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How F1 Drivers Might Control Cars With Their Brains

Imagining a future where thought controls a car moving very, very fast.



By Eric Tegler Feb 4, 2016

65



The McLaren MP4-X Concept Car.

What does the future of Formula 1 look like? Teams like Red Bull Racing and McLaren are already imagining it. Their ideas range from near-term possibilities like closed-cockpit F1 cars and F-35-like helmet-mounted information displays to further-flung ideas like nanotechnology-enabled self-repairing chassis, dynamically configurable tires. The final frontier, naturally, is fully autonomous race cars.

But you can't take humans out of the cockpit says Sam Collins, deputy editor of *Racecar Engineering*, a UK-based motorsports publication. Collins, who has written a series of articles on racing's future, adds there'd be little interest in racing without people in the cars—and in danger.

"You have to have the human in the equation. It's so important and we've got to lose a few," says Collins. "Look at the popularity of NASCAR, the race after Dale Earnhardt died. Look at the popularity of Formula 1 after Ayrton Senna died. People want to see derring-do. Death in motor racing should certainly not be encouraged, but there should always be the specter of death. The perception of danger is very important."

Drivers risking life and limb are pivotal, a point not lost of F1 futurists who posit a slew of ways to "improve the human" to cope with the higher speeds and quicker action technology will add to racing. One idea is to harness the capabilities of the driver's brain directly.

Adjusting things like brake bias or engine mode on an F1 car could be done via what is known as a "brain computer interface" Collins explains. He points out a [project at the Freie Universität Berlin in Germany in Germany](#) developed a semi-autonomous vehicle which allowed impulses from the brain to control some elements of a vehicle's operation.

The project worked by translating electromagnetic signals within a test subject's brain into patterns that could be recognized by computer software. The subject wore a cap with 16 sensors that transmitted neural signals. Software was progressively trained to recognize when a subject was

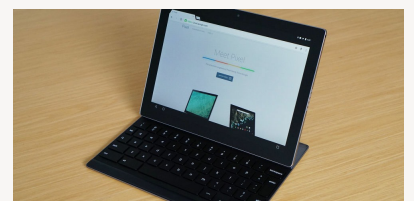


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thinking "left" or "right." Wearing the cap, the test subject took the driver's seat in a semi-autonomous vehicle and directed it by "thinking" left or right, essentially instructing the car's driving software and sensors to follow through.

The experiment was limited, but demonstrated that drivers could potentially think an action and it would be executed. Using brain implants, they might also be able to communicate telepathically with their teams while battling on track, relaying seat-of-the-pants data to engineers without speaking a word.

The legendary McLaren Formula team advanced this idea as part the futuristic MP4-X concept car it released last December. According to the [press release put out by McLaren](#), "the most exciting feature of the MP4-X is how the car connects to the driver's brain. McLaren Applied Technologie, which built the concept, is calling this feature 'cognitive human-machine interface, gesture control and brain synaptic control'".

A practical scenario McLaren sees arising from a human-machine interface could be the ability for team engineers to detect very early when a driver is struggling with tires by comparing known brain activity when tires are new and grip high to the driver's level of mental activity/energy when grip progressively begins to fade. Accounting for detectable differences would theoretically allow the pitwall to sense tire degradation even before a driver communicated it verbally.

Others have raised more outlandish ideas. In 2014, British futurist Dr. Ian Pearson suggested that onboard cameras might become obsolete as TV producers could tap directly into the driver's eyes. Viewers could see exactly what a driver sees through his own eyes.

It all sounds incredible and potentially fascinating. But as with all technology, things might not go so smoothly.

Sam Collins believes how effective driver-computer interface would be would vary wildly depending on the human using it. "It would take a particularly special driver," says Collins. "I don't think you'd find Lewis Hamilton able to do that but you'd find Fernando Alonso able to do it. It might change the type of driver who is successful or reward different drivers. It's not a straightforward thing."

But if the technology to make such an interface possible exists, it may well be inevitable. Says Collins: "It all sounds like something from *Minority Report*, but it's real technology now."

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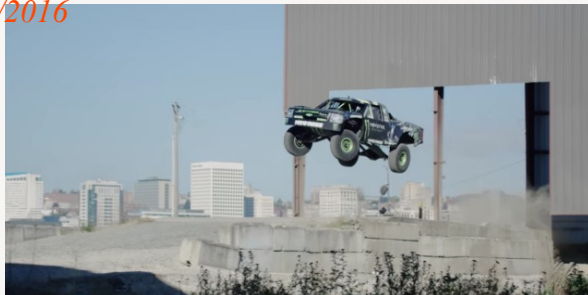
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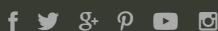
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