# THE HUMAN RACE

Real-Time Live!

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themill.com/portfolio/3516/the-human-race
The Mill



The Mill and Epic present "The Human Race", an interactive film made possible by real-time VFX, blurring the line between production and post. Powered by an advanced implementation of UE4, Mill Cyclops, and Mill BLACKBIRD, it revolutionizes the conventions of digital filmmaking by rendering and compositing final pixels in real time. These technologies were combined to push beyond the limits of existing real-time rendering capabilities, producing a futuristic film that features a Chevrolet Camaro racing a Chevrolet FNR concept car.

Until now, CG cars were added by VFX artists in post-production, requiring days of rendering to produce high-quality imagery. The only vehicle filmed for "The Human Race" was The Mill BLACKBIRD, a fully adjustable rig that enables filmmakers to insert almost any car into any filmed environment. During the shoot, live video feeds and positional data from the Array tracking system were fed directly into Unreal Engine. The Camaro was then rendered and composited seamlessly into the footage in real-time AR, allowing the directors to instantly see the final look and composition of each shot. The same real-time technology was used to create, alter, and produce the short film.

Pushing the use of game engines beyond on-set visualization, this is a truly interactive film, viewed through the Unreal Engine as it renders and composites the final sequence in real time. With pre-rendered methods, the film would need to be finished over 300 times to match the given configuration options. With the Unreal Engine, the film is rendered on the fly, allowing for any number of configurations without affecting render count. The ability to create "final pixels" in real time will ultimately change the way filmmakers create scenes and make critical decisions, as well as alter the viewer experience.

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