

# Flexible user interface distribution for ubiquitous multi-device interaction

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Research Group of Professor Insik Shin. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

KAIST researchers have developed mobile software platform technology that allows a mobile application (app) to be executed simultaneously and

more dynamically on multiple smart devices. Its high flexibility and broad applicability can help accelerate a shift from the current single-device paradigm to a multiple one, which enables users to utilize mobile apps in ways previously unthinkable.

Recent trends in mobile and IoT technologies in this era of 5G high-speed wireless communication have been hallmarked by the emergence of new display hardware and [smart devices](#) such as dual screens, foldable screens, smart watches, smart TVs, and smart cars. However, the current mobile app ecosystem is still confined to the conventional single-device paradigm in which users can employ only one screen on one device at a time. Due to this limitation, the real potential of multi-device environments has not been fully explored.

A KAIST research team led by Professor Insik Shin from the School of Computing, in collaboration with Professor Steve Ko's group from the State University of New York at Buffalo, has developed mobile software platform technology named FLUID that can flexibly distribute the user interfaces (UIs) of an app to a number of other devices in real time without needing any modifications. The proposed technology provides single-device virtualization, and ensures that the interactions between the distributed UI elements across multiple devices remain intact.

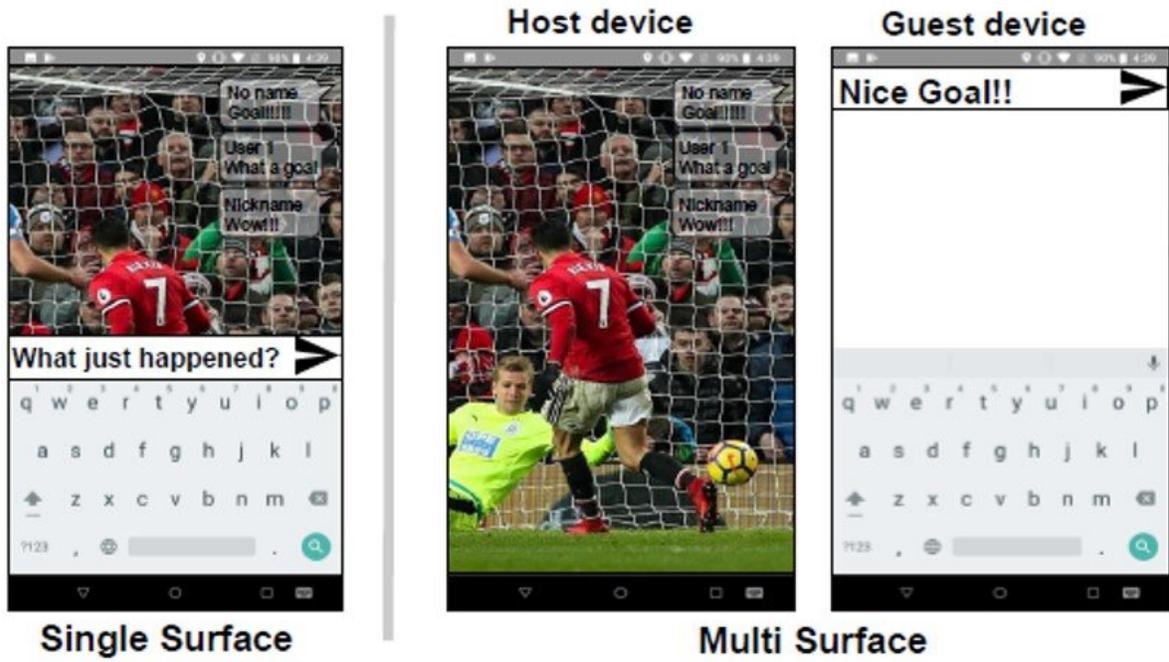


Figure 1. Live video streaming and chatting app scenario. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

This flexible multimodal interaction can be realized in diverse ubiquitous user experiences (UX), such as using live video steaming and chatting apps including YouTube, LiveMe, and AfreecaTV. FLUID can ensure that the video is not obscured by the chat window by distributing and displaying them separately on different devices respectively, which lets users enjoy the chat function while watching the video at the same time.

