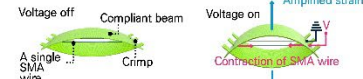


Intuitive Local Pressure-Based Haptic System for Steering Wheel with SMA Actuators

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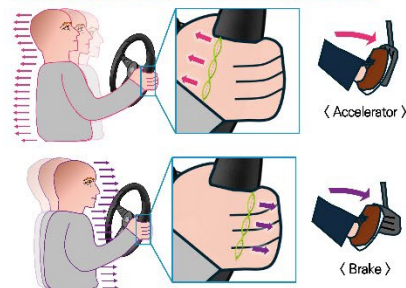
Actuator principle



Driving assistance scenario utilizing side-actuation Left directional haptic feedback



Entertainment sports scenario utilizing front and rear actuation Rendering dynamic inertia while accelerating and braking



Summary: Existing haptic steering wheels often rely on vibration, which can be fatiguing, noisy, and less effective on uneven road surfaces. This research proposes a superior system using shape memory alloy (SMA) actuators to deliver localized pressure-based feedback. These actuators boast high power density, enabling strong, clear haptic signals sufficient for human perception. Furthermore, their soft, compressible design is arranged in an array conforming to the steering wheel's curvature, ensuring an ergonomic and natural grip for the driver. This innovative approach allows for more intuitive directional feedback, enhancing driver assistance and rendering dynamic inertia for entertainment.