

# FaceDirector software generates desired performances in post-production, avoiding reshoots

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Some film directors are famous for demanding that scenes be shot and re-shot repeatedly until actors express just the right emotion at the right time, but directors will be able to fine-tune performances in post-production, rather than on the film set, with a new system developed by Disney Research and the University of Surrey.

Called FaceDirector, the system enables a director to seamlessly blend [facial images](#) from a couple of video takes to achieve the desired effect.

"It's not unheard of for a director to re-shoot a crucial scene dozens of times, even 100 or more times, until satisfied," said Markus Gross, vice president of research at Disney Research. "That not only takes a lot of

time - it also can be quite expensive. Now our research team has shown that a director can exert control over an actor's performance after the shoot with just a few takes, saving both time and money."

Jean-Charles Bazin, associate research scientist at Disney Research, and Charles Malleson, a Ph.D. student at the University of Surrey's Centre for Vision, Speech and Signal Processing, showed that FaceDirector is able to create a variety of novel, visually plausible versions of performances of actors in close-up and mid-range shots.

Moreover, the system works with normal 2D video input acquired by standard cameras, without the need for additional hardware or 3D face reconstruction.

The researchers will present their findings at ICCV 2015, the International Conference on Computer Vision, Dec. 11-18, in Santiago, Chile.

"The central challenge for combining an actor's performances from separate takes is video synchronization," Bazin said. "But differences in head pose, emotion, expression intensity, as well as pitch accentuation and even the wording of the speech, are just a few of many difficulties in syncing video takes."

Bazin, Malleson and the rest of the team solved this problem by developing an automatic means of analyzing both [facial expressions](#) and audio cues. It then identifies frames that correspond between the takes using a graph-based framework.

"To the best of our knowledge, our work is the first to combine audio and [facial features](#) for achieving an optimal nonlinear, temporal alignment of facial performance videos," Malleson said.

Once this synchronization has occurred, the system enables a director to control the performance by choosing the desired facial expressions and timing from either video, which are then blended together using facial landmarks, optical flow and compositing.

To test the system, actors performed several lines of dialog, repeating the performances to convey different emotions - happiness, sadness, excitement, fear, anger, etc. The line readings were captured in HD resolution using standard compact cameras. The researchers were able to synchronize the videos in real-time and automatically on a standard desktop computer. Users could generate novel versions of the performances by interactively blending the video takes.

The researchers showed additional results of FaceDirector for different applications: generation of multiple performances from a sparse set of input video takes in the context of nonlinear [video](#) storytelling, script correction and editing, and voice exchange between emotions (for example to create an entertaining performance with a sad voice over a happy face).

**More information:** "FaceDirector- Continuous Control of Facial Performance in Video-Paper" [[PDF](#), 13.22 MB]

Provided by Disney Research

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