In addition, the UI for the destination input on a navigation app can be migrated into the passenger's device with the help of FLUID, so that the destination can be easily and safely entered by the passenger while the driver is at the wheel.

FLUID can also support 5G multi-view apps—the latest service that allows sports or games to be viewed from various angles on a single [device](#). With FLUID, the user can watch the event simultaneously from different viewpoints on multiple devices without switching between viewpoints on a single screen.



Figure 2. Navigation app scenario. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

Ph.D. candidate Sangeun Oh, who is the first author, and his team implemented the prototype of FLUID on the leading open-source mobile operating system, Android, and confirmed that it can successfully deliver the new UX to 20 existing legacy apps.

"This new technology can be applied to next-generation products from South Korean companies such as LG's dual screen phone and Samsung's foldable phone and is expected to embolden their competitiveness by giving them a head-start in the global market." said Professor Shin.

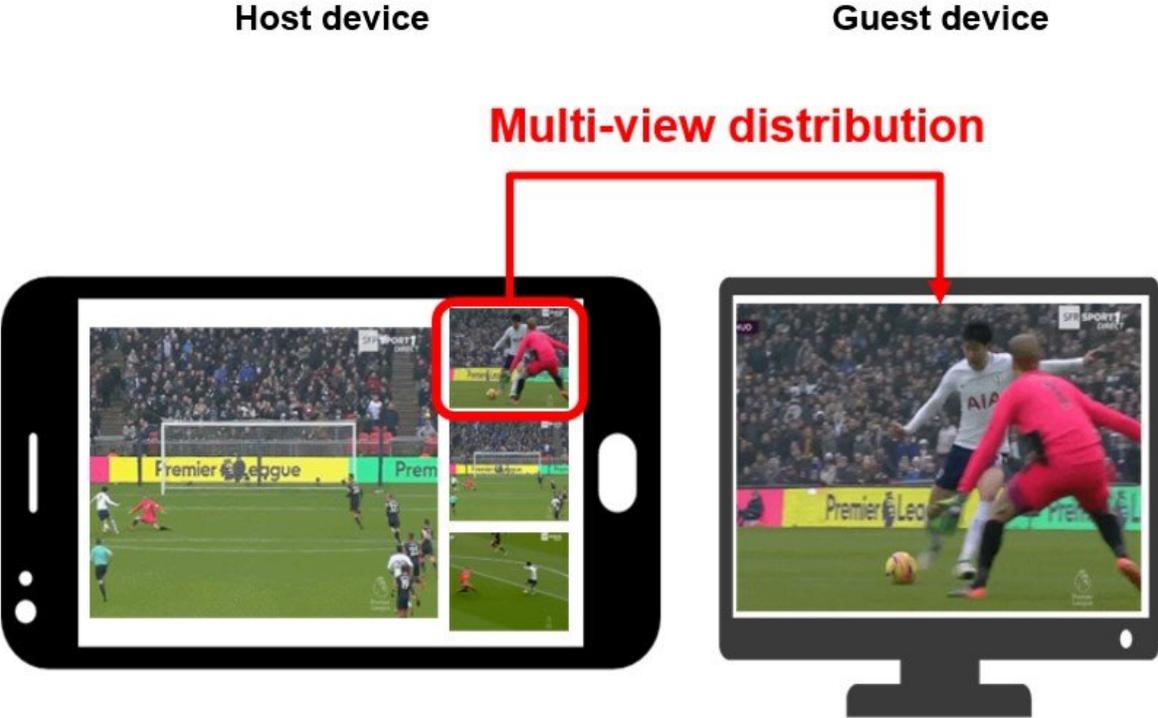


Figure 3. 5G multi-view app scenario. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

**More information:** FLUID: Flexible User Interface Distribution for Ubiquitous Multi-device Interaction. To be published in Proceedings of the 25th Annual International Conference on Mobile Computing and Networking (ACM MobiCom 2019). ACM, New York, NY, USA

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