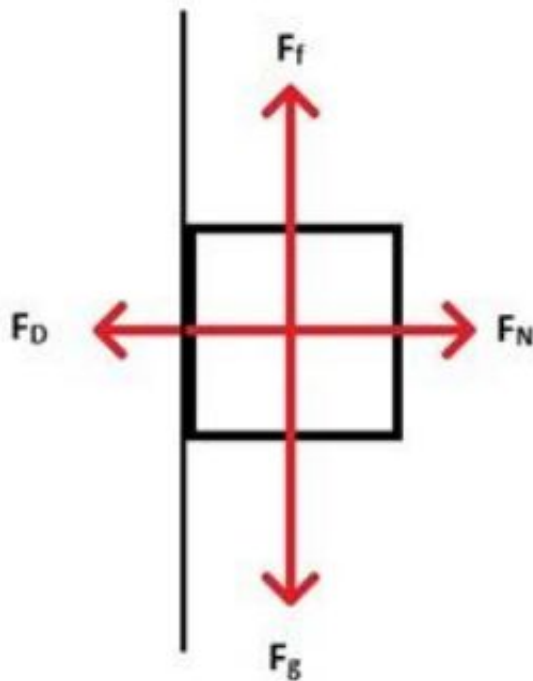


Racing cars on walls would be possible, according to student paper

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A free-body diagram showing forces acting on the centre-of-mass of a vehicle travelling on a vertically banked track. Credit: University of Leicester

Driving a racing car at an angle of 90 degrees to the ground could be possible with the right track design, suggest University of Leicester students

There can't be many petrol heads who haven't wondered whether it

would be possible to drive their [car](#) along vertical walls. It would certainly help with cutting out traffic jams.

Worryingly, it seems the boy racer's pipe dream might be possible, according to University of Leicester physics students.

But Top Gear fanatics should think twice before trying this at home; it would only work with a very specific racing track and a very well-designed car. Chances are, whatever you drive to work won't cut it.

A group of four MPhys physics students have worked out that a [racing car](#) travelling at over 150 miles per hour would be able to stick to the walls of a completely circular speedway track with 90 degree banks.

The reason? At those speeds, the force of gravity acting on a racing car would be less than the frictional force holding the car on the wall.

The students published their findings in a final year paper for the *Journal of Physics Special Topics*, a peer-reviewed student journal run by the University's Department of Physics and Astronomy.

They wanted to investigate this because it has been previously shown that speedway cars actually travel at their fastest around the steep bends of speedway tracks.

The group chose to look at two different vehicles – an open wheeled Penske-Reynard-Honda racing car and an Audi TT road car – to compare how different car shapes and characteristics would affect their gravity-defying capabilities.

They then analysed the forces acting on each car if it was travelling around a completely circular speedway track at 90 degrees. It is important for the track to be circular, so as ensure a constant centripetal

force - the inward force of an object travelling in a circular path.

To work out whether the force of gravity on the car was less than or equal to the static friction force holding it on the wall, they needed to include a range of factors including the mass of the vehicle, the car's speed and its centripetal force.

Another key factor was the downforce – the force sucking the car into the wall on due to its aerodynamic properties. This was obviously a lot greater for the sleek, efficient sports car than the comparatively everyday-looking Audi.

They found that for an open wheeled racing car weighing around 700 kg, the force of gravity would be 8571N less than the frictional force, meaning the car would easily be able to stay on the vertical banking.

But for the 1,390 kg Audi, the force of gravity was around 6400N larger than the frictional force, meaning the car would tumble off the wall – presumably with grim consequences for both car and driver. So don't be tempted to give it a try next time you are stuck in traffic.

The students point out in the paper that vertical racing is unlikely to ever become a reality as "such a track would likely be both hugely expensive and very dangerous in the event of a crash".

"I wanted to look at what the limits are to the amount of downforce racing cars produce," said Ben Jordan, 21, from Bury St. Edmund, who came up with the idea for the paper.

"We looked at how the centripetal acceleration and the downward [force](#) work together to keep the racing car on the vertical wall.

"We wanted to compare the racing car with a normal road car, because it

illustrates the concept better. It makes you see how advanced the aerodynamics of racing cars are.

"I am quite a fan of Formula One – that probably inspired it," added Ben. "I don't think I would want to be driving the thing, but it would be great to watch."

Course tutor Dr Mervyn Roy, a lecturer in the University of Leicester's Department of Physics and Astronomy, said: "The aim of the module is for the students to learn about peer review and scientific publishing.

"The students are encouraged to be imaginative with their topics, and find ways to apply basic physics to the weird, the wonderful and the everyday."

More information: "Racing on the Edge" is available online: [physics.le.ac.uk/journals/inde ... article/view/629/432](https://physics.le.ac.uk/journals/index.php/physics/article/view/629/432)

Provided by University of Leicester

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