

Research Project

TILT CONTROL FOR A NARROW TRACK VEHICLE

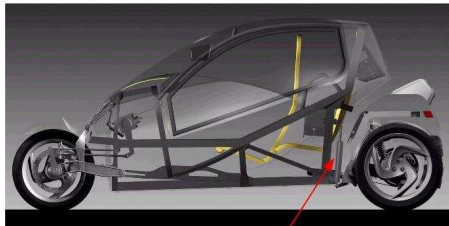


Motivation

The objective of the EU-funded CLEVER Project (Compact Low Emission VEHICLE for uRban transport) was the development of a novel two-seat city vehicle providing car-like levels of comfort, safety and convenience, but with the lower emissions and small road footprint of a motorcycle. A narrow three-wheeled tilting vehicle was identified as the best configuration for achieving these goals.

Vehicle handling: the challenge of active tilt control

When cornering, a narrow track vehicle can only resist a small roll moment. To overcome this limitation, the vehicle's centre of gravity is moved inwards during cornering by tilting the vehicle body in the same manner as a motorcycle. An active tilting system using hydraulic actuation has been employed, allowing for car-like controls and a balanced vehicle at all speeds.



Actuators positioned between front and rear frame

Five prototype vehicles were constructed. Initial testing revealed that while basic steady-state handling was good, transient response required improvement. Aggressive steering inputs could cause a rear wheel to lift, possibly leading to roll-over.

Future work

Work is on-going, through simulation and experimental testing, to improve the tilt control and hence cornering ability of the vehicle. The aim is to ensure the safety and stability of the vehicle in all driving scenarios and road conditions. The integration of the active tilt control with a motorcycle-like counter steering strategy (implemented using steer-by-wire) is being investigated.



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