small display can lead to fatigue. This disclosure describes a multi-screen mode for live streaming applications that include multiple video streams in which one of the streams is automatically selected and made prominent, e.g., displayed at a larger size relative to the other streams. Automatic stream selection can be based, e.g., on the relative amounts of video or audio activity in each stream.

### **KEYWORDS**

- Live streaming
- Game streaming
- Streaming video
- Video saliency
- Video conferencing
- Split screen

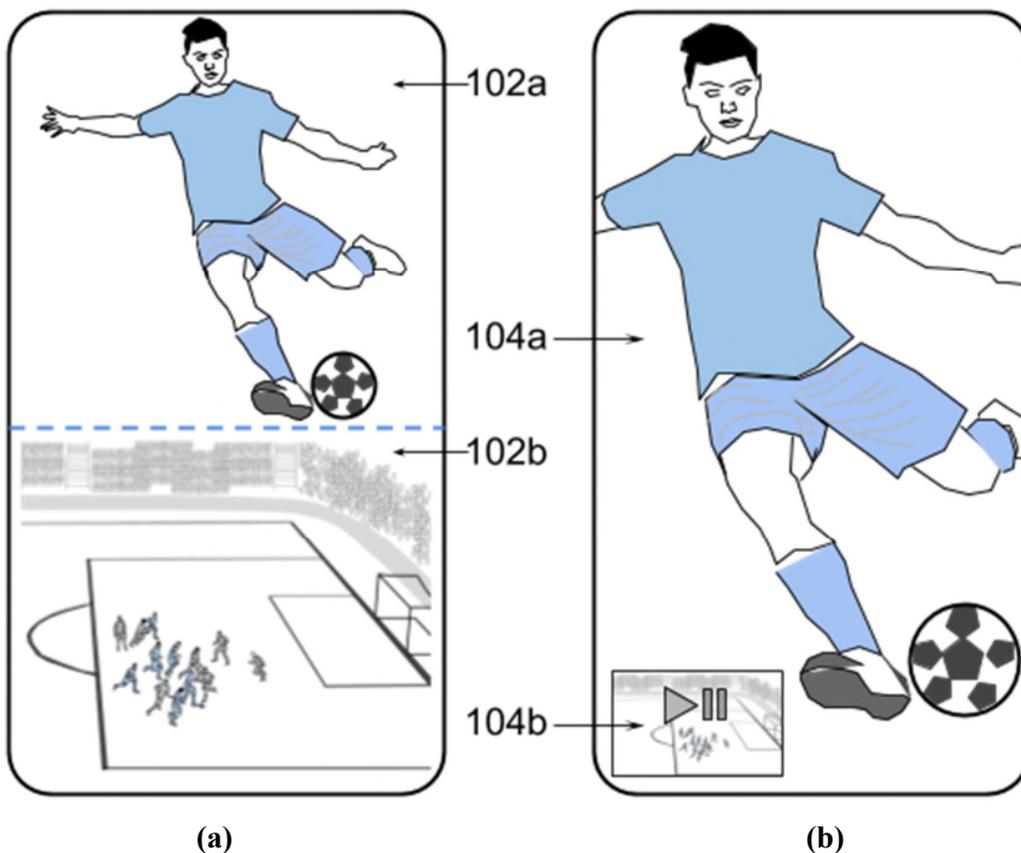
### **BACKGROUND**

There are several applications for multi-screen, live streaming video, e.g., video games with perspectives from multiple players or angles; video sharing; multi-participant video conferencing; etc. Multiplayer, live streaming video games are of increasing popularity, with a substantial fan base.

Viewing or managing multiple video streams or channels on a mobile device with a relatively small display such as a smartphone can lead to fatigue. For example, in the gaming context, a user that is streaming their screen often views streams from other users simultaneously

streaming their video. The user may want to go to these other streams and interact. This is difficult on a small screen; besides, changing between streams causes a loss of context.

DESCRIPTION



**Fig. 1: Optimized multi-screen live streaming**

This disclosure describes a multi-screen, e.g., dual-screen, mode for live streaming applications that automatically selects one of the streams to be made prominent. Fig. 1 illustrates an example of a multi-person, multi-view video game. Initially, in Fig. 1(a), two perspectives of an ongoing game are equally represented. For example, the multiple streams (102a-b) can be side-by-side (not shown) or one above the other, e.g., as shown in Fig. 1(a) where the top stream 102a is a close-up view of a soccer player character in the game, while the bottom stream 102b is

a wider view of the soccer field. As illustrated in Fig. 1(b), based on the activity within the content of each stream, one of the streams is automatically made prominent, e.g., maximized (104a), while the other(s) are made less prominent, e.g., minimized (104b). While Fig. 1(a) shows two streams, any number of streams can be included in the live stream and a particular stream can be made prominent.

Per the techniques of this disclosure, the stream that is automatically given prominence, e.g., enlarged, can be the one with the most video and/or audio activity. Video activity can be assessed in a variety of ways, e.g., the amount of lip movement, body movement, change in features, scene brightness, etc. Audio activity can be assessed in a variety of ways, e.g., substantial changes in audio energy, spectral content, etc. Comments or live chats that accompany live streams can also be automatically switched between streams based on the prominence or activity of the streams and/or their comments.

The user can override the relative prominences automatically assigned to each stream. For example, the user can select or deselect a user interface feature such as a button to switch between streams or channels and their comments or chats. If a user is streaming another user's activity, an option can be provided to enable the user's audio along with the other user's stream. Options can be provided to enable the user to close or restart the multi-screen session. In this manner, a user can engage with one or more related streams originating from other users or sources while remaining connected to their own stream.

## CONCLUSION

This disclosure describes a multi-screen mode for live streaming applications that include multiple video streams in which one of the streams is automatically selected and made

prominent, e.g., displayed at a larger size relative to the other streams. Automatic stream selection can be based, e.g., on the relative amounts of video or audio activity in each stream.

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